INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN NAVAL BASE KITSAP SEPTEMBER 2018








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NAVAL BASE KITSAP

September 2018

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September 2018

The plan will be reviewed annually and updated as necessary.

Date of Annual Review	Name and Title of Reviewer	Summary of Updates

Commander, Navy Region Northwest

United States Navy Signature Page

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a *et seq*., as amended); Department of Defense Instruction 4715.03 *Natural Resources Conservation Program*; and OPNAV M-5090.1 *Environmental Readiness Program Manual*.

Approved by:

C. S. GRAY
Rear Admiral, U.S. Navy
Commander, Navy Region Northwest

11/2/18
Date

Commanding Officer

United States Navy Signature Page

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act, as amended, 16 United States Code §670(a) et seq.; Department of Defense Instruction 4715.03, Natural Resources Conservation Program; and OPNAV M-5090.1, Environmental Readiness Program Manual.

Approved by:

E. A. SCHRADER
Captain, U.S. Navy
Commanding Officer

11/2/2018
Date

Installation Environmental Personnel

United States Navy Signature Page

This Integrated Natural Resources Management Plan is a long-term planning document to guide Naval Base Kitsap in the management of natural resources to support its military mission, while protecting and enhancing natural resources for multiple uses, sustainable yield, and biological integrity. The primary purpose of the plan is to ensure natural resources management and military operations are integrated and consistent with legal requirements and stewardship. This plan and the use of the natural resources comply with the legal mandates and, to the extent practicable, are integrated with public ecosystem goals.

Approved by:

GREG LEICHT
Installation Environmental Program Director
Naval Base Kitsap

2/27/2019
Date

TYLER YASENAK
Natural Resources Manager
Naval Base Kitsap

2/28/2019
Date

JULIA STOCKTON
Natural Resources Manager
Naval Base Kitsap

2-27-2019
Date

Region Environmental Personnel

United States Navy Signature Page

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act, as amended, 16 United States Code §670(a) et seq.; Department of Defense Instruction 4715.03, Natural Resources Conservation Program; and OPNAV M-5090.1, Environmental Readiness Program Manual.

Approved by:

CYNTHIA KUNZ
Sr. Natural Resources Specialist
NRNW Code N45

11/15/2018
Date

United States Fish and Wildlife Service Signature Page

This Integrated Natural Resources Management Plan meets the requiresments of the Sikes Act (16 U.S.C. 670a *et seq*., as amended); and supports U.S. Fish and Wildlife Service policies, management goals, and objectives.

Approved by:

BRAD THOMPSON
Acting State Supervisor, Washington Fish and Wildlife Office
United States Fish and Wildlife Service

11/28/2018
Date

Washington State Department of Fish and Wildlife Signature Page

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a *et seq.*, as amended); and support Washington Department of Fish and Wildlife policies, management goals, and objectives.

Approved by:

KELLY SUSEWIND
Director
Washington Department of Fish and Wildlife

11/29/18
Date

National Marine Fisheries Service Signature Page

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a *et seq.*, as amended); and supports NOAA/NMFS policies, management goals and objectives.

Approved by:

KRATZ.KIM.W.1365874677 Digitally signed by KRATZ.KIM.W.1365874677
Date: 2019.02.28 07:59:35 -08'00'

KIM KRATZ
NOAA Fisheries Assistant Regional Administrator
National Marine Fisheries Service

Date

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Executive Summary

The United States Department of the Navy has revised the Integrated Natural Resources Management Plan (INRMP) for Naval Base Kitsap. The revised INRMP provides natural resources management strategies for multiple locations:

- Naval Base Kitsap Bangor, which includes Navy-owned portions of the Toandos Peninsula, Camp Wesley Harris and Zelatched Point and associated waterfront restricted zone listed under 33 CFR § 334.1220 within Hood Canal
- Naval Base Kitsap Bremerton, which includes Puget Sound Naval Shipyard and Intermediate Maintenance Facility, a tenant command of Naval Base Kitsap, Camp McKean and associated waterfront restricted area listed under 33 CFR § 334.1240 within Sinclair Inlet
- Naval Base Kitsap Keyport, which includes Naval Undersea Warfare Center Keyport, a tenant command of Naval Base Kitsap, and associated waterfront restricted area listed under 33 CFR § 334.1230 within Liberty Bay
- Jackson Park Housing Complex and Naval Hospital Bremerton, which are located along Ostrich Bay
- Department of the Navy owned rail line that runs from Shelton, Washington to Naval Base Kitsap Bangor and Bremerton

Naval Base Kitsap is located in western Washington and has outlying properties extending as far north as Alaska. Naval Base Kitsap Manchester, in Washington State, is covered under an INRMP that was signed in 2009 and its currently being revised. Southeast Alaska Acoustic Measurement Facility (SEAFAC), at Back Island Alaska, does not currently have its own INRMP, but one is under development. In western Washington, the Naval Base Kitsap INRMP encompasses properties in Kitsap, Mason, and Jefferson counties and supports approximately 22,000 military and civilian personnel (Commander, Naval Installations Command 2009). Per iNFADS (internet Naval Facilities Assets Data Store), the installation manages 9,385 acres of land, which includes 6,609 acres for Naval Base Kitsap Bangor, 788 acres for Toandos Peninsula, 30 acres for Zelatched Point, 382 acres for Naval Base Kitsap Bremerton, 278 acres for Naval Base Kitsap Keyport, 239 acres for the Jackson Park Housing Complex and Naval Hospital Bremerton, 388 acres for Camp Wesley Harris, 21 acres for Camp McKean, and 650 acres for the Department of the Navy owned rail line (Figure 3-2).

The revised INRMP is a longterm planning document and is organized according to Department of the Navy guidance issued in April 2006, the OPNAV M-5090.1, and DOD Instruction 4715.03. The plan strives to fully integrate and coordinate the natural resources program with other Naval Base Kitsap plans and activities. It establishes goals that represent a long-term vision for the health and quality of Naval Base Kitsap's natural resources. The goals of the plan may be

revised over time to reflect changing missions and environmental conditions. Any future changes in mission, training activity, or technology will be analyzed to assess their impact on natural resources. As new installation plans and Department of the Navy guidance and regulations are developed, they will be integrated with the goals and management actions of the plan. The plan will be reviewed, assessed, and modified as needed on an annual basis to ensure continued integration with other management plans or changes in military mission.

Goals identified for natural resources management at Naval Base Kitsap include the following:

Goal 1: Protect, sustain, and enhance the natural resources at Naval Base Kitsap to ensure that resources are maintaining ecological integrity, while supporting existing and future military needs with no net loss.

Goal 2: Increase awareness of natural resource issues, programs, and responsibilities for sustaining natural resources among the public, Naval Base Kitsap employees, residents, and tenants.

Goal 3: Integrate the Naval Base Kitsap natural resources program with local, state, and regional environmental programs and initiatives to sustain biodiversity and the ecosystem to the maximum extent practicable while meeting the needs of the military mission.

Goal 4: Provide sustainable natural resources related outdoor recreation opportunities.

Goal 5: Improve natural resources management and compliance through enhanced management tools.

The revised INRMP goals will be evaluated via the annual Natural Resources Conservation Metrics evaluation, and documented within the Navy's environmental and Conservation website. This process is discussed further within Section 1.5 of this INRMP.

The revised INRMP was prepared in accordance with and complies with the Sikes Act (16 United States Code [USC] 670a et seq.) as amended (2015), Department of Defense Instruction 4715.03 (*Environmental Conservation Program*), Chief of Naval Operational Instruction M-5090.1 (*Navy Environmental and Natural Resources Program Manual*), and a recent series of Department of Defense and Department of the Navy guidance memoranda on the Sikes Act and Integrated Natural Resources Management Plans. The United States Fish and Wildlife Service, National Marine Fisheries Service, and Washington State Department of Fish and Wildlife have reviewed and signed the INRMP, indicating their mutual agreement with the Commander, Navy Region Northwest, and Commanding Officer, Naval Base Kitsap regarding natural resources management on Naval Base Kitsap. Additionally, the revised INRMP was sent for review to Tribal Governments with Usual and Accustomed Areas.

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Table of Contents

List of Appendices

List of Figures

List of Tables

NAVAL BASE KITSAP INRMP CROSSWALK TO THE DEPARTMENT OF DEFENSE TEMPLATE

DoD Template	**NBK INRMP**
Cover Page	Cover Page
Signature Page	Signature Pages – separate page for Navy and each signing agency
Executive Summary	Executive Summary
Table of Contents	Table of Contents
Chapter 1 – Overview	Section 1: Overview
1.a. Purpose	1.1 Purpose and Plan
1.b – Scope	1.1 Purpose and Plan
1.c. – Goals and Objectives Summary	1.3 INRMP Vision, Goals, and Objectives
1.d – Responsibilities of Stakeholders	1.6 Roles and Responsibilities
1.e – Commitment of Regulatory Agencies	8.3 Natural Resources Consultation Requirements
1.f – Authority	1.2 Authority
1.g – Stewardship of Compliance Statement	1.4 Stewardship and Compliance
1.h – Review and Revision Process	1.5 Review and Revision Process
1.i – Management Strategies	8.2 Management Strategy
1.j – Integration with other Plans	1.7 Integration of Other Installation Plans
Chapter 2 – Current Conditions and Use	Section 2: NAVBASE Kitsap Overview
2.0 – Installation Information	2.1.1 (NAVBASE Kitsap Bangor and associated properties), 2.1.4 (NAVBASE Kitsap Keyport), 2.1.7 (Jackson Park Housing Complex and Naval Hospital Bremerton), 2.1.10 (NAVBASE Kitsap Bremerton and associated properties)
2.a.1 – Location Statement (concise)	2.1.1 (NAVBASE Kitsap Bangor and associated properties), 2.1.4 (NAVBASE Kitsap Keyport), 2.1.7 (Jackson Park Housing Complex and Naval Hospital Bremerton), 2.1.10 (NAVBASE Kitsap Bremerton and associated properties)
2.a.2 – Regional Land Use	1.4 Stewardship and Compliance
2.a.3 – History and Pre-Military Land Use (abbreviated)	2.1.2 (NAVBASE Kitsap Bangor and associated properties), 2.1.5 (NAVBASE Kitsap Keyport), 2.1.8 (Jackson Park Housing Complex and Naval Hospital Bremerton), 2.1.11 (NAVBASE Kitsap Bremerton and associated properties)
2.a.4 – Military Mission	2.1.3 (NAVBASE Kitsap Bangor and associated properties), 2.1.6 (NAVBASE Kitsap Keyport), 2.1.9

	(Jackson Park Housing Complex and Naval Hospital Bremerton), 2.1.12 (NAVBASE Kitsap Bremerton and associated properties)
2.a.5 – Operations and Activities	2.1.3 (NAVBASE Kitsap Bangor and associated properties), 2.1.6 (NAVBASE Kitsap Keyport), 2.1.9 (Jackson Park Housing Complex and Naval Hospital Bremerton), 2.1.12 (NAVBASE Kitsap Bremerton and associated properties)
2.a.6 – Constraints Map	1.1 Purpose and Plan
2.a.7 – Opportunities Map	2.2 Other Operations, Actiview, and Land and Water Uses
2.b – General Physical Environment and Ecosystems	3 Regional Natural Resources Setting and Current Management (Ecological Setting), 3.1 Physical Setting, 4.1 Physical Conditions (NAVBASE Kitsap Bangor), 5.1 Physical Conditions (NAVBASE Kitsap Keyport), 6.1 Physical Conditions (NAVBASE Kitsap Bremerton), 7.1 Physical Conditions (Jackson Park and Naval Hospital Bremerton)
2.c – General Biotic Environment	4.2 Habitats and Communities (NAVBASE Kitsap Bangor), 5.2 Habitats and Communities (NAVBASE Kitsap Keyport), 6.2 Habitats and Communities (NAVBASE Kitsap Bremerton), 7.2 Habitats and Communities (Jackson Park and Naval Hospital Bremerton)
2.c.1 – Threatened and Endangered Species and Species of Concern	3.6.1 ESA Species Potentially Occurring on NAVBASE Kitsap
2.c.2 – Wetlands and Deep Water Habitats	Executive Summary; 4.2.2 Wetlands (NAVBASE Kitsap Bangor), 5.2.2 Wetlands (NAVBASE Kitsap Keyport), 6.2.2 Wetlands (NAVBASE Kitsap Bremerton), 7.2.2 Wetlands (Jackson Park and Naval Hospital Bremerton)
2.c.3 – Fauna	4.3.2 Fauna (NAVBASE Kitsap Bangor), 5.3.2 Fauna (NAVBASE Kitsap Keyport), 6.3.2 Fauna (NAVBASE Kitsap Bremerton), 7.3.2 Fauna (Jackson Park and Naval Hospital Bremerton)
2.c.4 – Flora	4.3.1 Flora (NAVBASE Kitsap Bangor), 5.3.1 Flora (NAVBASE Kitsap Keyport), 6.3.1 Flora (NAVBASE Kitsap Bremerton), 7.3.1 Flora (Jackson Park and Naval Hospital Bremerton)
Chapter 3 – Environmental Management Strategy and Mission Sustainability	Section 8: Environmental Management Strategy and Mission Sustainability
3.a – Supporting Sustainability of the Military Mission and the Natural Environment	8.1 Supporting Sustainability of the Military Mission and the Natural Environment
3.a.1 – Integrate Military Mission and Sustainability Land Use	8.2 Management Strategy
3.a.2 – Define Impact to the Military Mission	8.4 Planning for NEPA Compliance
3.a.3 – Describe Relationship to Range Complex Management Plan or other Operational Area Plans	N/A
3.b – Natural Resources Consultation Requirements (Section 7, EFH)	8.3 Natural Resource Consultation Requirements
3.c. – NEPA Compliance	8.4 Planning for NEPA Compliance

3.d – Opportunities for Beneficial Partnerships and Collaborative Resource Planning	8.7 Beneficial Partnerships and Collaborative Resource Planning
3.e – Public Access and Outreach	8.6 Public Access and Outreach
3.e.1 – Public Access and Outdoor Recreation	8.8 Outdoor Recreation
3.e.2 – Public Outreach	8.6 Public Access and Outreach
3.e.3 – Encroachment Partnering	8.11 Encroachment Action Plan
3.e.4 – State Comprehensive Wildlife Plans Integration	8.10 State Wildlife Action Plans
Chapter 4 – Program Elements	Section 4: Natural Resources on NAVBASE Kitsap Bangor, Section 5: Current Condition of Natural Resources on NAVBASE Kitsap Keyport, Section 6: Current Conditions of Natural Resources on NAVBASE Kitsap Bremerton, Section 7: Current Condition of Natural Resources on Jackson Park Housing Complex and Naval Hospital Bremerton
4.a. – Threatened and Endangered Species and Species Benefit, Critical Habitat, Species of Concern Management	4.4 ESA Listed Species (NAVBASE Kitsap Bangor), 5.4 ESA Listed Species (NAVBASE Kitsap Keyport), 6.4 ESA Listed Species (NAVBASE Kitsap Bremerton), 7.4 ESA Listed Species (Jackson Park and Naval Hospital Bremerton)
4.b – Wetlands and Deep Water Habitats	4.2.2 Wetlands (NAVBASE Kitsap Bangor), 5.2.2 Wetlands (NAVBASE Kitsap Keyport), 6.2.2 Wetlands (NAVBASE Kitsap Bremerton), 7.2.2 Wetlands (Jackson Park and Naval Hospital Bremerton)
4.c – Law Enforcement	8.9 Law Enforcement
4.d – Fish and Wildlife	4.3.2 Fauna (NAVBASE Kitsap Bangor), 5.3.2 Fauna (NAVBASE Kitsap Keyport), 6.3.2 Fauna (NAVBASE Kitsap Bremerton), 7.3.2 Fauna (Jackson Park and Naval Hospital Bremerton)
4.e – Forestry	3.2.5 Forest Management
4.f. – Vegetation	4.3.1 Flora (NAVBASE Kitsap Bangor), 5.3.1 Flora (NAVBASE Kitsap Keyport), 6.3.1 Flora (NAVBASE Kitsap Bremerton), 7.3.1 Flora (Jackson Park and Naval Hospital Bremerton)
4.g – Migratory Birds	4.3.2.4 Migratory Birds (NAVBASE Kitsap Bangor), 5.3.2.4 Migratory Birds (NAVBASE Kitsap Keyport), 6.3.2.4 Migratory Birds (NAVBASE Kitsap Bremerton), 7.3.2.4 Migratory Birds (Jackson Park and Naval Hospital Bremerton)
4.h – Invasive Species	3.4 Invasive Species
4.i – Pest Management	3.5.2 Nuisance Wildlife and Feral Animal Management
4.j – Land Management	Table 2-1: NAVBASE Kitsap INRMP Land Management Acres
4.k – Agricultural Outleasing	9.4.1 Funding Sources
4.l – GIS Management, Data Integration, Access, and Reporting	8.14 GIS, Data Integration, Access, and Reporting

4.m – Outdoor Recreation	8.8 Outdoor Recreation
4.n – Bird/Animal Aircraft Strike Hazard	3.5.1 BASH
4.o – Wildland Fire	2.2.3 Fire Prevention
4.p – Training of Natural Resources Personnel	8.13 Natural Resources Personnel Training
4.q – Coastal/Marine	2.3.6 Coastal Zone Management Act (CZMA)
4.r – Floodplains	4.1.3.3 Toandos Buffer Zone and Zelatched Point
4.s – Other Leases	N/A
Chapter 5 – Implementation	Section 9: Implementation
5.a – Summary of Project Prescription Development Process	9.1 Project Prescription Development
5.b – Achieving No Net Loss	8.12 Achieving No Net Loss of the Military Mission, 9.5 Effectiveness of INRMP Providing No-Net-Loss to Military Mission
5.c - Use of Cooperative Agreements	9.4.2 Beneficial Partnerships and Cooperative Resources Planning
5.d – Funding Process	9.4.1 Funding Sources and Mechanisms
Appendix 1. Acronyms	Appendix A: Acronyms and Abbreviations
Appendix 2. Detailed Natural Resource Prescriptions	Appendix G: Forestry Prescriptions
Appendix 3. List of Projects	Appendix D: INRMP Projects, Schedules, and Implementation Table
Appendix 4. Surveys; Results of Planning Level Surveys	N/A
Appendix 5. Research Requirements	N/A
Appendix 6. Migratory Bird Management	2.3.3 Migratory Bird Treaty Act (MBTA) & Executive Order (EO) 13186; 4.3.2.4 Migratory Birds (NAVBASE Kitsap Bangor); 5.3.2.4 Migratory Birds (NAVBASE Kitsap Keyport); 6.3.2.4 Migratory Birds (NAVBASE Kitsap Bremerton); 7.3.2.4 Migratory Birds (Jackson Park & Naval Hospital Bremerton)
Appendix 7. Benefits for Endangered Species	3.2.5.3.6 Endangered Species; 8.2 Management Strategy
Appendix 8. Critical Habitat	3.6.1 ESA Species Potentially Occurring on NAVBASE Kitsap (By Species)

1 OVERVIEW OF INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

1.1 Purpose and Plan

The United States Department of the Navy (DON) has revised and combined the Integrated Natural Resources Management Plans (INRMPs) for Naval Base (NAVBASE) Kitsap installations (Table 1-2 & Figure 2-1). This combined INRMP provides natural resources management strategies for NAVBASE Kitsap Bangor (which includes the Navy-owned portions of the Toandos Peninsula and Zelatched Point, and numerous tenant commands to include: Strategic Systems Program (SSP), U.S. Pacific Fleet (PACFLT), Submarine Development Squadron 5 (SUBDEVRON), and Maritime Force Protection Unit (MFPU)); NAVBASE Kitsap Bremerton (which includes the tenant command Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF); NAVBASE Kitsap Keyport (which includes the tenant command Naval Undersea Warfare Center Division, Keyport (NUWCDIV) Keyport); Jackson Park Housing Complex and Naval Hospital Bremerton; Camp Wesley Harris; Camp McKean; and the DON-owned rail line that runs from Shelton, Washington to NAVBASE Kitsap Bangor and Bremerton. The following table identifies the properties covered by the NAVBASE Kitsap INRMP with brief descriptions of their actions.

Installation	Acres	Description
NAVBASE Kitsap Bangor	6,609	NAVBASE Kitsap Bangor, is located in Kitsap County on the eastern bank of Hood Canal, approximately 20 miles west of Seattle, Washington, and 5 miles northwest of the unincorporated town of Silverdale. The installation provides berthing and support services to Navy submarines and other fleet assets. The entirety of the installation, including land areas and adjacent water areas in Hood Canal, is restricted from general public access.
Toandos Buffer Zone	788	The Toandos Buffer Zone is located in Jefferson County on the eastern side of the Toandos Peninsula, on the western bank of the Hood Canal across from NAVBASE Kitsap Bangor. It is undeveloped and acts as a buffer zone for NAVBASE Kitsap Bangor activities. The area surrounding the property is rural.
Zelatched Point	30	Zelatched Point is located in Jefferson County on the southwestern end of the Toandos Peninsula on Dabob Bay. It is across the Hood Canal, approximately 4 miles west of the NAVBASE Kitsap Bangor waterfront. Zelatched Point has one pier and several facilities that support the Naval Undersea Warfare Center (NUWC) Keyport mission for test and evaluation operations within the Dabob Bay Military Operating Area. The area surrounding the property is rural.
Camp Wesley Harris	388	Camp Wesley Harris is located in Kitsap County approximately 8 miles southwest of NAVBASE Kitsap Bangor. It is situated along the crest of the Kitsap Peninsula between Hood Canal and Dyes Inlet, and Seabeck Highway bisects it. Camp Wesley Harris provides a small arms training facility for the military.

Installation	Acres	Description
NAVBASE Kitsap Keyport	278	NAVBASE Kitsap Keyport is located in Kitsap County on the Kitsap Peninsula abutting Liberty Bay. It is approximately 15 miles due west of Seattle and 10 miles north of Bremerton. NUWC Keyport is the major tenant command at the installation. NUWC Keyport provides testing and evaluation for undersea warfare systems, including maintenance and repair, and fleet industrial support for torpedoes, mobile mines, unmanned underwater vehicles, and countermeasures.
NAVBASE Kitsap Bremerton	382	NAVBASE Kitsap Bremerton is located in Kitsap County on the north side of Sinclair Inlet within the city of Bremerton. The eastern portion of the base is a fenced, high-security area known as the Controlled Industrial Area. Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) is the major tenant command of the installation. PSNS & IMF overhauls and repairs all nuclear powered warships. NAVBASE Kitsap Bremerton is a homeport for submarines and aircraft carriers.
Camp McKean	21	Camp McKean is located in Kitsap County on Kitsap Lake, approximately 5 miles west of NAVBASE Kitsap Bremerton. It is a recreational facility that supports Navy commands and authorized Fleet & Family Readiness patrons.
Jackson Park Housing Complex and Naval Hospital Bremerton	239	The properties are located in eastern Kitsap County on the west bank of Ostrich Bay, a small embayment on the south end of Dyes Inlet, Puget Sound. Jackson Park Housing Complex provides residential family housing. Naval Hospital Bremerton is located north of Jackson Park Housing Complex. It provides medical services to active duty and retired military personnel and their dependents.
Rail line from Shelton to Bangor and Bremerton	650 (48 miles)	The railroad line begins in Shelton, Washington (Mason County) and runs to NAVBASE Kitsap Bremerton, and to NAVBASE Kitsap Bangor, in Silverdale (Kitsap County). The property line varies between 25 feet to over 200 feet from the track centerline depending on location. The railroad line provides freight rail service to NAVBASE Kitsap from the Elma-Bangor branch, and provides for limited commercial use.

NAVBASE Kitsap also includes a separate sites containing the Manchester Fuel Department (operated by Fleet Logistics Center Puget Sound) and SEAFAC Back Island Alaska, but the scope of this INRMP does not include these locations as they have separate INRMPs.

This INRMP revision is consistent with guidance and regulations provided in the Department of Defense (DOD) Instruction 4715.03 (*Natural Resources Conservation Program*), Chief of Naval Operational Instructions (OPNAV) M-5090.1 (*Navy Environmental and Natural Resources Program Manual*), and more recent DON and DOD Sikes Act and INRMP guidance memoranda. These guidance documents collectively require a plan and management approach that integrates mission support, multipurpose use, ecosystem or landscape-level management, and environmental compliance and stewardship.

This revised INRMP was developed after a thorough review of the previous INRMPs associated with NAVBASE Kitsap (which include INRMPs for Bangor and Keyport, 2001), review of new

data since the last INRMP, as well as detailed discussions with Naval Facilities Engineering Command (NAVFAC) Northwest natural resources staff and various INRMP stakeholders. This INRMP strives to integrate INRMP activities with other installation plans and base activities and to provide explicit goals and objectives to which natural resources initiatives and projects will contribute. The projects and initiatives contained in this INRMP include a combination of ongoing natural resources management activities from previous years and new projects and activities identified as priorities during the review process.

1.2 Authority

This INRMP is authorized under the Conservation Programs on Military Installations (Sikes Act), as amended; Public Law (PL) 86-797, 16 United States Code (USC) § 670(a) et seq., which requires military installations to prepare and implement INRMPs to provide for:

a) Fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation;

b) Fish and wildlife habitat enhancement or modifications;

c) Wetlands protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants;

d) Integration of and consistency among the various activities conducted under the plan;

e) Establishment of specific natural resources management goals and objectives and timeframes for proposed actions;

f) Sustainable use by the public of natural resources to the extent that the use is consistent with the needs of the fish and wildlife resources;

g) Public access to the military installation that is necessary and appropriate for natural resource uses, subject to requirements necessary to ensure safety and military security;

h) Enforcement of applicable natural resources laws and regulations;

i) No net loss in the capability of military installation lands to support the military mission of the installation; and

j) Such other activities as the Secretary of the Navy determines appropriate.

The Sikes Act also sets guidelines for the collection of fees for the use of natural resources such as hunting and fishing.

Over the last several years, various guidance documents have been prepared on the interpretation of the Sikes Act Improvement Act (SAIA) and on INRMP preparation. Below are listed key DOD and Department of Navy (DON) documents relevant to natural resource management.

- ***Memorandum on Implementation of Ecosystem Management in DOD:*** This memorandum issued by the Deputy Under Secretary of Defense on 8 August 1994, was the first formal statement of an ecosystem management approach to land management in the DOD. Ecosystem management is to be achieved through developing and implementing INRMPs. This memorandum contains DOD's 10 principles of ecosystem management as an attachment, which were later included as an enclosure in DOD Instruction 4715.03 and those policies addressed in the 1996 instruction continue in the most recent guidance (see below).

- ***DOD Instruction 4715.03, Natural Resources Conservation Program (18 March 2011) and Implementation of Sikes Act Improvement Amendments: Supplemental Guidance Concerning Integrated Natural Resource Management Plan (INRMP) Reviews (1 November 2004):*** This DOD instruction and supplemental guidance pertains to both natural and cultural resources management on DOD lands. It includes budgeting classifications for funding priorities and detailed information on the intent of INRMPs.

- ***DOD Manual 4715.03***, Integrated Natural Resources Management Plan (INRMP)) Implementation Manual (25 November 2013). This manual provides procedures to prepare, review, update, and implement INRMPs in compliance with the Sikes Act.

- ***Memorandum on Implementation of Sikes Act Improvement Amendment: Updated Guidance:*** This memorandum of the Under Secretary of Defense, issued on 10 October 2002, provides guidance for implementing the requirements of the Sikes Act in a consistent manner throughout the DOD and replaces the 21 September 1998 guidance Implementation of the Sikes Act Improvement Amendments. The October 2002 memorandum and its supplement issued in November 2004 emphasize implementing and improving the overall INRMP coordination process and focus on coordinating with stakeholders, reporting requirements and metrics, budgeting for INRMP projects, using the INRMP as a substitute for critical habitat designation, supporting military training and testing needs, and initiating the INRMP review process.

- ***The Implementation of Sikes Act Improvement Amendment - Supplemental Guidance Concerning Leased Lands (17 May 2005):*** This document provides supplemental guidance for implementing SAIA requirements consistently throughout the DOD. The guidance covers lands occupied by tenants or lessees or being used by others pursuant to a permit, license, right of way, or any other form of permission. INRMPs must address the resource management of all lands for which the subject installation has real property accountability, including leased lands. Installation Commanding Officers (COs) may require tenants to accept responsibility for performing appropriate natural resource management actions as a condition of their occupancy or use, but this does not preclude the requirement to address the natural resource management needs of these lands in the installation INRMP.

- ***OPNAV M-5090.1, Environmental Readiness Program Manual:*** Establishes broad policy and assigns responsibilities for the Naval Natural Resources Program. Ensures each command establish procedures to continuously inform Navy decision makers of the conditions of natural resources, the objectives of INRMPs, and potential or actual conflicts between Navy actions/management plans and environmental requirements. Each command shall recognize and balance environmental stewardship with mission readiness in retaining control and use of Navy land, sea, and air space for sustainment of mission needs and military readiness.

- ***NAVFAC Real Estate Operations and Natural Resources Management Procedure Manual, P-73, Volume II:*** This document addresses CNO natural resources program requirements, guidelines, and standards.

- ***Integrated Natural Resources Management Plan Guidance for Navy Installations (10 April 2006):*** This guidance provides natural resource managers at Navy installations with **a**n interpretation of what processes are needed to prepare INRMPs. This document also includes, per the SAIA guidance, significant new reporting requirements and measures of merit associated with INRMP development, implementation, and annual review.

- ***Memorandum of Understanding (MOU) between the U.S. Department of Defense, U.S. Fish and Wildlife Service (USFWS), and the Association of Fish and Wildlife Agencies. (July 29, 2013)***: This tripartite MOU furthers a cooperative integrated natural resource management program on military installations and further cooperative relationship between the U.S. Department of Defense, U.S. Department of the Interior Fish and Wildlife Service, and state fish and wildlife agencies acting through the Association of Fish and Wildlife Agencies in preparing, reviewing, revising, updating, and implementing Integrated Natural Resource Management Plans for military installations.

1.3 Vision, Goals and Objectives

The following sections detail the overall natural resources management elements at NAVBASE Kitsap and provide specifics on natural resource constituents found at each installation. The goals supported by the INRMP through objectives and projects, which provide management strategies and specific actions to achieve these goals. The goals will ensure the success of the military mission while conserving natural resources. The general philosophies and methodologies used throughout the NAVBASE Kitsap natural resources management program focus on conducting required military activities while maintaining ecosystem viability. These management strategies in the following chapters, lead to the goals and objectives of Chapter 8 that guide the installations.

1.4 Stewardship and Compliance

Conservation biology fully recognizes and embraces the many contributions that need to be made by biologist and non-biologist alike. In many cases, social values, economics, and political factors have more of an impact on natural resources management than do biological sciences. The Installation CO, tenants, operations personnel, and other installation personnel have an influence on environmental conditions at NAVBASE Kitsap; they become part of the solution by working with the Natural Resource Managers (NRMs) and integrating their perspectives within the management process of the installations, and incorporating ecosystem management's "ten guiding principles" as the basis for land use planning and management. The planning and management is pertinent in implementing this INRMP.

As NAVBASE Kitsap faces pressure of increasing demands and fewer resources to meet them, stewardship of the environment becomes a very practical issue. Biodiversity, which refers to the variety of life and the ecological processes that sustain it, is critical to the integrity and sustainability of the NAVBASE Kitsap ecosystems. This concept of biodiversity is central to ecosystem management, which is the basis for NAVBASE Kitsap's natural resources management. Sustainability is a systemic concept to preserve biodiversity and ensure the integrity of natural ecosystems over time while meeting the needs of the military mission. This concept of conservation and sustainability goes beyond the definition of compliance, which is simply meeting the minimum requirements of laws and regulations that pertain to the environment. NAVBASE Kitsap's personnel will take an active approach to managing the natural resources of the installations and integrate all plans and operations into the concepts of biodiversity and sustainability of these resources. This INRMP outlines a strategy for sustaining biodiversity and the ecosystem as well as plans for complying with applicable regulations while meeting the needs of military mission.

1.5 Review and Revision Process

Per DoD Instruction 4715.03 and OPNAV M-5090.1, Natural Resources metrics must be completed annually by each Navy installation with natural resources. The metrics ensure the effectiveness of NAVBASE Kitsap's INRMP. The evaluation will utilize the seven focus areas in the Navy's Conservation Website. These seven focus areas are:

a) Natural Resources Management (Ecosystem Integrity)

b) Listed Species and Critical Habitat

c) Recreational Use and Access

d) Sikes Act Cooperation (Partnership Effectiveness)

e) Team Adequacy

f) INRMP Implementation

g) INRMP (Natural Resource Program) Support of the Installation

Use of the Navy's Conservation Website (U.S. Navy Environmental Portal Account and Common Access Card (CAC) are required for access) to accomplish the INRMP Annual Reviews will also generate Navy conservation program metrics to measure effects of the conservation program on the installation's mission and the status of the installation's relationship with USFWS, National Marine Fisheries Service (NMFS), Washington Department of Fish and Wildlife (WDFW), and other stakeholders as appropriate.

The annual evaluation/metrics must be completed in cooperation with the appropriate field-level offices of the USFWS and WDFW. Navy Region Northwest has also invited the National Oceanic and Atmospheric Administration (NOAA) NMFS to collaborate with installations in the management of NMFS regulated fish and marine mammals located on or around NAVBASE Kitsap properties. Although not required by the Sikes Act, the Navy has invited NMFS to review this INRMP. The cooperating partners will work together to measure both the successes and issues resulting from INRMP implementation. During these reviews, it may be determined that the installation's current INRMP is effective and is not in need of revision. With agreement from USFWS, NMFS (when appropriate, but not required), and WDFW through written documentation, the annual informal evaluations may be used to substitute for the 5-year formal review. Minor changes (updates) can be made to the INRMP following annual reviews to prevent the need for a more costly revision following the review for operation and effect. NAVBASE Kitsap will document annual reviews and work with USFWS, NMFS, and WDFW to use the annual review process to meet the 5-year formal review requirement whenever possible. NAVBASE Kitsap NRMs will coordinate with the partner agencies to coordinate the annual INRMP review at a time and location that is convenient for all.

Section 101(b)(2) of the Sikes Act specifically directs that the INRMPs be reviewed "as to operation and effect" by the primary parties "on a regular basis, but not less often than every five years", emphasizing that the review is intended to determine whether existing INRMPs are being implemented to meet the requirements of the Sikes Act (as amended) and contribute to the conservation and rehabilitation of natural resources on military installations.

No element of the Sikes Act is intended to either enlarge or diminish the existing responsibility and authority of the USFWS or WDFW concerning fish and wildlife responsibilities on military lands. An INRMP reflects mutual agreement of the parties concerning the conservation, protection, and management of fish and wildlife resources. All actions and projects in the INRMP are subject to the availability of funds appropriated by Congress, and none of the proposed projects shall be interpreted to require obligation or payment of funds in violation of any applicable federal law including the Federal Anti-Deficiency Act (31 USC § 1341). All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under Federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 USC § 1341 et seq.).

1.6 Roles and Responsibilities

1.6.1 Navy Responsibilities

Successfully implementing an INRMP requires the support of natural resources personnel, other installation staff, command personnel, and installation tenants. The following section discusses the responsibilities for INRMP implementation within the United States Navy (USN).

Chief of Naval Operations, Environmental Readiness Division

Chief of Naval Operations (CNO) shall serve as the principal leader and overall Navy program manager for the development, revision, and implementation of INRMPs and shall:

a) Provide policy, guidance, and resources for the development, revision, and implementation of INRMPs and associated National Environmental Policy Act (NEPA) documents.

b) Represent the Navy on issues regarding the implementation of INRMPs and delegate responsibility in writing.

c) Resolve high-level conflicts associated with development and implementation of INRMPs.

d) Approve all INRMP projects before INRMPs are submitted to regulatory agencies for signature.

Commander, Navy Installations Command

The Commander, Navy Installations Command (CNIC) shall:

a) Ensure that installations under its command develop, revise, and implement INRMPs if required, and:
    1) Reevaluate the need for an INRMP at all installations that currently do not have an INRMP.
    2) Following the initial evaluation, reevaluate all remaining installations that do not have an INRMP every five years.

b) Ensure that installations comply with DoD, Department of the Navy (DON) and CNO policy on INRMPs and associated NEPA document preparation, revision and implementation.;

c) Ensure the programming of resources necessary to maintain and implement INRMPs, which involves:

    1) The review of an endorsement of projects recommended for INRMP implementation prior to submittal for signature. These projects are identified in Appendix D;

2) The evaluation and validation of Environmental Program Review (EPR) web project proposals.

d) Participate in the development and revisions of INRMPs, which involves the maintenance of a close liaison with N45, NAVFAC and other budge submitting offices (BSOs).
e) Provide overall program management oversight for all natural resources program elements.

Regional Commanders

The Regional Commanders shall:

a) Ensure that installations comply with DOD, DON, and Director Environmental Readiness Division (CNO) policy on INRMPs, and associated NEPA document preparation, revision, and implementation.

b) Ensure that installations INRMPs undergo annual informal reviews as well as formal five-year evaluations. Ensure installations complete the annual INRMP metric review, and endorse the results prior to submittal to CNIC via the chain of command.

c) Ensure the programming of resources necessary to maintain and implement INRMPs, which involves:

1. The evaluation and validation of EPRWeb project proposals.

2. The funding of installation natural resources management staff.

d) Establish positive, productive relationships with local and regional authorities responsible for natural resource conservation for the benefit of subordinate command functions and INRMP development and implementation is accomplished.

Installation Commanding Officer

The NAVBASE Kitsap Commanding Officer (CO) shall ensure the preparation, completion, and implementation of the INRMP and associated NEPA documentation for this installation and should systematically apply the conservation practices set forth in the Plans.

The installation CO's role is to:

a) Act as steward of the natural resources under their jurisdiction and integrate natural resources requirements into the day-to-day decision-making process.

b) Ensure natural resources management and the INRMP comply with all natural resources related legislation; Executive Orders (EO) and Executive Memoranda; as well as DOD, SECNAV, DON and CNO directives, instructions, and policies.

c) Involve appropriate tenant, operational, training, or R&D commands in the INRMP review process to ensure no net loss of military mission.

d) Designate by letter, one or more Natural Resources Managers (NRMs) responsible for the management efforts related to the preparation, revision, implementation, and funding for the INRMP. (Appendix I)

e) Involve appropriate Navy Judge Advocate General (JAG) or Office of the General Counsel (OGC) Legal Counsel to provide advice and counsel with respect to legal matters related to natural resources management and INRMPs.

f) Endorse INRMPs via Commanding Officer NAVBASE Kitsap signature.

The installation Commanding Officer at NAVBASE Kitsap holds the highest-ranking position at the installation and is ultimately responsible for all aspects of the installation and its many functions. This includes ensuring that the INRMP is developed, implemented, and fully supported. The installation Commanding Officer can facilitate the implementation of the INRMP by encouraging support down the chain-of-command; ensuring that a process is established for early coordination between the NRMs and key installation staff; and ensuring that natural resources management is integrated with other installation management functions, military operations, security, and Research, Development, Testing & Evalluation (RDT&E) activities.

Installation Environmental Program Director

The Installation Environmental Program Director (IEPD) works for the installation CO to ensure the installation is in compliance with all natural resources related legislation; EO and Executive Memoranda; DOD and CNO directives, instructions, and policies. The NRM is a member of the IEPD's staff who is recommended by the IEPD to the installation CO to be designated the NRM. The IEPD assists in project design, implementation, and in identifying personnel, internal or external to the installation with expertise to accomplish INRMP projects. The IEPD is one of many signatories to the INRMP and works at a high level to ensure its success.

Installation Natural Resource Manager(s) (NRMs)

The NRMs are responsible for natural resources management at NAVBASE Kitsap. The NRM is designated in writing by the Commanding Officer (Appendix I). The NRM duties include ensuring that the CO is informed of natural resource conditions and issues; goals and objectives of the INRMP; and potential or actual conflicts between mission requirements and natural resource mandates.

The NRM is a member of the NAVBASE Kitsap Public Works Department – Environmental Division and is administratively a NAVFAC employee. They are primarily responsible for the preparation, revision and implemention of this INRMP and coordinating with other personnel on the installations as necessary to implement the INRMP to meet the goals and objectives. They

are also responsible for ensuring this plan is reviewed, current, and compliant in coordination with the USFWS, NMFS, and the WDFW. The NRM is responsible for annually compiling, tracking, and maintaining the INRMP metrics on the Navy Conservation Website.

NAVBASE Kitsap divides natural resource management responsibilities among several installations and tenant personnel according to Table 1-1.

Table 1-1: Installation Natural Resource Managers and Areas of Responsibility

NRM Billet	Areas of Responsibility
NRM for NAVBASE Kitsap Bremerton	NAVBASE Kitsap Bremerton, PSNS & IMF industrial area of NAVBASE Kitsap Bremerton, Jackson Park Housing Complex, Naval Hospital Bremerton, and Camp McKean and the Navy Railroad from NAVBASE Kitsap Bremerton to Shelton
NRM for NAVBASE Kitsap Bangor	NAVBASE Kitsap Bangor, NAVBASE Kitsap Keyport, Zelatched Point, Toandos Buffer Zone, Camp Wesley Harris, and the portion of the Navy Railroad from the start of the Bangor spur (east of the Bremerton Airport) to its termination at NAVBASE Kitsap at Bangor
NRM for NAVBASE Kitsap Manchester	NAVBASE Kitsap Manchester (Fuel Depot): Separate INRMP coverage.
NRM for Alaska Sites	Back Island Alaska: Separate INRMP coverage.

The above personnel work in close coordination with each other in managing NAVBASE Kitsap's natural resources and often lend assistance on properties outside their primary areas of responsibility as workloads demand.

Region Program Director for Environmental (N45)

The Region Program Director for Environmental (N45) provides a Senior Regional Natural Resources Specialist to ensure execution of Natural Resources conservation responsibilities in support of the Regional Commander. The specialist reviews and signs INRMPs for technical sufficiency, consistency within the region, and compliance with Navy and DoD policy.

Public Affairs Office

The Public Affairs Office (PAO) provides a significant link between the INRMP and the on-and off-installation communities. The PAO will facilitate communication between offices across the installation, tenant commands, and nearby communities regarding environmental management

initiatives. Within NAVBASE Kitsap, there are multiple PAOs depending on the issue at hand, the installation, and the command.

Naval Facilities Engineering Command Northwest

Naval Facilities Engineering Command Northwest (NAVFAC NW) provides oversight and support for the development, maintenance, and implementation of Navy Region Northwest's installation INRMPs and the natural resource program. NAVFAC Northwest's role in natural resources management is to:

a) Provide technical and contractual support to NAVBASE Kitsap for the preparation, development, and implementation of INRMPs and associated NEPA documents.

b) Facilitate and coordinate the issuance of INRMP-related NEPA documents.

c) Evaluate and disseminate information concerning new technology, methods, policies and procedures for use in the development and implementation of INRMPs.

d) Assist with the development of the INRMP Project Implementation Table, EPR and Legacy project proposals.

e) Provide technical and administrative guidance for the development and execution of contracts and cooperative agreements to develop and implement INRMPs.

f) Facilitate the acquisition of INRMP "mutual agreement" between the Navy, USFWS and state fish and wildlife agencies.

g) Facilitate conflict resolution between the Navy, USFWS and state fish and wildlife agencies and other stakeholders, as necessary.

h) Provide technical oversight and resources for forest management and assist in implementing forest habitat management actions.

i) Provide support and resources to installation fish and wildlife program and assist with hunting and fishing fee and permit collections and distributions.

j) Assist with compiling, tracking and maintaining INRMP metrics on the Conservation website.

NAVFAC NW, including the installation NRMs, are a compilation of professionally qualified foresters, botanist, fisheries specialists, marine mammal experts, marine and terrestrial bird specialist, and knowledgeable biologists for invasive species management. These subject matter experts are all available to support and assist the installation's natural resources program and associated consultations pertaining to ESA Section 7, Magnuson Stevens Act, MMPA, BASH and MBTA.

1.6.2 External Stakeholder Responsibilities

Other Federal Agencies

The Sikes Act directs DOD to seek mutual agreement with the USFWS in the management of natural resources on DOD installations. The USFWS, along with the Navy, has signature approval authority over INRMPs. Navy Region Northwest has invited the National Oceanic and Atmospheric Administration (NOAA) NMFS to collaborate with installations in the management of NMFS regulated fish and marine mammals located on or around NAVBASE Kitsap properties. Although not required by the Sikes Act, the Navy has invited NMFS to review this INRMP. USFWS and NOAA Fisheries biologists may be called upon to provide expertise in environmental areas and support to the NRM through interagency agreements, if necessary.

State Agencies

The Sikes Act also directs the DOD to coordinate with appropriate state fish and game offices in the management of natural resources on DOD installations. The WDFW has signature approval authority over this INRMP. WDFW biologists may be called upon to provide assistance and support to the NRM, if necessary.

Tribal Governments

NAVBASE Kitsap will seek input from tribes whose Usual and Accustomed (U&A) Areas are co-located with waters owned or used by the Navy, pursuant to SECNAVINST 11010.14A, COMNAVREGNWINST 11010.14, and OPNAV M-5090.1. A copy of the draft INRMP will be sent to each tribe, whose input will be sought on the proposed projects.

Usual and Accustomed Areas are based on treaties signed by the United States (U.S.) government and local Tribes whereby Tribes ceded vast tracts of land to the U.S. These treaties have continuing force today and often allow the taking of fish or other rights at usual and accustomed grounds. U&A Areas vary by Tribe and are not universal across all of NAVBASE Kitsap. The following tribes have U&A Areas adjacent to the NAVBASE Kitsap properties covered by this INRMP:

- Jamestown S'Klallam Tribe
- Lower Elwha Klallam Tribe
- Port Gamble S'Klallam Tribe
- Skokomish Tribe
- Suquamish Tribe

1.7 Integration of Other Installation Plans

The existing natural resource management plans for NAVBASE Kitsap installations will be incorporated into the overall NBK INRMP. The existing plans are described in Table 1-2 and show which parts of the installations are covered where.

1.7.1 Integrated Cultural Resources Management Plan (ICRMP)

ICRMPs are currently in draft and being written for individual installation properties. The ICRMPs for each larger NBK property will cover some of the smaller sites that fall within the property management. The NRM will coordinate plans and actions within the INRMP with the Cultural Resources Manager (CRM) to ensure plans and actions are in compliance with laws protecting cultural resources.

1.7.2 Integrated Pest Management Plan

An Integrated Pest Management Plan (IPMP) guides pest management at NAVBASE Kitsap (NAVFAC Atlantic 2011). The plan is reviewed by the Installation Pest Management (IPM) Coordinator annually, and is currently (2017) in the process of being updated with no significant changes. The integrated approach to pest management is a planned program incorporating education, continuous surveillance, recordkeeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. This approach uses targeted, sustainable methods (i.e., effective, economical, and environmentally sound).

The Navy requires the use of State-certified applicators for applying herbicides. Pest problems (e.g., mice, rats) are referred to the Navy's Base Operating Services Contract (BOSC) for resolution. The BOSC must follow the IPMP.

Commander, Navy Region Northwest has established an interagency agreement with the U.S. Department of Agriculture Animal & Plant Health Inspection Service, Wildlife Services (APHIS-WS) for wildlife-damage management activities across the Region, including NAVBASE Kitsap. The intent is to control gulls, Canada geese, and other birds and animals in order to protect human health and safety and minimize damage to structures. This agreement is reviewed annually and managed by the installation NRMs.

Additionally, the Navy has also entered into a Cooperative Agreement (CA) with Kitsap County to conduct noxious, non-native invasive weed surveys and removal on Naval Base Kitsap properties. Currently work will be conducted in 2017 at NAVBASE Kitsap Bangor, NAVBASE Kitsap Keyport, NAVBASE Kitsap Bremerton, and Camp Wesley Harris. All work covered by the CA will include surveys, mapping, and writing of a treatment plan for the control and removal of invasive plant species.

Table 1-2: Existing Natural Resource Plans

Plan	Date	Locations Covered by Plan
Natural Resources Management Plan for Puget Sound Naval Shipyard	February 1994**	Puget Sound Naval Shipyard (area is now NAVBASE Kitsap, Bremerton) East Park Housing (no longer owned by Navy) Jackson Park Housing Olalla Housing (no longer owned by Navy) Camp McKean Railroad right-of-way adjacent to Sinclair Inlet
Naval Submarine Base Bangor Integrated Natural Resources Management Plan	March 2001	NAVBASE Kitsap, Bangor Naval Undersea Warfare Center Detachment Keyport Annex Camp Wesley Harris Toandos Buffer Zone U.S. Railroad from Shelton, WA to Submarine Base Bangor (which is NAVBASE Kitsap, Bangor)
Naval Undersea Warfare Center Division, Keyport, Integrated Natural Resources Management Plan	March 2001*	NAVBASE Kitsap, Keyport
Naval Hospital Bremerton Integrated Natural Resources Management Plan 2005-2009	June 2004	Naval Hospital Bremerton

*The Navy-owned land at Zelatched Point was previously part of NUWCDIV Keyport, but it was not covered in the 2001 INRMP. **The June 2012 INRMP was not in compliance with NEPA as the EA was not completed, however it was a signed document.

2 NAVBASE KITSAP OVERVIEW

2.1 NAVBASE Kitsap Military Mission and History

NAVBASE Kitsap is one of the largest naval complexes in Navy Region Northwest and is composed of NAVBASE Kitsap Bangor, Toandos Peninsula, Zelatched Point, NAVBASE Kitsap Keyport, NAVBASE Kitsap Bremerton, Jackson Park Housing Complex, Naval Hospital Bremerton, and the DON-owned rail line (USN Railroad) from Bangor and Bremerton to Shelton (Figure 2-1). The scope of this INRMP includes only the NAVBASE Kitsap properties mentioned above and not NAVBASE Kitsap Manchester (Fleet Logistics Center Puget Sound operated Fuel Depot) and SEAFAC Back Island Alaska (Figures 2-2 and 2-3), as both are covered under their own INRMPs. The NAVBASE Kitsap INRMP manages 9,385 acres of land including 382 acres for NAVBASE Kitsap Bremerton; 239 acres for Jackson Park Housing Complex and Naval Hospital Bremerton; 278 acres for NAVBASE Kitsap Keyport; 6,609 acres for NAVBASE Kitsap Bangor; 388 acres for Camp Wesley Harris; 21 acres for Camp McKean; 788 acres for Toandos Peninsula; 30 acres for Zelatched Point; and 650 acres (48 mi) of USN Railroad (Table 2-1). NAVBASE Kitsap is located in western Washington State and encompasses properties in Kitsap, Mason, and Jefferson Counties.

Table 2-1: NAVBASE Kitsap INRMP Land Management Acres

Installation	Acres	Description
NAVBASE Kitsap Bangor	6,609	NAVBASE Kitsap Bangor, is located in Kitsap County on the eastern bank of Hood Canal, approximately 20 miles west of Seattle, Washington, and 5 miles northwest of the unincorporated town of Silverdale. The installation provides berthing and support services to Navy submarines and other fleet assets. The entirety of the installation, including land areas and adjacent water areas in Hood Canal is restricted from general public access.
Toandos Buffer Zone	788	The Toandos Buffer Zone is located in Jefferson County on the eastern side of the Toandos Peninsula, on the western bank of the Hood Canal across from NAVBASE Kitsap Bangor. It acts as a buffer zone for NAVBASE Kitsap Bangor, activities. The area surrounding the property is rural.
Zelatched Point	30	Zelatched Point is located in Jefferson County on the southwestern end of the Toandos Peninsula on Dabob Bay. It is across from the Hood Canal, approximately 4 miles west of the NAVBASE Kitsap Bangor waterfront. Zelatched Point has one pier and several facilities, which support the Naval Undersea Warfare Center (NUWC) Keyport mission for test and evaluation operations within the Dabob Bay Military Operating Area. The area surrounding the property is rural.

Installation	Acres	Description
Camp Wesley Harris	388	Camp Wesley Harris is located in Kitsap County approximately 8 miles southwest of NAVBASE Kitsap Bangor. It is situated along the crest of the Kitsap Peninsula between Hood Canal and Dyes Inlet. Camp Wesley Harris provides a small arms training facility for the military.
NAVBASE Kitsap Keyport	278	NAVBASE Kitsap Keyport is located in Kitsap County on the Kitsap peninsula abutting Liberty Bay. It is approximately 15 miles due west of Seattle and 10 miles north of Bremerton. NUWC Keyport is the major tenant command at the installation. NUWC Keyport provides testing and evaluation for undersea warfare system, include maintenance and repair, and fleet industrial support for torpedoes, mobile mines, unmanned underwater vehicles, and countermeasures.
NAVBASE Kitsap Bremerton	382	NAVBASE Kitsap Bremerton is located in Kitsap County on the north side of Sinclair Inlet within the City of Bremerton. The eastern portion of the base is a fenced, high-security area known as the Controlled Industrial Area. Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS&IMF) is the major tenant command of the installation. PSNS & IMF overhauls and repairs all nuclear powered warships. NBK Bremerton is a homeport for submarines and aircraft carriers.
Camp McKean	21	Camp McKean is located in Kitsap County on Kitsap Lake, approximately 5 miles west of NAVBASE Kitsap Bremerton. It is a recreational facility that supports Navy commands and authorized Fleet & Family Readiness patrons.
Jackson Park Housing Complex and Naval Hospital Bremerton	239	The properties are located in eastern Kitsap County on the west bank of Ostrich Bay, a small embayment on the south end of Dyes Inlet, Puget Sound. Jackson Park Housing Complex provides residential family housing. Naval Hospital Bremerton is located north of Jackson Park Housing Complex. It provides medical services to active duty and retired military personnel and their dependents.
Rail line from Shelton to Bangor and Bremerton	650 (48 miles)	The railroad line begins in Shelton, Washington (Mason County) and runs to NAVBASE Kitsap Bremerton, and to NAVBASE Kitsap Bangor in Silverdale (Kitsap County). The property line varies between 25 feet to over 200 feet from the track centerline depending on location. The railroad line provides freight rail service to NAVBASE Kitsap from the Elma-Bangor branch, and provides for limited commercial use.

The mission of NAVBASE Kitsap is to serve as the host command for the Navy's fleet throughout West Puget Sound and to provide base operating services, including support for both surface ships and submarines home-ported at Bremerton and Bangor. NAVBASE Kitsap is the largest facility in Navy Region Northwest and provides world-class service and tenant support,

programs, and facilities that meet the needs of their hosted war fighting commands, tenant activities, crew, and employees.

NAVBASE Kitsap and its tenant activities perform a complex and growing mission that includes home porting and repairing submarines, aircraft carriers, and surface ships. NAVBASE Kitsap and its tenants provide support, research, development, testing, training, technical assistance, and operations in support of the Navy's fleet throughout West Puget Sound.

2.1.1 NAVBASE Kitsap Bangor

NAVBASE Kitsap Bangor is located approximately 8 kilometers (km) (5 miles [mi]) northwest of Silverdale, Washington in Kitsap County and is situated on the eastern bank of Hood Canal. The portion of Hood Canal adjacent to NAVBASE Kitsap Bangor averages 2.4 km (1.5 mi) in width and is bordered on the west by Toandos Peninsula in Jefferson County. The surrounding Toandos Peninsula area is rural in character. Zelatched Point, on Dabob Bay, has a pier used for berthing small craft. Operations within the Dabob Bay Military Operating Area are supported by land-based facilities at Zelatched Point. There is also a landing pad at Zelatched Point to support helicopter operations. Camp Wesley Harris, approximately 13 km
(8 mi) southwest of NAVBASE Kitsap Bangor, is situated along the crest of the Kitsap Peninsula between Hood Canal and Dyes Inlet and is bisected by Seabeck Highway.

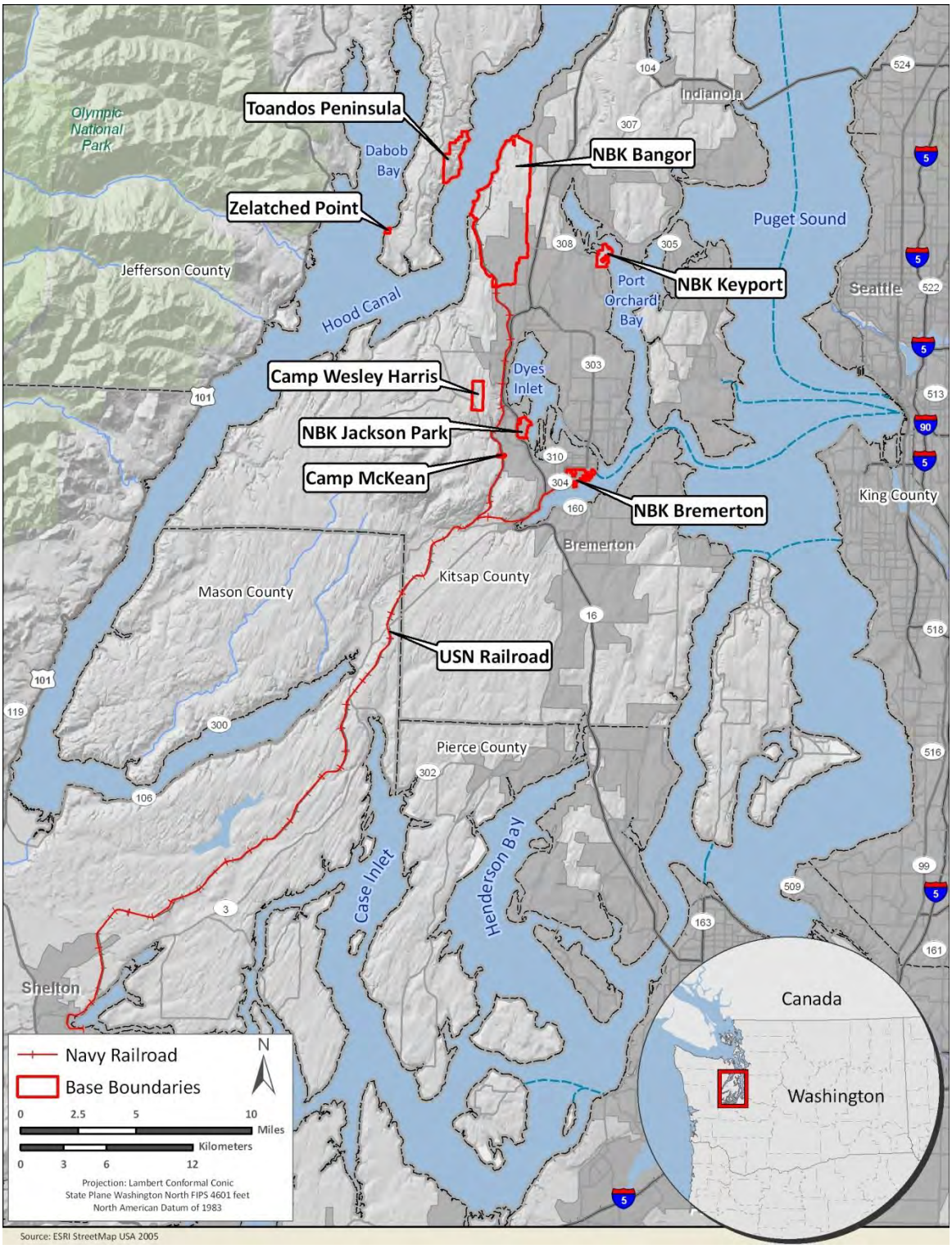

Figure 2-1: NAVBASE Kitsap Location Map

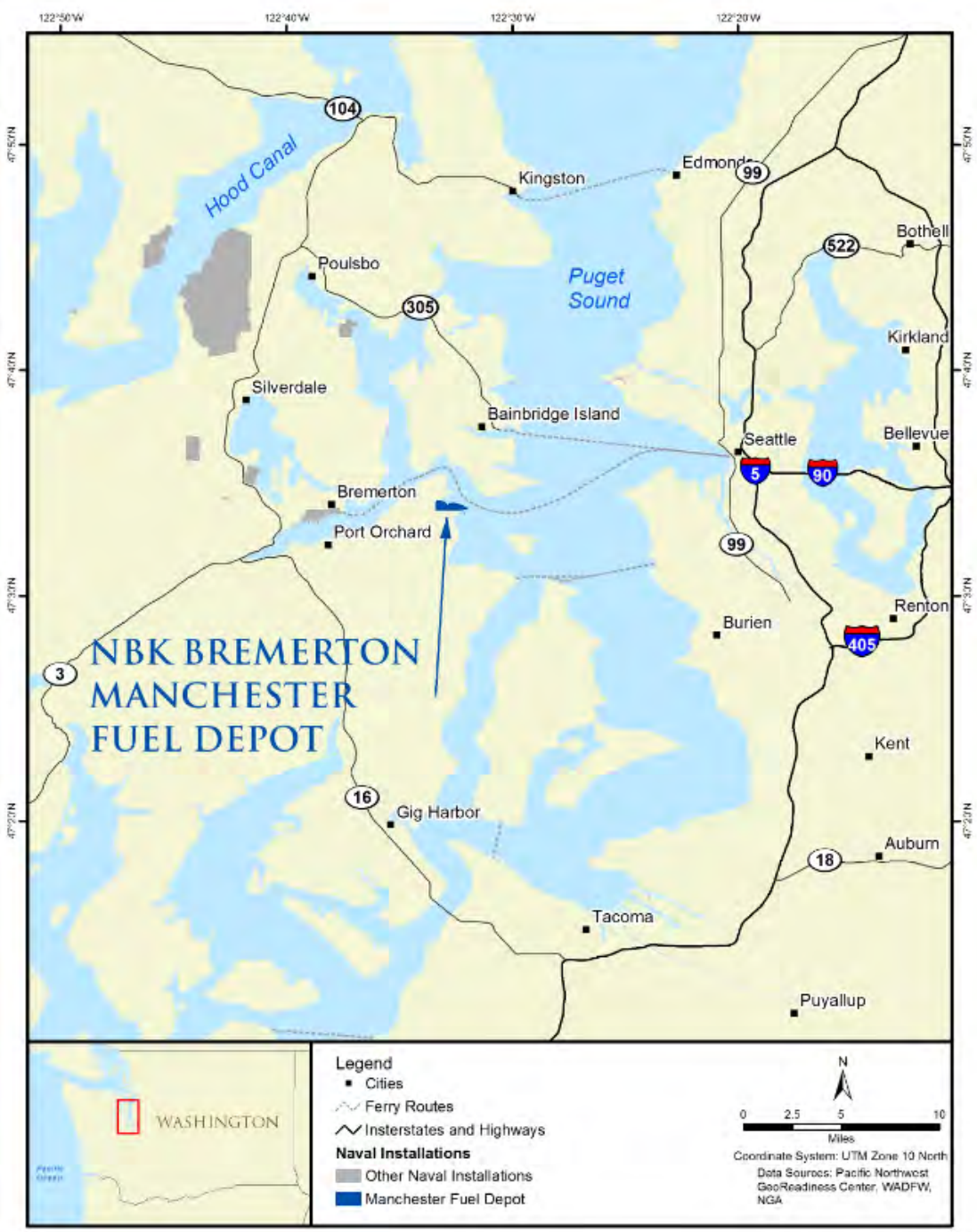

Figure 2-2: NAVBASE Kitsap Manchester Location Map

Figure 2-3: Back Island Alaska Location Map

2.1.2 NAVBASE Kitsap Bangor History

The land for NAVBASE Kitsap Bangor was purchased from landowners beginning in 1941 for the construction of an ammunition depot. In those early days, the base was commissioned as Naval Ammunition Depot, Bangor. "Bangor" was the name of the small community where the acreage was located, which, in turn was named after Bangor, Maine due to their geographical similarities (Navy 2007). In 1943, the Marginal Pier was built to handle the loading of ammunition on Navy transport ships headed for the Pacific Theater during World War II. With the necessities of war, Bangor Naval Magazine began operation on 25 January 1945. To help move supplies and resources between NAVBASE Kitsap Bangor and NAVBASE Kitsap Bremerton, the USN Railroad was built in 1945 and is currently operated and maintained under contract with Puget Sound and Pacific Railroad.

Several changes in status occurred from the time the base was established in 1945 until it was commissioned as a Trident base in 1977. In 1964, the base became a Polaris Missile Storage Facility in addition to its original mission of handling ammunition. The 30 acres at Zelatched Point were acquired in 1964 (USN 2001a). Subsequently, in the late 1970s the missile handling activity became known as Strategic Weapons Facility, Pacific (SWFPAC), responsible for the Trident Missile program. In February 1977, Naval Ammunition Depot stood down and the base was commissioned as Naval Submarine Base Bangor. In August of 1982 the first Trident submarine, USS Ohio, arrived at the Delta Refit Pier on the Bangor waterfront. On 4 June 2004, Naval Submarine Base Bangor was enveloped into a regional concept under Commander, Naval Installations was renamed NAVBASE Kitsap Bangor.

The U.S. Marine Corps used the facilities at the future Camp Wesley Harris site, a property then owned by the Kitsap Rifle and Revolver Club, in the late 1920s (USN 2007a). The federal government began leasing the club's property in 1933. In 1935, the Marines constructed a mess hall, an administration building, and a bath house at the rifle range. Late in 1940, the government officially took possession of Camp Wesley Harris. In subsequent years, the facility was expanded and upgraded, and some buildings were demolished. The Marines controlled Camp Wesley Harris until it was taken over by the Navy in 1989.

Camp Wesley Harris supported military training by providing a marksmanship and tactical training facility. In 1998, two areas at Camp Wesley Harris were remediated to stabilize lead and other metals in the soil. Most buildings and facilities were demolished in 2005. Only five structures remain: two restrooms, a pump house, a water reservoir, and a training building. Camp Wesley Harris occupies approximately 388 acres and is located 8 mi southwest of NAVBASE Kitsap Bangor, between Hood Canal and Dyes Inlet (USN 2007a).

The pier at Zelatched Point area has been historically used for floatplanes and range craft during test and evaluation operations. The USN Railroad provides freight rail service to NAVBASE Kitsap Bangor from the Elma-Bangor branch. The USN owns approximately 77 km (48 mi) of railroad line, beginning at Shelton, Washington, and running to the PSNS & IMF at NAVBASE

Kitsap Bremerton and to NAVBASE Kitsap Bangor in Silverdale. The railroad was built in 1945 and is currently operated and maintained under contract with Puget Sound and Pacific Railroad. The property line varies between 7.6 meters (m) (25 feet [ft]) to over 61 m (200 ft) from the track centerline, depending on location. Administration of the railroad from Shelton to the shipyard (58 km [36 mi]) is with PSNS & IMF, and from Bremerton Junction to NAVBASE Kitsap Bangor (19 km [12 mi]) is with NAVBASE Kitsap Bangor (USN 2004a).

2.1.3 NAVBASE Kitsap Bangor Mission

The mission of NAVBASE Kitsap Bangor is to support and maintain a Trident submarine squadron and other ships home-ported or moored at the installation and to maintain and operate administrative and personnel support facilities including security, berthing, messing, and recreational services. As part of the nation's sea-based strategic deterrence mission, TRIDENT submarines play a critical role of great strategic importance for the United States. The TRIDENT program consists of submarine-launched ballistic missiles, which have been a vital part of the Navy's strategic deterrence mission since 1956 and are an integral component of the Navy's ability to defend the nation. NAVBASE Kitsap Bangor is the Pacific homeport for the Navy's TRIDENT submarine fleet. NAVBASE Kitsap Bangor is the only naval installation on the west coast with the specialized infrastructure able to support the TRIDENT program. The specialized infrastructure includes buildings, utilities, and systems used to support missile production shops, missile maintenance, missile component storage, and missile handling cranes, in addition to providing security and operational port facilities. These facilities support every aspect of the TRIDENT program operations, services, and systems. Additional Navy owned properties included with NAVBASE Kitsap Bangor include areas directly across the Hood Canal on Toandos Peninsula. Zelatched Point, on the southern end of the Toandos Peninsula, is used for berthing small craft. Camp Wesley Harris' mission is to train submarine and other military personnel in the use of the firearms needed to perform their duties. The USN Railroad, in addition to serving the naval facilities, provides Puget Sound and Pacific Railroad a commercial rail opportunity to haul freight for several commercial clients (USN 2004a).

2.1.4 NAVBASE Kitsap Keyport

NAVBASE Kitsap Keyport is located on the Kitsap Peninsula abutting Liberty Bay, a branch of the Puget Sound. It is approximately 15 miles (24 km) due west of Seattle, Washington, and 10 miles (16 km) north of NAVBASE Kitsap Bremerton. The nearest communities to NAVBASE Kitsap Keyport are Keyport, Silverdale, and Poulsbo, Washington. NUWC Keyport is the major tenant command at NAVBASE Kitsap Keyport.

NUWC Keyport is the Navy's premier provider of cold-water test and evaluation. In this capacity, NUWC Keyport - with remote sites in Hawaii, Southern California and Hawthorne, Nevada - provides depot maintenance and repair, in-service Engineering and fleet industrial support for torpedoes and other undersea warfare systems including mobile mines, unmanned

underwater vehicles, and countermeasures. NUWC Keyport uses NAVBASE Kitsap Bangor facilities for torpedo handling, maintenance, and storage, and conducts test and evaluation activities in the Dabob Bay Range Complex. Three underwater test ranges (Keyport, Dabob, and Quinault Ranges) and five parcels (Bolton Peninsula, Pulali Point, Sylopash Point, Whitney Point, and Zelatched Point) support NUWC Keyport's mission. These ranges are predominantly used to test undersea warfare devices and perform training activities.

2.1.5 NAVBASE Kitsap Keyport History

In 1909, the Navy investigated saltwater range locations between British Columbia and San Diego for testing torpedoes. In June 1910, Congress appropriated $145,000 for the purchase of land on the Kitsap Peninsula abutting Liberty Bay that would later become NAVBASE Kitsap Keyport. The station was formally commissioned in November 1914 as Pacific Coast Torpedo Station and the first new building was constructed in 1915. Additional acquisitions occurred in 1929 and 1943. During World War II, employment at the Naval Torpedo Station began to grow at a rapid pace, reaching 2,035 civilians and 821 military at the close of the war. The workload of torpedo proofing reached a peak of 100 per day in 1944. The workforce decreased to 275 in 1946, but significant activity continued after the war as three-dimensional underwater tracking ranges were designed and installed, and antisubmarine warfare acoustic homing torpedoes were tested and perfected on those ranges. From 1963 through 1969, the NUWC civilian workforce grew from 1,200 to 1,600. This was a result of increasing responsibility in torpedo and other underwater vehicle testing. The Bangor Ordnance Annex ammunition storage area covering 964 acres was placed under the jurisdiction of NUWC Keyport in 1970. The station name was changed in 1978 to the Naval Undersea Warfare Engineering Station (NUWES) to reflect new responsibilities primarily related to undersea warfare engineering. In 1994, NUWES was renamed NUWC. In 1999, the ownership of all Class I property, along with some buildings, were transferred to CNRNW. At that time, CNRNW assigned the natural resources management responsibility to Submarine Base Bangor (now NAVBASE Kitsap at Bangor). In 2000, the Submarine Torpedo Intermediate Maintenance Activity Pearl Harbor became a new Keyport operational site. In June 2004, the property was included in regionalization plans under the new title NAVBASE Kitsap Keyport.

2.1.6 NAVBASE Kitsap Keyport Mission

The primary mission at NAVBASE Kitsap Keyport is to proof, test, and evaluate underwater weapons, weapons systems, and components (USN 2001b). NUWC Keyport, the installation's primary tenant command, currently employs approximately 1,489 civilians, 20 military, and 669 contractor personnel. NUWC Keyport is the Pacific Fleet's designated systems test agent and comprehensive weapon quality engineering and environmental test laboratory. Keyport is also a major in-service engineering activity in support of mine warfare, sonar, underwater fire control, and other undersea warfare systems including those aboard Trident submarines. NUWC Keyport continues to perform its original mission of underwater weapons proofing and testing, utilizing a

comprehensive set of three-dimensional ranges in the Pacific Northwest that provide a broad variety of environmental and test conditions.

2.1.7 Jackson Park Housing Complex and Naval Hospital Bremerton

Jackson Park Housing Complex and Naval Hospital Bremerton are located in eastern Kitsap County on Ostrich Bay, a small embayment on the south end of Dyes Inlet, Puget Sound, Washington. Naval Hospital Bremerton is a separate command from NAVBASE Kitsap. However, beginning in 2011, all Class I property transferred from BUMED to CNIC, and natural resource management at Naval Hospital Bremerton will be conducted by the NAVBASE Kitsap Bremerton NRM.

Situated directly off Highway 3 between Bremerton and Silverdale, Jackson Park Housing Complex provides 870 housing units for military families. Within Jackson Park is Elwood Point Park. This waterfront park features walking paths, picnic areas, a baseball field, and basketball, tennis, and volleyball courts.

Naval Hospital Bremerton is a community-based acute care and obstetrical hospital, offering expert primary care, emergency care and a broad range of medical and surgical specialties, with 36 inpatient beds (with expansion capacity to 72+). The hospital is conveniently located between NAVBASE Kitsap Bremerton and NAVBASE Kitsap Bangor. Naval Hospital Bremerton is parent command for three Naval Branch Health Clinics and the Puget Sound Family Medicine Residency Program. The three clinics are located at NAVBASE Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett.

2.1.8 Jackson Park Housing Complex and Naval Hospital Bremerton History

The Jackson Park Housing Complex and adjacent Naval Hospital Bremerton properties served as an ammunition depot from 1904 through 1959. Entitled Naval Ammunition Depot (NAD) Puget Sound, activities included ammunition manufacturing, storage, assembly, and demilitarization. The NAD Puget Sound also served as the ammunition storage for ships entering the Puget Sound for repairs from World War II. NAD Puget Sound was closed in 1959 and was placed in caretaker status until the mid-1970s when the site was converted to military housing, reassigned to Puget Sound Naval Shipyard, and renamed Jackson Park. Construction of over 800 housing units began in the late 1960s and continued through the 1990s. In 1977, approximately 50 acres were transferred to Naval Regional Medical Center for a new hospital. Today, there are 870 housing units in Jackson Park quartering service families from sea and shore units. Unfortunately, during past operations, materials were improperly disposed of on land and in the marine area thus contaminating soil, groundwater, and the marine environment. Since 1993, environmental reclamation work has been ongoing in the Jackson Park and Naval Hospital area in an effort to identify and remove hazardous materials. Management of Jackson Park Housing was the responsibility of Commander, Puget Sound Naval Shipyard until 1998 when Naval Station Bremerton was established. Commanding Officer, Naval Station Bremerton tendered

Jackson Park Housing until 2004 when regionalization came to West Sound and Jackson Park went under the cognizance of Commanding Officer, NAVBASE Kitsap.

2.1.9 Jackson Park Housing Complex and Naval Hospital Bremerton Mission

The mission of Jackson Park is to provide family housing for Navy personnel and their families stationed at NAVBASE Kitsap. Nestled in the heart of Kitsap County on Ostrich Bay, Jackson Park offers the security of military housing with the comfort of an established neighborhood.

Naval Hospital Bremerton has a threefold-primary mission to support our war fighters, past and present, and their families by: Providing exceptional care anytime, anywhere; shape military medicine through training, research, and graduate medical education; and to prepare our forces for deployment. Naval Hospital Bremerton and its clinic's staff consist of over 1,400 dedicated military, civilian, contract, and American Red Cross volunteer personnel.

Over the course of 2009, Naval Hospital Bremerton had up to 11% of the active duty staff deployed supporting combat units in Iraq, Afghanistan, at Expeditionary Medical Facility Kuwait, and in other locales such as Joint Task Force-Horn of Africa. Active duty staff was also engaged in humanitarian aid and disaster response missions such as Operation Unified Assistance in Haiti and on USNS Mercy for Pacific Partnership 2010 that visited Vietnam, Cambodia, Indonesia, and Timor Leste.

2.1.10 NAVBASE Kitsap Bremerton

NAVBASE Kitsap Bremerton is located on the north side of Sinclair Inlet within the city of Bremerton, Washington, in Kitsap County. NAVBASE Kitsap Bremerton encompasses approximately 382 acres of land, approximately 400 acres of submerged marine Right to Use lands (JLUS 2013), numerous buildings and structures, and 6 dry docks for wet or dry berthing of all sizes and classes of vessels. The eastern portion of the naval base is a fenced, high-security area known as the Controlled Industrial Area (CIA). NAVBASE Kitsap Bremerton is bordered on the south by Sinclair Inlet, and on the north and east by the city of Bremerton. PSNS & IMF is the major tenant command at NAVBASE Kitsap Bremerton.

Camp McKean is located on Kitsap Lake, about 8 km (5 mi) west of NAVBASE Kitsap Bremerton. Camp McKean is primarily for summer day use in support of Navy commands and authorized Fleet & Family Readiness patrons. The site includes a seasonal swimming beach, large pavilion, gazebo, upper picnic field with two shelters, restrooms, fire rings, BBQ grills, children's playground, fishing pier, boat dock, sand volleyball court, and horseshoe pits.

2.1.11 NAVBASE Kitsap Bremerton History

The cornerstone of NAVBASE Kitsap Bremerton's history is Puget Sound Naval Shipyard. Established in 1891 as a naval station on 190 acres, the base was extended in the 1920s by filling in the shoreline with soil from grading the steep hillsides. The construction of dry docks through the 1940s and 1950s provided more soil to fill the shoreline. During World War I, the shipyard

built new ships including 25 submarine chasers, six submarines, two minesweepers, seven seagoing tugs, and two ammunition ships, as well as 1,700 small boats (Pike 2005).

The site originally opened as a repair facility, then expanded in World War I to accommodate shipbuilding. Following the United States entry into World War II, the Shipyard was able to repair and modernize all five surviving battleships from the attack on Pearl Harbor. Throughout the war, the Shipyard repaired, overhauled, and refitted hundreds of U.S. and Allied Forces ships, including 26 battleships, 18 aircraft carriers, 3 cruisers, and 79 destroyers. Nearly one-third of the 1,006 ships in the U.S. fleet were serviced by the Shipyard. In addition, the Shipyard constructed a number of new cruisers and destroyers. By 1945, the wartime workforce had reached more than 32,000 personnel. During the 1950s, the Shipyard's major effort was the extensive program of converting the older aircraft carriers conventional flight decks to angle decks as the Navy entered the era of jet-powered aircraft.

In 1961, the Shipyard was certified as a nuclear repair facility, enabling it to perform the overhauling of the new Polaris Fleet Ballistic Missile nuclear-powered submarines. During the 1990s, Naval Station Bremerton was established to serve as homeport for seven ships: USS CARL VINSON (CVN 70), USS SACRAMENTO (AOE-1), USS CAMDEN (AOE-2), USS RAINIER (AOE-7), USS BRIDGE (AOE-10), USS MOUNT HOOD (AE 29), and USS CALIFORNIA (CGN 36). Naval Station Bremerton provided support and services to approximately 10,000 sailors and their dependents. In June 2004, Naval Station Bremerton was disestablished and included in regionalization plans under the new title NAVBASE Kitsap Bremerton.

2.1.12 NAVBASE Kitsap Bremerton Mission

NAVBASE Kitsap Bremerton is the homeport while providing support and maintenance to vessels needing service. NAVBASE Kitsap Bremerton's largest tenant, Puget Sound Naval Shipyard (PSNS), is the largest and most diverse shipyard on the West Coast and is the second largest industrial facility in the State of Washington, both in terms of plant investment and in the number of civilians employed. Puget Sound Naval Shipyard possesses the capabilities to overhaul and repair all types and sizes of ships of the United States Navy while NAVBASE Kitsap Bremerton also serves as homeport for an aircraft carrier, submarines, and multiple support ships. The shipyard's other significant capabilities include alteration, deactivation, disassembly & recycling, and dry-docking of all types of naval vessels.

2.2 Other Operations, Activities, and land and water uses

Waterfront operations include the overall integration of all port operations. Activities include vessel traffic movement and management, personnel clearance and tracking, and ingress/egress within the restricted areas.

2.2.1 Environmental Restoration Program

The Installation Restoration program was established by the Navy to evaluate and clean-up sites where past practices have resulted in contamination of soils, groundwater, or other media by hazardous substances. These sites are managed by remedial project managers who coordinate work necessary to ensure cost-effective and timely site assessment, planning, and remediation of identified releases consistent with requirements. The Installation Restoration program is separate from the natural resources program for funding and management. Appendix F of the INRMP contains a description of all contaminated sites on NAVBASE Kitsap, and updates/changes to these sites will be incorporated into INRMP updates. The majority of these sites has been cleaned and/or currently has institutional controls on them with long-term monitoring. Occasionally NRMs work with the Installation Restoration program on remedial action projects affecting natural resources. Examples of this are Charleston Beach and Floral Point. NAVBASE Kitsap has several identified sites in various stages of characterization, assessment, monitoring, or closure. The NRM will work with remedial project managers to ensure coordination of both programs.

See Appendix F for specific information on Installation Restoration sites at NAVBASE Kitsap.

2.2.2 Spill Prevention, Control, and Countermeasures (SPCC)

Spill Prevention, Control, and Countermeasures (SPCC) plans have been developed for NAVBASE Kitsap installations (PSNS & IMF Instruction 5090.9E and Naval Base Kitsap Bremerton SPCC Plan). A full description of the plans will not be described here, but it is important to note that the Environmental Division manages the plans; coordinates training and drills for installation staff; carries out inspections of storage tanks, equipment, and procedures that have a potential to release hazardous materials to the environment; and participates as spill response team members in the event of an actual release. The Port Operations Division for each installation is trained and has the necessary equipment to respond to a spill to the water and begin clean-up procedures. The installation's firefighters are trained in hazardous materials response. Both organizations are staffed and available for spill response 24 hours a day. The installations can also call upon Commander, Navy Region Northwest, for help in staffing and equipping a response to a spill. Spill response at NAVBASE Kitsap is covered under the *Navy Region Northwest Oil and Hazardous Substance Integrated Contingency Plan* (COMNAVREG 5090.1) which was approved by the Washington Department of Ecology (WDOE) in 2010. The purpose of the Integrated Contingency Plan is to establish procedures and methods that provide for the improved protection of the state's aquatic environments, natural resources, and public/private interests from the impacts of oil and hazardous substance pollution. In so doing, the plan ensures readiness of personnel and equipment, maximizes the effectiveness and timeliness of oil and hazardous substance spill response procedures, and demonstrates actions taken to coordinate with other state and federal contingency plans. The NRM will participate in

trainings, practice events, and actual spill events if they occur to ensure natural resources are protected and properly accounted for per the INRMP and the Integrated Contingency Plan.

2.2.3 Fire Prevention

Historically the wet climate of western Washington has minimized the duration of the seasonal window of susceptibility for a large-scale fire disturbance. With changing climatic patterns, the precipitation total has not decreased but the duration of the seasonal window of susceptibility to a fire start has increased. This increase combined with the characteristic long fire return intervals indicates this area as low fire frequency but having a high fire intensity and extent once a fire start occurs. The current climate trend provides the opportunity to manage proactively vegetation and accessibility to reduce the rate and extent of fire spread in critical areas. The Navy considers the series of existing firebreaks such as roads, railroads, streams, and other wet areas that transverse all NAVBASE Kitsap installations as currently adequate for wild fire protection and control (USN 2001a). Weeds and brush along the sides of the roads are either sprayed or mowed, helping maintain the efficiency of fuel breaks. NAVBASE Kitsap has full-time manned fire stations at Bremerton, the Jackson Park Housing Complex, Bangor, and Keyport. Outlying areas would receive assistance from local or state fire districts in the event of wildfire (USN 2001a). Support for on-site fire station personnel to become wildfire qualified is essential for effective initial attack response. Areas designated to support development of firefighter qualifications such as hand fire-line construction and other wildland firefighting skills is essential to minimize the size of a fire start on the installations covered by this INRMP.

2.2.4 Project Review Procedure

The installation environmental staff reviews new operations, proposed construction, maintenance projects, and programs to be conducted on the installations. The environmental review coordinator will also attend meetings to go over lists of projects specific to each installation to determine if further review is required. Depending on the initial environmental coordinators review, some projects are coordinated with the installation NRMs. This ensures that the installation is in compliance with all environmental laws and regulations, provides feedback to the project managers regarding costs and length of time to receive permits, and provides an additional design review check to help catch conflicts or other design issues when needed. The process includes the following steps:

a) A program or project manager submits the scope of the new operation, maintenance activity, or construction project to the NAVBASE Kitsap Environmental Office for review. The initial submittal generally includes the project information, including maps, diagrams, and drawings that outline the project and show the location.

b) The environmental review coordinator will receive the package and:

    1. Send it to the correct Environmental Division staff members (sometimes including the NRM) for their review and comments.

c) The environmental review coordinator will coordinate the comments and return them to the program manager. The review comments will include:

1. The identification of any environmental requirements (e.g., wetland buffers);
2. Suggestions for Best Management Practices (BMPs) to minimize or eliminate any potential environmental degradation;
3. The identification of all environmental permits, consultations, and other documents required to carry out the project (e.g., Clean Water Act permits; Section 7 of the ESA requirements; and NEPA documentation);
4. The designation of the environmental staff person who will write and obtain the permits or carry out the environmental consultation process with outside regulatory agencies;
5. An estimation of any costs necessary to obtain environmental permits or other documents; and
6. Provide a schedule for obtaining all permits and documentation.

2.2.5 Hazardous Material and Waste Management

The Environmental Division and the Safety Director review and approve all hazardous material usage on the installation. The installation has hazardous materials storage areas where materials are brought, logged into a tracking system, and disbursed to various tenant commands and vessels upon request.

The installation has hazardous waste storage areas where hazardous waste is stored temporarily. The installations are staffed with hazardous waste employees whose duties are to pick-up hazardous waste from visiting ships and on-base tenant commands and shops, transport it back to the storage areas, profile the waste, repackage it if necessary, and manage the proper shipping and disposal of the waste according to federal and state regulations. The hazardous waste storage areas are equipped with holding tanks, secondary containment, and other measures to prevent any spilled material from entering storm drains.

2.3 Regulatory Requirements for Natural Resources Management

2.3.1 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) of 1969 (42 USC § 4321 et seq.) requires federal agencies to evaluate the impacts of their proposed actions on the quality of the human environment. The Navy's policies regarding NEPA, OPNAV M-5090.1 Chapter 10, Environmental Planning Under the National Environmental Policy Act and Executive Order 12114, SECNAVINST 5090.6A (SECNAV Instruction 5090.6A, Environmental Planning for

Department of the Navy Actions, dated April 26, 2004), and Navy's Supplemental Environmental Planning Policy, dated 23 September 2004, reinforce NEPA requirements and emphasize environmental planning at the earliest stages of projects. The Navy recognizes that the NEPA process includes the systematic examination of the likely environmental consequences of implementing a proposed action. To be an effective decision-making tool, the Navy integrates the process with other Navy-Marine Corps project planning at the earliest possible time. This ensures planning and decision-making reflect environmental values, avoid delays, and avoid potential conflicts. The Navy is able to achieve its mission at home, at sea, and abroad more efficiently when environmental planning is properly integrated into Navy decision-making for those Navy actions that have the potential for adverse environmental consequences.

2.3.2 Endangered Species Act (ESA)

The Endangered Species Act (ESA) requires federal agencies to manage federally listed threatened and endangered (TES) species and their habitats in a manner promoting conservation of TES species, consistent with recovery plans for such species. Section 7 of the ESA requires all federal agencies to enter into consultation with the USFWS and NMFS whenever actions are proposed that "may affect" listed and proposed TES species of plants and animals. Proposed projects, operations, or other actions, are scrutinized for potential impacts to TES species through a formal review process. ESA Section 7 consultations will be initiated if warranted, otherwise, written documentation that there are no effects to TES species will be generated by the Natural Resources Manager and kept with the project files. The Natural Resources Manager will use this INRMP as a tool to identify the potential impacts of planned Navy actions on endangered or threatened species at an early stage and to provide a basis for altering the action to prevent or minimize those impacts.

Risk to military mission: USFWS or NMFS (or both) may require changes or mitigation that could result in delays and additional costs. Because of this, it is imperative that the Command initiate early environmental/natural resources review of proposed actions, in order to assess risks, develop alternatives, and correctly identify mitigation costs both in terms of time and dollars.

2.3.3 Migratory Bird Treaty Act (MBTA) & Executive Order (EO) 13186

The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful.

This Act protects migratory birds and their nests and eggs from being hunted, captured, purchased, or traded, but the United States Fish and Wildlife (USFWS) issues federal depredation permits allowing take under specific conditions. If an installation uses take to manage bird damage other than European starlings (*Sturnus vulgaris)*, house sparrows (*Passer domesticus*), and feral pigeons (*Columba livia*), it may be required to coordinate with the USFWS.

In July 2006, the DoD and the USFWS signed and entered into a Memorandum of Understanding (MOU) to promote the conservation of migratory birds in accordance with EO 13186. This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; ensure DoD operations – other than military readiness activities – are consistent with the Migratory Bird Treaty Act.

In part, contractors must have the appropriate permits when performing work for the Navy that may affect migratory birds covered under this Act. NAVBASE Kitsap also has an Interagency Agreement with the US Department of Agriculture, Animal & Plant Health Inspection Service (APHIS) Wildlife Services (WS). This agreement states that APHIS WS will provide assistance to Commander, Navy Region Northwest (COMNAVREG NW) to support wildlife damage management activities on its installations. Existing migratory bird damages include geese, gulls, and terns nesting on rooftops and in areas where accumulations of nesting and fecal matter negatively impact human safety. These damages are currently being managed to acceptable levels, but are expected to persist simply due to our proximity to the Puget Sound. Other concerns may arise in the future. Depredation permits will be obtained prior to conducting actions that would result in taking problem migratory birds or their nests or eggs (in accordance with the Migratory Bird Treaty Act). Emphasis will be given to nonlethal methods, when practical and effective.

2.3.4 Bald and Golden Eagle Protection Act (BGEPA)

The Bald Eagle Protection Act was enacted in 1940; in 1962, Congress extended the Act to cover golden eagles. The Bald and Golden Eagle Protection Act prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. “Take” is defined as to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb” a bald or golden eagle. The term “disturb” under the Act was defined via a rule published in the Federal Register on June 5, 2007. “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with the normal breeding, feeding, or sheltering behavior.

2.3.5 Marine Mammal Protection Act (MMPA)

The Marine Mammal Protection Act of 1972 (MMPA) prohibits, with certain exceptions, the take (see definition below) of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the import of marine mammals and marine mammal products into the U.S. The Congress passed the MMPA based on the following findings and policies:

- Some marine mammal species or stocks may be in danger of extinction or depletion as a result of human activities;

- These species or stocks must not be permitted to fall below their optimum sustainable population level (depleted);
- Measures should be taken to replenish these species or stocks;
- There is inadequate knowledge of the ecology and population dynamics; and
- Marine mammals have proven to be resources of great international significance.

Definitions

> **Take:** to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal.

The Marine Mammal Protection Act reauthorization bill went to Congress on June 16, 2005. Among other proposals, the bill includes amendments to clarify the harassment definition:

Section 3 (16 USC § 1362) is amended in subsection (18) to read as follows:

"(18) The term "harassment" means any act which–

> (A) [Level A] injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild; or
>
> (B) [Level B] (i) disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered; or (ii) is directed toward a specific individual, group or stock of marine mammals in the wild that is likely to disturb the individual, group, or stock of marine mammals by disrupting behavior, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering.

The NRM will review all proposed projects, operations, and training plans for possible impacts to marine mammals. If impacts to marine mammals are identified, the NRM will provide recommendations to the program/project managers so that changes or mitigation can be considered early in the planning process. There are operations and training that have received prior review regarding marine mammal protection, and the NRM no longer is required to review. They are following the terms and conditions that were set forth in the consultation to continue working. The NRM will also inform personnel that operate watercraft about the MMPA regulations and restrictions regarding marine mammals.

2.3.6 Coastal Zone Management Act (CZMA)

Congress passed the federal Coastal Zone Management Act (CZMA) in 1972 to encourage the appropriate development and protection of the nation's coastal and shoreline resources. The Coastal Zone Management Act gives states the lead role in managing these areas. To assume this role, the state prepares a Coastal Zone Management Program document that describes the State's coastal resources and how these resources are managed. Washington was the first state to receive

federal approval of a Coastal Zone Management Program in 1976. The Washington State Department of Ecology (WSDOE) Shorelands & Environmental Assistance Program (SEA Program) is responsible for implementing Washington's program (WSDOE, 2012). Washington State's Coastal Zone Management Program Document (WSDOE 2001) excludes from the coastal zone those lands that are subject solely to the discretion of the federal government. This exclusion includes military reservations and other defense installations.

OPNAV M-5090.1, Chapter 14 describes how the Navy will operate in areas subject to the Coastal Zone Management Act (CZMA). The Navy is required by the CZMA to ensure activities affecting any coastal use or resource is fully consistent with the enforceable policies of the Washington State Shoreline Management Program, unless Navy compliance is prohibited by law.

2.3.7 Clean Water Act (CWA) & Executive Order (EO) 11990

According to Executive Order 11990 (1977), the term "wetlands" includes areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds. EO 11990 requires Federal agencies to minimize the loss or degradation of wetlands and to enhance their natural values. Section 404 of the Clean Water Act prohibits discharges of dredged or filled material into waters of the U.S., including wetlands, without first obtaining a permit from the U.S. Army Corps of Engineers. OPNAV M-5090.1 refers to 33 CFR § 320-330, Clean Water Act (CWA) Section 404, and requires that the Navy comply with the national goal of no net loss of wetlands, and to avoid loss of size, function, and value of wetlands.

2.3.8 Magnuson-Stevens Fishery Conservation and Management Act

As amended in October 1996, the Magnuson-Stevens Fishery Conservation and Management Act requires that federal agencies consult with the U.S. Secretary of Commerce (currently delegated to NMFS) on any action proposed to be undertaken that may adversely affect Essential Fish Habitat (EFH). The objective of this EFH assessment is to determine whether or not the proposed project may adversely affect designated EFH for relevant commercial, federally managed fish species within the proposed action area. It also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed project. Subsection 50 CFR § 600.920(f) specifies that EFH consultation should be consolidated with existing environmental review procedures required by other statutes, such as ESA, when appropriate. The NAVBASE Kitsap NRMs will review all proposed projects, operations, and training plans for possible impacts to EFH. If impacts to EFH are identified, the NRM provides recommendations to the program/project managers so that changes or mitigation can be considered early in the planning process.

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3 REGIONAL NATURAL RESOURCES SETTING AND CURRENT MANAGEMENT (ECOLOGICAL SETTING)

The ecological regions of the United States, or "Ecoregions" were first described in 1978 by the U.S. Department of Agriculture (USDA) Forest Service (Bailey 1995). The purpose of the original study was to provide a general description of the ecosystem geography of the United States, which resulted in a map titled *Ecoregions of the United States*. The technique of mapping ecoregions was subsequently expanded to include the rest of North America and the world. In 1993, as part of the Forest Service's National Hierarchical Framework of Ecological Units, ecoregions were adopted for use in ecosystem management (Figure 3-1) (Bailey 1995). NAVBASE Kitsap lies within the Puget Trough ecoregion, which is recognized for its rich, complex, and important marine near shore environment. This ecoregion features a wide variety of deep-water and near shore habitats including coastal lagoons, kelp and sea grass beds, rocky shores, sandy beaches and spits, and salt marsh wetlands. The diversity of life in and around Puget Sound has been influenced by the complex interactions of the freshwater and saltwater environments. These and the surrounding forests support a complex web of plants, fish and other organisms, which include more than 200 species of fish, dozens of marine mammals, hundreds of birds and thousands of marine invertebrate species (WDFW 2005).

NAVBASE Kitsap also lies within the Marine Ecosystem Division (Ecological Unit [EU] 240) of the Humid Temperate Ecosystem Domain (EU 200) (Bailey 1995). The Marine Division is situated along the Pacific Coast between latitudes 40 and 60 degrees north; it is a zone that receives abundant rainfall from maritime polar air masses and has a rather narrow range of temperatures because it borders on the ocean. Coastal mountain ranges influence precipitation markedly in these middle latitudes. Although precipitation is abundant throughout most of the year, it is considerably limited during the summer. The total rainfall is not great by tropical standards, but the cool air temperatures cause a reduction in evaporation and produce a very damp, humid climate, with much cloud cover, resulting in mild winters and relatively cool summers.

NAVBASE Kitsap also occupies the Pacific Lowland Mixed Forest Province (EU 242) that occurs within a north-south depression between the Coast Ranges and the Cascade Mountains. Elevations range from sea level to 1,500 ft (460 m). Soils are principally characterized as mostly Alfisols, Inceptisols, and Ultisols, but are primarily dominated by Inceptisols within the Puget Sound Valley (Bailey 1995).

In 2005, several other scientific and planning entities have utilized this ecoregion unit as the basis for assessment and study, most significantly the non-governmental organization NatureServe, whose work is primary in plant associations and habitat descriptions and

categorizations. The Navy has adopted this classification standard for use in the annual Natural Resource metrics and reporting.

3.1 Physical Setting

3.1.1 Climate & Topography

The climate in the region near NAVBASE Kitsap has a strong marine influence characterized by cool, dry summers and mild, wet winters. Precipitation in this region generally averages 50 - 65 inches per year with over 98% falling in the form of rain. Only 5 - 10% of the annual precipitation occurs between July and September (DON-SBB 2000). The majority of the intense winter storms created in the Pacific Ocean never enters the NAVBASE Kitsap area due to the protection provided by the Olympic Mountains [U.S. Department of Agriculture-Soil Conservation Service (USDA-SCS) 1994]. However, there is a gap located between the Olympic Mountains and the Willipa Hills, which provides a low-level passage for marine air moving inland (USDA-SCS 1994). Occasional hot, dry air masses from east of the Cascades reach the Puget Sound area for brief periods, but temperature extremes are generally modified by weather systems moving eastward from the Pacific Ocean (USN 2001b).

Area topography also influences precipitation levels throughout the region and the surrounding environs. Lowland areas surrounding the City of Bremerton receive an annual precipitation of about 50.6 inches (URS 1999). Precipitation in the higher elevation areas of the watershed can be much greater. For example, precipitation at the Twin Lakes rain gauge in the Gorst Creek watershed, maintained by the City of Bremerton, averages 60 inches per year. Average precipitation on Gold Mountain, the highest point in the Sinclair Inlet watershed, is greater still (URS 1999). Winter snowfall is generally light, averaging 8.8 inches annually. The annual average temperature in the City of Bremerton is 51 degrees Fahrenheit (°F) (URS 1999). Daily mean high and low temperatures for January are 45°F and 34°F, respectively. Daily mean high and low temperatures for August are 75°F and 54°F, respectively (URS 1999).

During summer months, winds in the City of Bremerton area are generally light but persistent, due to the presence of regional sea breezes. From June to September, winds generally blow from the north with velocity ranges 0 - 9 miles per hour (mph). However, the complexity of the shoreline geography in the region can effect wind direction. For instance, wind measurements taken during the summer months of 1994 indicated prevailing winds originating from the east to northeast and blowing toward the landward end of Sinclair Inlet (URS 1999). During the winter, winds are stronger but more variable, associated with the frequent passage of storm systems. Prevailing winds are from the southwest, with velocities often reaching 20 mph from October to May. However, strong winter storms from the north do occur annually, resulting in relatively high-energy wave action on areas of the inlet’s south shoreline.

On average, 5 - 8 days per month, the region experiences clear or partly cloudy days during the winter; whereas during the summer, approximately 20 days per month are clear or partly cloudy

(URS 1999). Relative humidity ranges from 75 - 85% during the day and as high as 85% at night. The frequency of foggy days' averages 10% annually, rising as high as 20% in October and November (URS 1999).

Climate change has not been properly assessed for the majority of DOD installations, including the installations that are covered in this INRMP. The United States Government Accountability Office (GAO) was asked to assess the DOD's actions to adapt to the challenges of climate change during a DOD and Installation audit, with a final report submitted in May 2014. During this audit, it was found that some of the installations were trying to incorporate the required information into their INRMPs with varied interpretations of instructions, while others were leaving it out until further guidance. The GAO report provided 3 recommendations that the DOD concurred with in the final report. These three recommendations were to complete a baseline climate change vulnerability assessment of all DOD sites; provide further direction and information to clarify instructions that were submitted to the installations; and, approval for projects may in future incorporate a climate change adaptation that should be listed in the approval process for funding.

Climate change regulations are evolving. Currently, the following serve as guidance:

EO 13514**:** Oct 2009**.** Energy (GHG reduction), Water, Waste conservation and reduction goals

- Requires agency Strategic Sustainability Performance Plans

Whitehouse Council on Environmental Quality (CEQ): (Mar 2011). "Federal Agency Climate Change Adaptation Planning, Implementing Instructions" require federal agencies to:

- Assess likely effect of climate change on agency's ability to achieve its mission & strategic goals, Sept 30, 2011

QDR: **(**Feb 2010) "The Department must complete a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required."

Department of Defense Strategic Sustainability Performance Plan: (August 2010). Planning actions in accordance with EO13514

DoDI 4715.03: (Feb 2011). Integrate climate change impact assessment and adaptation planning in INRMPs.

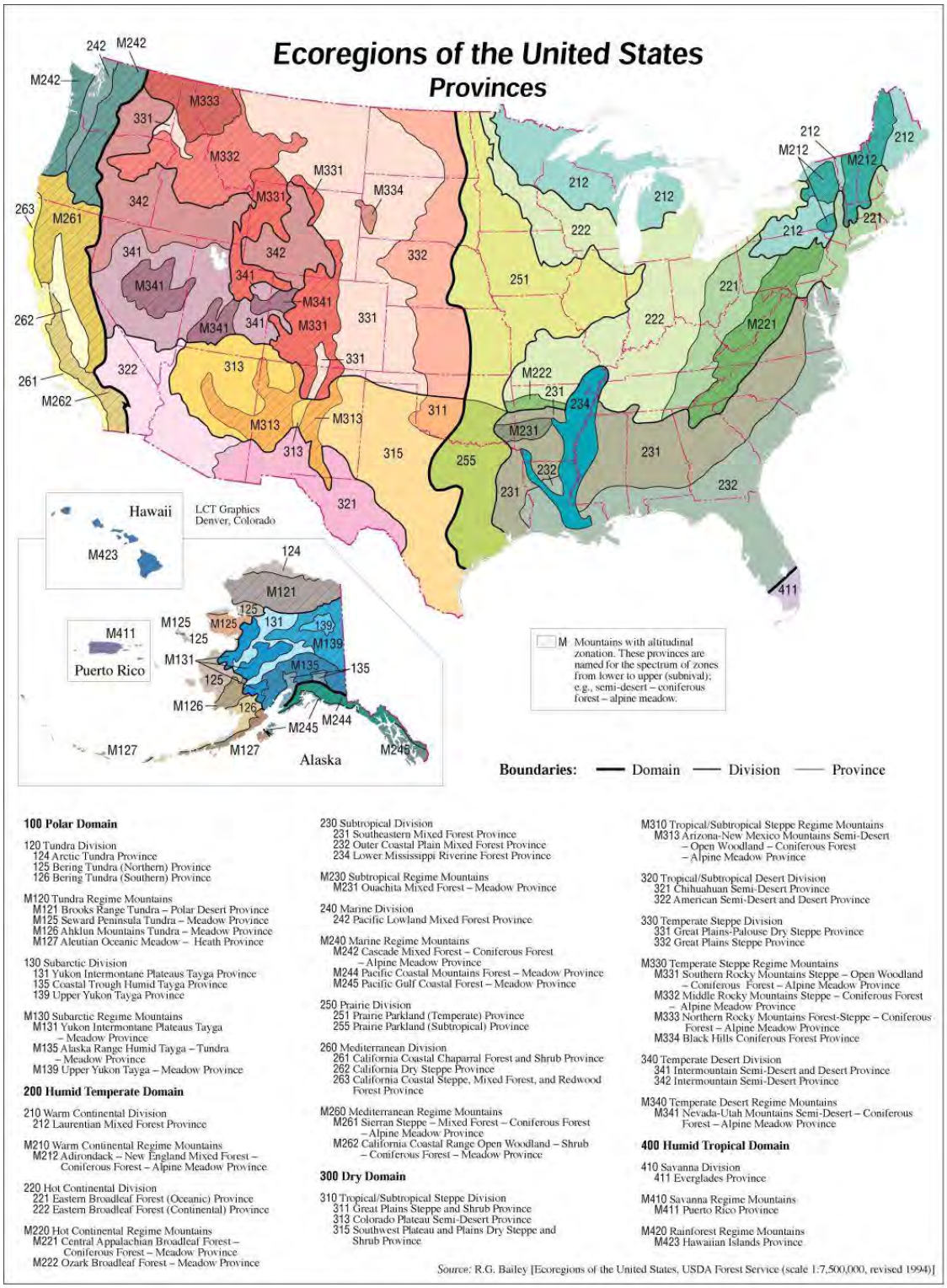

Figure 3-1: Ecoregions of the United States

3.1.2 Water Resources

The Puget Sound Georgia Basin, which encompasses all of the NAVBASE Kitsap installations, is comprised of 13 parallel and similar hydrologic units that discharge into coastal bays, inlets, estuaries, and lagoons of Puget Sound and then toward the Pacific Ocean. The hydrology of streams along the eastern portion of Hood Canal and the Puget Sound Basin are unique in that they are dependent on precipitation and groundwater contribution, and receive snowmelt runoff from the Olympic or the Cascade Mountains (PSSRP 2007). However, much of the western portion of the Puget Sound lies in the rain shadow of the Olympic Mountains that results in reduced precipitation.

The U.S. Geological Survey (USGS) and USDA - Natural Resources Conservation Service (NRCS) developed Federal Guidelines, Requirements, and Procedures for the National Watershed Boundary Dataset, which establishes interagency guidelines, requirements, and procedures that created a national, consistent, seamless, and hierarchical hydrologic unit dataset based on topographic and hydrologic features across the United States (USGS and USDA-NRCS 2009). This Watershed Boundary Dataset (WBD) at a 1:24,000 scale in the conterminous United States consists of digital geographic data that include two additional levels of detailed hydrologic unit boundaries nested within existing or modified 1: 250,000-scale hydrologic units. The WBD document serves as interagency guidance for developing digital geographic data for watersheds.

According to the revised WBD, NAVBASE Kitsap lies within the Puget Sound Sub region 1711 (16,800 square miles) of the Pacific Northwest Region 17 (277,660 square miles). The Puget Sound Georgia Basin drainage system is further defined by 13 hydrological connected watersheds that ultimately discharge into the Strait of Georgia and Strait of Juan de Fuca, then the Pacific Ocean. However, of these 13 connecting watersheds, only three watersheds encompass all NAVBASE Kitsap installations (Figure 3-2) and include:

- Tahuya River-Frontal Hood Canal (171100180102): 157,215 acres
- Little Quilcene River-Frontal Hood Canal (1711001807): 26,165 acres
- Olalla Valley-Frontal Puget Sound (1711001907): 184,408 acres

Washington State also has a watershed identification scheme, the Water Resource Inventory Area (WRIA), which uses a numbering system. All NAVBASE Kitsap installations fall within WRIA 15 (Kitsap) with the exception of the Toandos and Zelatched Point properties, which fall in WRIA 17 (Quilcene-Snow) (WDOE 2007).

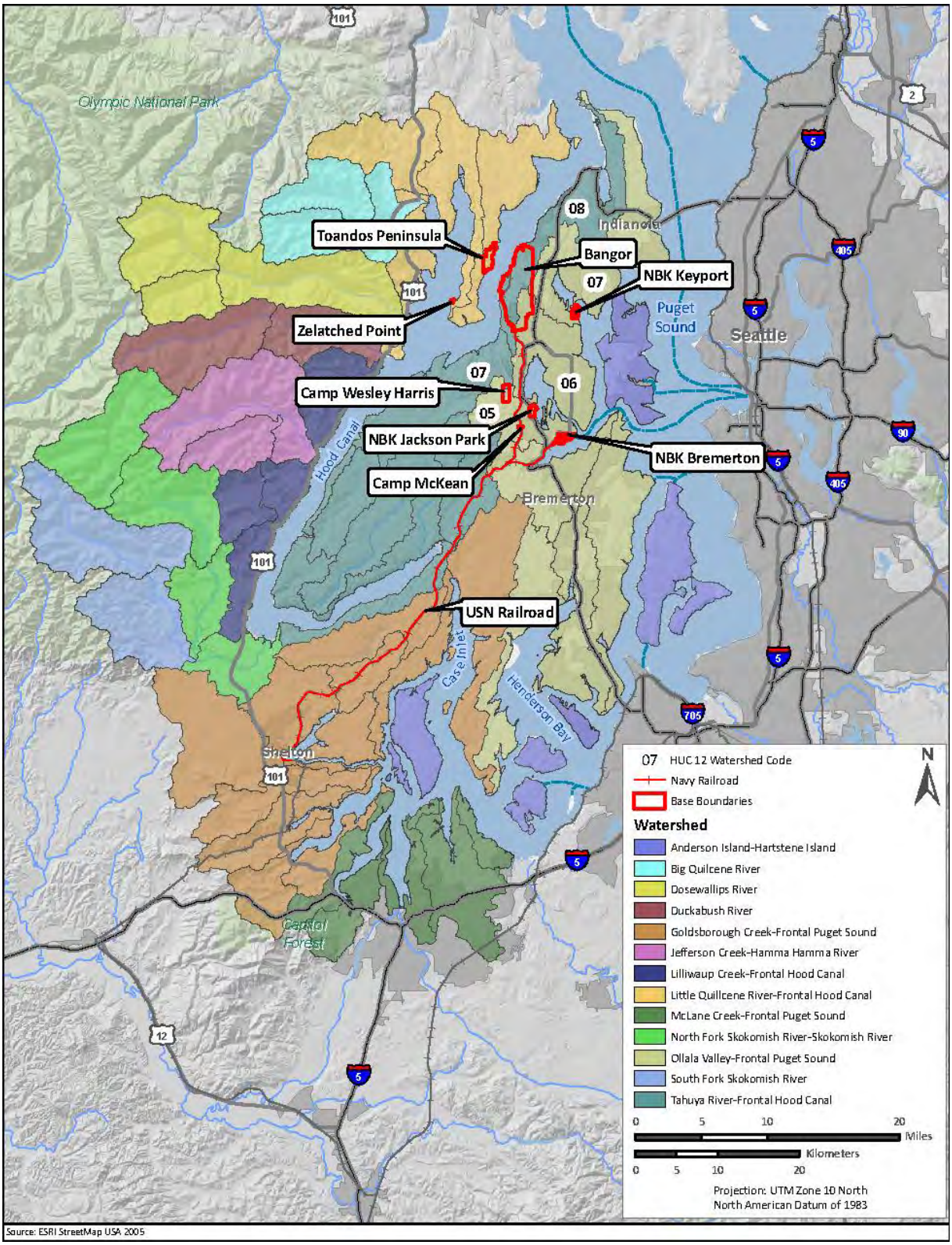

Figure 3-2: NAVBASE Kitsap Watershed Map

3.1.3 Geological Resources

The area encompassing NAVBASE Kitsap and associated military installations lies in the Puget Sound Lowland. The Puget Sound Lowland is a broad structural trough, filled with unconsolidated sediments of Miocene to recent age overlying volcanic bedrock. Several continental ice sheets covered the region during the Quaternary period, resulting in the complex deposition of glacial and interglacial deposits. The latest of these is called the Fraser glaciations and consisted of several ice advances, of which the Vashon Stade was the most extensive.

The Quaternary geologic history for the Puget Lowland is outlined by six stratigraphic units, which are significant features of the hydro geologic system at NAVBASE Kitsap. These units, from youngest to oldest and their general characteristics are discussed below:

- Vashon Recessional Outwash consists of a thin veneer of interceded sand and gravel, deposited by melt water flowing from the receding glacier. These deposits occur mainly in the large north-south trending outwash channels. Localized perched aquifers, situated in outwash-filled depressions in the upper surface of the less permeable Vashon Till provide small quantities of groundwater.

- Vashon Till is a lodgment till typically consisting of a hard, gray, heterogeneous deposit resembling concrete. Thickness ranges from a few feet to over 50 feet. It consists of various sized gravels and boulders suspended in a matrix of clay, silt, and sand that were deposited at the base of the glacier as it moved across the landscape. Till clasts are derived from local basaltic bedrock sources and from granitic and metamorphic sources located in the northern Puget Lowland and British Columbia. The overall dense, compact nature of the till hinders groundwater flow, making it one of the primary aquitards in the area. It serves as a low permeability base for perched aquifers and the upper bounding unit for confining groundwater zones. This unit may not be continuous across the Bangor area.

- Vashon Advanced Outwash consists primarily of coarse sands and gravels beneath the Vashon till. These predominantly glaciofluvial sediments were deposited in the proximal areas in front of and along the sides of the advancing Vashon ice sheet. A typical sequence described by Garling and others (1965) contains poorly sorted gravels at the top, grading down to well sorted, stratified sands and gravels with localized strata of lacustrine silt and clay. This unit is highly permeable and may yield large quantities of water where it extends below the regional water table. Confined groundwater can be encountered where the advance outwash is capped by low permeability till.

- The Kitsap Formation consists of laminated silt and clay with an occasional stratum of sand and gravel, deposited in an interglacial lacustrine environment. Thickness can be as much as 150 feet with the top of the unit normally below sea level although it may be encountered as high as 150 feet above sea level. Unnamed gravel is commonly associated

with the Kitsap Formation, consisting of iron-stained poorly bedded, fine to cobble gravels derived from the Olympic Mountains to the west and reworked granitic pebbles from older glacial tills. The finer-grained portion of this sequence is unimportant as a viable source for domestic water supplies. However, the numerous discontinuous sand and gravel strata of the Kitsap Formation and the unnamed gravel yield small supplies of groundwater.

- The Older Sand and Gravel incorporates the Salmon Springs Drift and pre-Salmon Spring's deposits (undifferentiated) (Garling et al. 1965). The Salmon Springs Drift consists of interceded coarse gravels and sands deposited in a fluvial environment, with local occurrences of glacial till. Pre-Salmon Springs glaciation deposits are undifferentiated and include both glacial and non-glacial fine-grained sands, silts, and clays. These deposits can be differentiated from Vashon deposits by the high degree of iron oxidation, and the inclusion of pumice granules and lenses. The top of these sediments occurs near sea level while the base is seldom encountered. The combined thickness is believed to be over 200 feet. The coarser-grained Salmon Springs Drift is capable of supplying large quantities of artesian groundwater and is reported to be the most important groundwater unit on the Kitsap Peninsula.

- The Tertiary Volcanic Bedrock predominantly consists of dark, fine-grained basalt. In some areas, secondary mineralization has created an amygdaloidal texture. The total thickness of these rocks is not known but is in excess of 7,000 feet. The dense and extremely impermeable character of these rocks renders them unimportant as aquifers.

NAVBASE Kitsap also lies within 42 miles (70-kilometer) of the Seattle Fault, which could be an epicenter for earthquakes. This neighboring fault could generate a shallow crustal event, with potential magnitudes of 8 on the Richter scale (USN 2001b).

3.1.4 Soils & Installation Restoration (IR) Sites

The following soils overview of Kitsap County is from the *Soil Survey of Kitsap County Area, Washington*, by Carl McMurphy [published in 1980 by the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS 1980)]:

"The soils of Kitsap County formed mainly in glacial drift deposited by the most recent of several continent-sized glacial ice sheets. This 3,000-foot thick glacier, emanating from Canada, formed most of the topography and waterways of the area between 13,000 and 15,000 years ago. The predominant deposit, and therefore soil parent material, is glacial till. It generally consists of compact basal till covered by a thin, discontinuous layer of ablation till. The Alderwood, Harstine, Kapowsin, Poulsbo, Shelton, and Sinclair soils formed in this till material. As the glacier approached and receded from the area, melt water streams deposited outwash sand and gravelly sand. The Indianola, Ragnar, Neilton, and Grove soils formed in the outwash material.

Glaciolacustrine silt and clay were also deposited in some places during glaciations. The Kitsap and Kapowsin Variant soils formed in this material."

The Toandos Peninsula falls within Jefferson County. The following soils overview is from the *Soil Survey of Jefferson County Area, Washington*, by Fred McCreary (USDA-NRCS 1975):

"The eastern part of Jefferson County consists of relatively low, rolling to moderately steep, glacial terraces and long, narrow valleys in the northern and northeastern sections. The southern section of this part consists principally of moderately steep to steep glacial terraces and very steep, rough, broken mountain foothills. Most soils are too gravelly and stony or too steep for farming. About half of these soils are relatively poor, and nearly all of them are deficient in the essential elements of nitrogen potassium, and phosphate. Most soils of this eastern section are most suitable for growing trees or other forest products."

3.2 Ecological Communities of Naval Base Kitsap

3.2.1 Wetlands Management

EO 11990, *Protection of Wetlands* (1977), initially defined "wetlands" as those areas inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Section 6c). This definition was adopted into the Clean Water Act (CWA) for regulatory purposes [40 Code of Federal Regulations (CFR) § 230.3(t)]. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds. EO 11990 requires federal agencies to minimize the loss or degradation of wetlands and to enhance their natural values. Section 404 of the CWA prohibits discharges of dredged or filled material into waters of the U.S., including wetlands, without first obtaining a permit from U.S. Army Corps of Engineers (USACE). According to OPNAV M-5090.1, the Navy will comply with the national goal of no net loss of wetlands, and will avoid loss of size, function, and value of wetlands.

The majority of wetlands in and around developed areas on NAVBASE Kitsap at Bangor have been previously delineated to varying degrees although changes to surface-water hydrology can alter the size of wetlands. Changes in hydrology and the potential for finding additional, typically small wetlands is always present and must be verified on the ground prior to finalizing project design and pursuing implementation. Baseline climate change vulnerability assessment of all DOD sites would help in assessing wetlands and surface-water hydrology, and possible changes to this sytem. Further information to clarify instructions that were submitted to the installations; and, approval for projects may in future incorporate a climate change adaptation that should be listed in the approval process for funding.

Wetlands on NAVBASE Kitsap at Keyport adjacent to developed areas are also generally well delineated. The USN Railroad was surveyed in 2015 to document the location, size, likelihood and quality of wetland presence within the Navy right-of-way. NAVBASE Kitsap properties where limited wetlands information is available include Camp Wesley Harris, Jackson Park and Naval Hospital Bremerton, and the Toandos Buffer Zone. There are no known wetlands within the boundaries of NAVBASE Kitsap at Bremerton.

To help categorize previously undelineated wetlands on Navy owned property, NAVBASE Kitsap uses the WDOE *Wetland Rating System for Western Washington* (WDOE 2014), which is consistent with the U.S. Corps Wetland Delineation Manual and its regional supplements. The purpose of the rating system is to differentiate between wetlands based on the functionality, sensitivity, significance, replacement capability, and rarity of the wetland. Use of this rating system aids NAVBASE Kitsap land managers and planners in protecting and managing wetlands. NAVBASE Kitsap Environmental staff evaluating previously uncategorized wetlands will use the latest version of WDOE's Wetland Rating Form for Western Washington. These staff will have experience and/or education in the identification of natural wetland features, indicators of wetland function, vegetation classes, and ability to distinguish between different plant species.

Wetlands on NAVBASE Kitsap property requiring delineation will fall into Categories I through IV based on the points assigned by WDOE's Wetland Rating Form. Table 3-1 describes the categories and point system to be used on NAVBASE Kitsap wetlands.

Table 3-1: NAVBASE Kitsap Wetland Categories based on Washington State Wetland Rating System

Wetland Category	Description	Scoring
Category I	Wetlands that 1) represent a unique or rare wetland type; or 2) are more sensitive to disturbance than most wetlands; or 3) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or 4) provide a high level of functions.	>23
Category II	Wetlands that are difficult, though not impossible, to replace and provide high levels of some functions. Wetlands that are disturbed and may be Estuarine and greater than 1 acre.	20 – 22
Category III	Wetlands with a moderate level of functions and may be Estuarine between 0.1 and 1 acre in size.	16-19
Category IV	Wetland with the lowest levels of function and are often heavily disturbed.	<16

Through NAVBASE Kitsap's Environmental Review process, described in Section 2.2.4, Environmental staff will confirm whether a proposed project will impact wetlands. Proposed projects will maintain undisturbed buffers around wetlands according to Table 3-2.

Table 3-2: Wetland Buffer Widths on NAVBASE Kitsap Properties

Category of Wetland	Buffer Width
Category I	200 feet
Category II	100 feet
Category III	50 feet
Category IV	30 feet

Buffer widths will be measured horizontally from a perpendicular line established at the wetland edge to the buffer width specified in Table 3-2. The Navy's Geographic Readiness Exchange (GRX) provides general mapping for site planning purposes. Mapping tools can plot buffers around water features for planning purposes. Environmental staff performing this analysis should

verify that the applicable GRX layers are based on an up-to-date survey of the water feature as changes in surface-water hydrology could alter wetland boundaries.

Decreases to the above buffer widths must be approved by the NAVBASE Kitsap Environmental Director. Projects requesting a decrease in wetland buffer widths will be required to demonstrate that the decreased buffer will not adversely impact the wetland. Projects where direct impacts to wetlands are unavoidable will require a CWA Section 404 permit and Compensatory Mitigation, as regulated by the USACE.

NAVBASE Kitsap staff will characterize baseline wetland conditions as needed and ensure GIS layers reflect the proper size and conditions as consistent with resources allocated to the installation to implement. NAVBASE Kitsap will enhance the functions and values of these systems as allowable and ensure no loss in size or function.

3.2.2 Streams, Lakes and Riparian Zone Management

3.2.2.1 Streams and Lakes

The management approach to the streams and lakes on NAVBASE Kitsap properties is similar to wetlands management. The location of perennial streams and lakes on NAVBASE Kitsap properties are generally well documented and are detailed on the installation maps presented in Sections 4 through 7. Similar to wetlands, the exact course of streams may change from year to year due to high winter flows, beavers, or other natural changes to surface-water hydrology.

Streams, lakes, and riparian zone management should be considered as watershed processes. Watershed processes are dynamic physical and chemical interactions that form and maintain the landscape and ecosystems. For example, the way that water, sediment, and wood move determine the shape and form of the channel and complexity of the physical features present. A stream with more of these physical features usually supports a greater number of species across the food chain, including fish.

3.2.2.2 Riparian Zones

The benefits of riparian vegetation around streams, lakes, shorelines, and estuarine areas includes preventing/reducing erosion, providing wildlife habitat, providing shade and therefore lowering water temperatures, and removing runoff pollutants via biofiltration. To maintain riparian vegetation, water bodies on or adjacent to NAVBASE Kitsap properties will be classified according to whether the water body supports fish habitat or not. For the purposes of Natural Resource Management at NAVBASE Kitsap, fish habitat is defined as areas of importance to the maintenance of fish, including areas supporting endangered, threatened, and sensitive species; and lakes or streams planted with game fish. Water bodies not previously classified on NAVBASE Kitsap property may require an assessment by fisheries biologist or other specialists to determine whether it supports fish habitat.

Proposed projects in the vicinity of freshwater bodies will be required to maintain riparian buffers according to Table 3-3.

Table 3-3: Riparian Zone Buffer Widths on NAVBASE Kitsap Properties

Category of Water Body	Buffer Width
Contains habitat for salmonids, game fish, and other anadromous fish	150 feet
Does not contain fish habitat	50 feet

Riparian buffers should be measured from the ordinary high water mark or from the top of the bank where the ordinary high water cannot be identified. A building or impervious surface setback line of 15 feet is required from the edge of the buffer. In addition to the above buffers, NRMs will incorporate the following recommendations whenever possible (Washington Sea Grant 2009):

a) **Protect marine riparian soils and vegetation** – prevent damage to native riparian soils and vegetation, including clearing, grading, compaction, covering (paving) and removal.

b) **Restore damaged marine riparian habitat** – restore vegetation, soil characteristics.

c) **Account for scale issues (temporal and spatial)** – when evaluating riparian condition, current functions and potential for future functions, and cumulative effects of alterations. The dynamic nature and connectivity of riparian areas and linkages between riparian and aquatic systems operate at multiple scales.

d) **Exclude all major sources of contamination from the riparian buffer** – including construction, impervious surfaces, mining, septic system drain fields, agricultural activity, clear-cutting, and application of pesticides and herbicides.

e) **Manage riparian areas for the long-term** – for many sites, substantial time, on the order of years to decades, will be required for vegetation to become fully functional.

f) **Require additional structural setbacks landward of buffers –** will allow routine maintenance of structures without compromising buffer function integrity.

g) **Climate change** - has not been properly assessed for the majority of DOD installations, including the installations that are covered in this INRMP. A recommendation by the GAO is a baseline climate change vulnerability assessment of all DOD sites (DoDI 4715.03).

Use of pesticides, fertilizers, and herbicides in riparian buffer areas is prohibited except those approved by the Environmental Protection Agency (EPA) or WDOE for use in fish and wildlife habitat areas. NAVBASE Kitsap planners and environmental project reviewers should ensure that riparian buffers are based on current surveys of the water body. The NAVBASE Kitsap pest managers will follow the WDFW recommended timing restrictions for planning all pesticide applications within riparian and aquatic areas. Pesticide use in the riparian area may only be conducted with approval of the NRM after the NRM ensures the chemical is appropriate for use in aquatic applications, the proper NPDES permit is in place, and all necessary ESA and EFH consultations have been completed.

Reduction of the above specified riparian buffers shall occur only with the written approval of the NAVBASE Kitsap Environmental Director and after demonstration that the water body will not be adversely impacted or that impacts are sufficiently mitigated. Similar to wetlands, unavoidable impacts to streams or lakes will require a CWA Section 404 permit and Compensatory Mitigation, as regulated by the USACE.

NAVBASE Kitsap staff will characterize stream and riparian zone conditions as needed and as consistent with resources allocated to ensure GIS layers reflect the proper size and conditions. NAVBASE Kitsap will enhance the functions and values of these systems as allowable and ensure no loss in size or function.

3.2.2.3 Low Impact Development

The Navy's low impact development (LID) policy for stormwater management (USN 2007d) has set a goal of no net increase in stormwater volume, sediment, or nutrient loading from major renovations and construction projects[1]. To support this goal, the policy directs that LID be considered in project design for stormwater management. The Navy is directed to plan, program, and budget to meet the requirements of this policy starting in fiscal year (FY) 2011. Additionally, Congress enacted Section 438 of the Energy Independence and Security Act (EISA) of 2007 to require federal agencies to reduce storm runoff from federally funded development projects. Federal agencies can comply with EISA Section 438 by incorporating a variety of LID stormwater management practices into the design of development projects.

EISA Section 438 will apply to a larger number of projects on NAVBASE Kitsap as compared with the Navy's LID policy triggers. The EISA provision is as follows:

> **"**The sponsor of any development or redevelopment project involving a federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the

[1] Major renovation projects are defined as having a stormwater component and exceeding $5 million when initially approved. Major construction projects are defined as those exceeding $750 thousand.

maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."

A strong component of LID stormwater management is maintaining or mimicking the natural functions of wetland and riparian buffers to infiltrate, evapotranspirate, dissipate, and filter runoff from developed areas. Additionally, maintaining or restoring predevelopment hydrology under the requirements of the EISA Section 438 will further encourage new construction to occur in previously developed areas thus promoting preservation of undeveloped lands.

3.2.3 Shoreline and Nearshore Management

Shellfish, forage fish, and many other wildlife species utilize the beaches and shoreline areas of NAVBASE Kitsap. At NAVBASE Kitsap, proposed projects, operations, or other actions are reviewed for any foreseeable effect on coastal use or resource. This analysis includes direct and indirect environmental effects as well as effects on coastal resources. Review of upland projects could include identification of point and nonpoint source pollution while projects on the shoreline may need review for above water shading and marine habitat impacts. This review will include NAVBASE Kitsap staff with expert knowledge in many areas including the ESA, CWA, wetlands management, forestry, and the Coastal Zone Management Act (CZMA).

CZMA calls for the effective management, beneficial use, protection, and development of the nation's coastal zone. As a means to reach those goals, the CZMA requires participating coastal states, including Washington, to develop management programs that demonstrate how states carry out their obligations and responsibilities in managing their coastal areas. In Washington, the WDOE is responsible for Washington's Coastal Zone Management Program. While the coastline, marine waters, and resources within NAVBASE Kitsap are not within the bounds of the state's enforceable coastal zone program, the "Federal Consistency" section of the CZMA requires NAVBASE Kitsap to comply to the maximum extent practicable with Washington's Coastal Zone Management standards.

During project review, if NAVBASE Kitsap determines an activity is likely to have coastal effects, a consistency determination, accompanied by supporting information is sent to WDOE for review. WDOE has 90 days to review and work with NAVBASE Kitsap to resolve any differences. In addition to project reviews the NRMs will do the following in support of managing NAVBASE Kitsap shoreline habitats:

a) **Inspect the shorelines, especially the beach areas, for manmade debris.** Manmade trash, often consisting of plastic items, washes up on many shorelines in the Puget Sound area. This trash is unsightly, and some items may be perceived as a food source by wildlife and cause harm. Accumulations of trash or manmade objects may remove areas of shore from forage fish spawning opportunities or from bird use. If any derelict fishing nets are observed near or on Navy properties, they will be reported to the Northwest

Straits Initiative at 360-733-1725 or 1-855-542-3935 or online at: http://www.derelictgeardb.org/reportgear.aspx.

b) **Protect aquatic vegetation.** Eelgrass, kelp, and marine algae may be found along some of the sub- and intertidal areas around NAVBASE Kitsap. Eelgrass generally occurs in shallow waters as deep as 10 meters while kelp can be found in waters as deep as 20 meters (Mumford 2007). Both eelgrass and kelp provide an important habitat for marine invertebrate and vertebrate species including ESA listed salmonids and rockfish. The varied types of marine algae in the Puget Sound and Hood Canal are an important food sources for several species of sea birds, fish, and invertebrates. During the program/project review process, the NRM will look for potential impacts to aquatic vegetation and offer alternatives to minimize or eliminate the impacts. Due to the uncertainty surrounding the success of eelgrass restoration and mitigation projects around the Puget Sound, protecting intact vegetation should be considered a priority for all in-water work. Specifics regarding the types of aquatic vegetation found at each of the installations covered within this INRMP can be found in the following installation specific Sections 4 through 7.

c) **Stormwater runoff.** The NRM will work with NAVBASE Kitsap and PSNS & IMF stormwater managers in reviewing proposed projects and programs for stormwater or other discharges, and ensure that these discharges do not degrade the water or sediment quality of the waters surrounding an installation.

d) **Military training.** The Navy and other services conduct training operations at various installations in Puget Sound. However, operations with the potential to impact shorelines are infrequent at NAVBASE Kitsap. Training operations can require that equipment and personnel utilize the near shore areas. The NRM will be familiar as to the seasonal use of beaches by birds and forage fish spawning, and recommend shoreline areas or seasonal timing that will result in minimal or no impact to these species or their habitats. Proposed exercises would go through a thorough review under the NAVBASE Kitsap environmental review process described in Section 2.2.4.

e) **Avoid Shoreline Armoring.** The NRMs will work with NAVBASE Kitsap planners and project managers to minimize new shoreline armoring and to use soft armoring whenever possible. The NRMs will encourage the placement of new buildings, roads, and other development outside of the shoreline area as to avoid the need for armoring. When repairing armoring or installing new armoring, NAVBASE Kitsap will strive to use soft armoring techniques such as large woody debris, gravel berms, beach nourishment, and vegetation, and review the Marine Shorelines Design Guidelines as guidance for work. Soft shore techniques are site specific and have had varied success throughout the Puget Sound. The NRMs will seek the expertise of outside officials when appropriate. The Shorelands and Environmental Assistance Program at the WDOE and/or local Habitat

Biologist from the Washington State Department of Fish and Wildlife may be called upon to assist in the design, implementation, and monitoring of these projects.

3.2.4 Aquifer Management

Management of the aquifers on NAVBASE Kitsap ensures the Navy's ability to continue providing a clean source of potable water (where utilized), prevents saltwater intrusion and contaminant introduction, and helps maintain stream flow during summer months. Some degree of active aquifer management occurs on the following NAVBASE Kitsap installations: NAVBASE Kitsap Bangor, NAVBASE Kitsap Bremerton, NAVBASE Kitsap Keyport, and Jackson Park. Past industrial and military activities have introduced contaminants into the upper aquifers at all four of these locations. Efforts are ongoing at these installations to remediate and/or monitor the groundwater in the upper aquifers. Two installations, NAVBASE Kitsap Bangor and NAVBASE Kitsap Keyport, use the groundwater from deeper aquifers as potable water sources. Wellhead protection programs at NAVBASE Kitsap Bangor and NAVBASE Kitsap Keyport limit development and activities within specified distances to the wells. Wastewater for NAVBASE Kitsap is pumped to the local treatment facilities that are regulated by the WDOE.

Installation specific management of the aquifers at NAVBASE Kitsap Bangor and NAVBASE Kitsap Keyport is provided in Sections 4 and 5. Ongoing remediation efforts and/or long term groundwater monitoring at NAVBASE Kitsap Bangor, NAVBASE Kitsap Bremerton, NAVBASE Kitsap Keyport, and the Jackson Park Housing Complex are aimed at reducing contaminant migration to other aquifers or surface water with impacts to human health and the environment. Information on the Installation Restoration sites for these installations is provided in Appendix F.

3.2.5 Forest Management

3.2.5.1 Authority and Requirement

The authority and requirement to have a Forest Management Plan is contained in an array of laws and DOD, DON, and NAVFAC instructions and directives cited elsewhere in this INRMP. For example, 32 CFR § 190 prescribes policies and procedures for an integrated program for multiple-use management of natural resources on property under DOD control. Title 10 USC, Section 2665, authorizes the sale of forest products as well as reimbursement for the costs of managing forest resources for timber production. This is administered in accordance with DOD Financial Management Regulation Volume 11A, Chapter 16 (August 2002), Accounting for Production and Sale of Forest Products. The Department of the Navy Financial Management Policy Manual, Volume 3, paragraphs 07150 and 035475-79, provide guidance on funding, accounting, and fiscal reporting procedures. The Timber Conservation and Shortage Relief Act of 1990 prohibit export of unprocessed timber originating from federal lands west of the 100th meridian. OPNAV M-5090.1, Environmental and Natural Resources Program Manual, discusses

requirements, responsibilities, and policy for natural resources management for Navy ships and shore activities. NAVFAC P-73, Real Estate Procedures Manual Vol. II, provides contractual guidance for timber sales. DODINST 4715.03 provides policy, requirements, and procedures on the use, sale, and disposition of Government forest products.

In accordance with DOD and DON requirements, the Navy Forest Management Program is centrally funded and centrally executed through NAVFAC. The NAVFAC Northwest Forester will provide professional forestry services to manage and develop the forest resources for the economical production of forest products and the conservation of related resources. The Forester will prepare, and review with the installation, the forestry annual work increments. As this is a centrally managed program, the Forester's services and forest management projects are funded by Forestry Funds, at no cost to the installation. Forest projects may be supported with other funding sources as well. Non-silvicultural forestry actions, such as land clearing for construction or security/safety clearance zones, require that project funds be provided for the professional forester services provided by NAVFAC Northwest.

3.2.5.2 Forest Description

NAVBASE Kitsap forestlands are located on nine operational land components:

a) NAVBASE Kitsap Bangor (including the Ordnance Annex): 3,754 acres of forest

b) Toandos Peninsula: 723 acres of forest

c) Camp Wesley Harris: 355 acres of forest

d) NAVBASE Kitsap Keyport: 52 acres of forest

e) NAVBASE Kitsap Bremerton: small dispersed clumps and urban forest

f) Jackson Park Housing Complex & Naval Hospital: small dispersed clumps and urban forest with a 15-acre parcel northwest of the hospital

g) Camp McKean: small dispersed clumps and urban forest

h) Zelatched Point: 15 acres of forest

i) Navy Shelton-Bremerton-Bangor railroad right-of-way: 300 acres of forest

Total forest acreage is approximately 6,090 acres plus the small dispersed clumps and urban forest at NAVBASE Kitsap Bremerton, Jackson Park and Camp McKean. This acreage could be increased significantly if open and brush areas were planted with native conifers.

The recent history of forest management at NAVBASE Kitsap can be surmised from the existing timber stands. The majority of existing trees are 60 - 125 years old, with a few scattered relict old

growth trees. This indicates that most of the acreage was harvested by pioneering landowners prior to Navy acquisition of the properties.

The reforestation of areas harvested in the 1860s and subsequent decades resulted from natural seeding coinciding with favorable environmental conditions for the establishment of new stands of timber. Since Douglas-fir dominated the acreage adjacent to harvested areas, it was the primary tree available to provide seed. In climatic regimes conducive to its growth, Douglas-fir produces an abundance of seed that can germinate on a wide variety of surface conditions. Therefore, naturally established stands of Douglas-fir tend to be very dense, often containing more than 2,000 stems per acre at an early age. The existing Navy forest stands have essentially developed naturally. Since the Navy acquired the property, there has been active forest management to improve the health and vigor of the forest stands. This Plan will continue those efforts to improve tree and forest health, vigor, and horizontal and vertical structural diversity.

3.2.5.3 Forest Management Plan

This forestry plan provides programmatic and silvicultural policy for ecologically sound and sustainable management of forest resources on NAVBASE Kitsap. It outlines procedures, projects, and silvicultural prescriptions to restore, enhance, conserve, and protect the productivity and resources of approximately 6,090 acres of forest on NAVBASE Kitsap land components. This plan will also address opportunities to reforest or afforest areas currently devoid of trees.

This plan's policies address existing second growth stands as well as restoration of the coniferous forest areas impacted by construction and military uses, which may have reduced the size and quality of the forest. The plan is consistent with DOD policy that forestlands suitable for timber production shall be intensively managed for restoration and improvement of forest resources and economical production of commercial forest products, based on soil-site capabilities and integrated with all aspects of the natural resources program in consonance with military uses and requirements.

Installation forests will be managed on an interdisciplinary, multi-use, watershed basis. This means that other natural resources programs and uses, such as military training, wildlife management, endangered species conservation, wetlands protection, and outdoor recreation will be addressed to assure that all natural resources programs and the military mission are integrated. This approach will facilitate the greatest good for the greatest array of uses over the longest period of time without diminishment of future productivity and land use options. Second growth areas will be managed to enhance structures typical of late succession forests.

Specific management strategies and prescriptions are presented in the Appendix G.

The forest management objectives are to:

a) Support the military mission by maintaining land availability and use options;

b) Maintain forest stands in a healthy productive condition through selective thinning, increasing tree and stand vigor, and enhancing structural diversity in both forestland and urban settings;

c) Maintain slope and soil stability along forest roads;

d) Protect water quality in wetlands, watercourses, and shorelines;

e) Integrate forest management with other natural resources disciplines and programs to protect natural resource attributes associated with forested areas;

f) Support natural resources aspects of sustainable outdoor education and recreation opportunities that are consistent with the carrying capacities of the natural resources upon which they are based; and

g) Utilize income to benefit the natural resources program when harvest of forest products is required.

Management of Navy forests will be coordinated in an integrated, balanced natural resources program that incorporates maintenance of soil productivity, watershed protection, wildlife habitat enhancement, aesthetic qualities, and other natural resource values while providing operating, training, and buffer areas for the military mission, housing, and support facilities. These policies and this plan will guide the preparation of annual increments and the selection of silvicultural techniques and projects used on Navy forests. Annual increments will be reviewed with the installation prior to implementation to assure compatibility with mission requirements.

3.2.5.3.1 Schedule for Review

This INRMP, which includes the Forest Management Plan, will be reviewed annually and then have a 5-year review for operation and effect. The greatest needs in forestry on NAVBASE Kitsap land components lie in the conservation of relict old growth trees; thinning of dense second growth stands to encourage development of understory vegetation and to enhance structural diversity; restoration of the original coniferous forest cover to areas historically impacted by construction of base facilities; and enhancement of existing forest stands impacted by historical operations and uses. This plan will provide stand-by-stand prescriptions tailored to achieve these objectives in both forestland and urban areas.
Thus, the INRMP will need revision when:

a) The prescriptions have been fully implemented and regulated forest stands are achieved;

b) Sufficient time has passed and, in the absence of plan implementation, natural processes have so changed the forest conditions that the plan no longer reflects existing conditions; or

c) Sufficient land use changes have occurred as a result of mission requirements that the plan is outdated.

Given recent types and intensities of mission uses and forestry activities, it is anticipated that annual reviews and updates will be sufficient.

3.2.5.3.2 Program Policy

The Navy Forest Management Program will be administered in consonance with applicable law and regulation. Planning, budgeting, fiscal management, reporting, and implementation will be in accordance with DOD program requirements, including forest management initiatives, mission support, positive community relations and public affairs, ecosystem forest management on a watershed basis, and environmental protection.

3.2.5.3.3 Silvicultural Policies

The Navy is committed to conserving and managing soil, water, forests, fish, wildlife, and outdoor recreation resources. The primary purpose in managing these natural resources is to support our national defense mission, maximize multiple land use benefits, and fulfill land stewardship responsibilities required by applicable laws, Executive Orders, administration initiatives, and DOD Directives. To achieve this purpose, this forestry plan will provide for:

a) Sustainable yield production, conservation, and management of quality forests and wood fiber;

b) Fish and wildlife species habitats;

c) Protection, conservation, and recovery of T&E species and their habitats;

d) Watershed/wetlands protection;

e) Outdoor education and recreation opportunities that are consistent with the carrying capacities of the natural resources upon which they are based; and

f) Development and maintenance of a desirable structural diversity and biological balance in the forest consistent with proven scientific practices.

These purposes will be adapted and applied to forestland and urban forest areas of NAVBASE Kitsap.

Silvicultural stand prescriptions will be interdisciplinary, ecosystem oriented, and considerate of watershed conditions. This means that:

a) Forest management will be holistic to include a wide array of natural resource uses, values and functions;

b) Wildlife and fisheries issues are incorporated into forest management planning, project criteria, and operations (e.g., seasonal restrictions etc.);

c) Wildlife trees, snag retention, and wetlands protection are integral parts of forest management and forest product sales;

d) Thinning prescriptions will achieve vertical and horizontal structural diversity to foster greater opportunities for biological diversity;

e) Stand prescriptions will contribute positively to enhancement of wildlife habitat and corridors, and endangered species protection, conservation and recovery;

f) Wetlands will be protected not only within jurisdictional boundaries, but including hyporheic zones and prescribed buffers;

g) Particular protective attention will be given to palustrine wetlands; and

h) Adjacent land conditions will be considered in prescriptions and implementation schedules.

3.2.5.3.4 Program Execution

The foresters shall also provide professional advice and assistance with mission-related tree issues such as selecting project sites that minimize environmental impacts and preparation of timber appraisals for projects that involve tree removal. The forester will prepare, and review with the installation, the forestry annual work increments. Annual increments describe planned forest management work to be completed during a fiscal year. Upon approval of the annual increment by the Installation Environmental Program Director and receipt of funding, the year's forestry work will be implemented. The annual increments may be adjusted if warranted by unforeseen circumstances or requirements and approved by the Installation Environmental Program Director. Any tree removal shall be approved by the NRM or IEPD.

3.2.5.3.5 Funding Sources

Reimbursement for the cost of managing commercial forest resources for timber production is authorized by 10 USC § 2665 from the sale of forest products. Forest products sale income and reimbursement of forestry expenses are planned, budgeted, and administered by the NAVFAC Northwest forester. The Commercial Forest Management Program for silvicultural and habitat benefit is implemented at no cost to the installation. Non-silvicultural forestry work, such as construction site delineations and clearings, Anti-Terrorism/Force Protection (ATFP) corridors, helipad approach zones, housing and support area urban forests requires that project funds be provided to cover forester labor.

3.2.5.3.6 Endangered Species

This Forest Management Plan fully supports the conservation and recovery of federally and state listed threatened and endangered species. As provided in the 2004 National Defense Authorization Act [PL 108-136, Section 4(a)(3)(B)(i)], DOD lands with approved Sikes Act compliant INRMPs will not be included in critical habitat designations. This Forest Management Plan will support the goals of species conservation, recovery, and habitat protection, where effects to species are possible within the managed areas, as outlined within this INRMP.

3.2.5.3.7 Forestry Contracts

Sales of forest products are accomplished in accordance with NAVFAC P-73, Volume II. All forest products sale contracts, including the personal firewood cutting program, are under the contractual authority of the NAVFAC Northwest Real Estate Contracting Officer. Service contracts used to acquire forestry services are processed in accordance with federal procurement regulations. Forest products sales and forestry services are not combined under one contract. Authority to award both types of contracts rests with NAVFAC Northwest. The forester will provide technical specifications and contract administration for forestry contracts, regardless of funding source.

3.2.5.3.8 Forest Practices

The following practices are commonly used in managing forested lands and may be applied to varying extents to the forested lands of NAVBASE Kitsap land components.

Forest Thinning

Trees need sufficient growing space to maximize diameter growth rates and to maintain tree vigor and health. Dense stands require thinning to allow tree crowns to expand and provide the leaf area necessary for optimum photosynthesis. Thinning also allows sunlight to reach the forest floor and support the development of grasses, forbs, brush, and tree reproduction in a healthy, multi-layered understory. This understory is essential to horizontal and vertical structural diversity. Thinning provides the opportunity for inspection for and removal of diseased trees that threaten the health of the surrounding trees.

Young, dense stands may be pre-commercially thinned to promote optimum tree vigor and health. Since the trees are too small to generate income, these thinning are called pre-commercial. The optimum time to initiate pre-commercial thinning is when saplings are 15 - 30 feet tall, the crowns of adjacent trees have begun to interlock, and dominance has been established. It is recommended that up to approximately 16 feet of growing space be established between high quality or dominant “leave trees.” All other trees between the leave trees are cut down and typically left on the forest floor to decompose, enrich soils, and recycle nutrients. An average spacing of 16 feet between trees establishes an after-thinning density of about 170 trees per acre. No wheeled or tracked equipment will be used, therefore there is no potential for soil

compaction, and work can be done at any time of year. About 20 years following pre-commercial thinning, the stand should be evaluated for a first commercial thinning.

Commercial thinning presumes that the income derived from the thinning will more than pay for the associated expenses. If properly conducted, a thinning should first remove the poor quality trees, leaving the best trees to grow. Considering the average tree diameter and age of the units needing commercial thinning on NAVBASE Kitsap land components, it is recommended that a spacing that provides for wind resistance and room to grow be determined based on stand history, location, height to diameter ratio, etc. Typically, commercial thinning averages approximately 20 feet between trees, establishing an after-thinning density of about 100 trees per acre. For those soils with a high soil compaction potential, skidding activities should be scheduled for the summer or fall months, or other periods of low soil moisture and limited in extent, capitalizing on previously existing skid trails. Scarring of the trunks of residual trees resulting from the falling or skidding of harvested trees should be kept to a minimum, since these scars serve as rot infection centers. Timber sale contracts and pre-commercial thinning contracts will contain definitions, terms, and conditions addressing excessive damage and penalties for exceeding allowable levels of damage. Felled trees are typically limbed, topped, and bucked into log lengths where they lay and their slash lopped and scattered evenly over the forest floor to decompose in depths averaging no greater than 24 inches above grade. This height limit may be exceeded in cases of desirable large organic debris. Any tree removal will be reviewed and approved by a NAVFAC Northwest Professional Forester and must have concurrence from the NRM or IEPD.

The commercial products that would result from forest thinning include primarily Douglas fir sawlogs, and some pole or piling grade material. Lesser quantities of sawlog red alder, western hemlock, western redcedar, western white pine, and grand fir may also be generated. Smaller sized or poor quality material of these species could be utilized as chipping saw, pulpwood, or firewood.

Tree Planting

The beauty and habitat qualities of forested areas at NAVBASE Kitsap land components can be expanded and enhanced by planting trees on open areas, to the extent compatible with other land use requirements. Inter-planting to replace mortality and additional plantings may be conducted in both forestland and urban areas.

3.2.5.3.9 Forest Description and Inventory

An inventory of forestland areas was conducted in 2001. Urban forest areas were not included in this inventory. Forestland areas were grouped based on dominant tree species, stem density/acre, age, and diameter. The results of this inventory are summarized in Appendix G. These data can be used to select forested areas for thinning, prioritization for treatment, and other appropriate management prescriptions. The total forested area on NAVBASE Kitsap land components is

approximately 6,090 acres of forestland plus urban forest clumps and landscape specimen areas including some unique habitats.

3.2.5.3.10 Vegetative Characteristics

The existing forest stands on NAVBASE Kitsap land components may be generally classed in four broad categories: second growth mixed conifer; second growth mixed conifer and broadleaved; ruderal or emergent, broadleaved or conifer; and urban forest.

Second growth mixed conifer forest dominates the installation. It is the result of logging that occurred between the 1880s and 1940s. The second growth stands are dominated by conifers Douglas-fir, western hemlock, western redcedar, and western yew. Shore pine, western white pine, and spruce are present in lower numbers.

Second growth mixed conifer and broadleaved stands have the above conifers plus fractions of big leaf maple, black cottonwood, wild cherry, willow, vine maple, and red alder.

Ruderal or emergent, broadleaved or conifer generally occurs on disturbed sites. Some of these areas are naturally occurring as a result of cropland no longer cultivated, cleared zones and areas impacted by historic construction, or landfills.

Urban forest areas are very small stands, clumps of trees or individual specimens found in housing, industrial, and support areas.

Overall, most second growth and mixed stands are very densely stocked above the desired 100 stems per acre level and are deficient in understory vegetation, reproduction, and structural diversity resulting from high stem densities that preclude adequate light from reaching the forest floor. Understory characteristics (understory calls) are included in the forest inventory.

3.2.5.3.11 Forest Soils

The characteristics of individual soil types can be used to predict the probable impact of various forest management practices on both vegetation and soils. Probable impacts can be predicted for woodland suitability, soil compaction, slope stability, competing vegetation, and tree wind throw. To help maintain soil stability and prevent erosion, silvicultural treatments should be designed to minimize impact to soils. In the event of a natural disturbance such as disease or pest infestation, it is possible that clear-cutting may be necessary to the limits of the disturbance. In this situation, new impacts to the soil resource should be limited to 10% of the area or less.

“Site quality” is a term used to describe the relative productivity of a land area for a particular tree species. It is usually defined in terms of capacity to produce wood. The most common expression of site quality is Site Index. Site Index is based on tree growth patterns and refers to the height of dominant or dominant and co-dominant trees in even-aged stands at some index age, usually 50 years. The height growth of such trees is considered to be independent of stand density over a wide range of densities, and strongly related to site quality. One goal of this plan

is to achieve well stocked, regulated stands in order to take advantage of site productivity and to restore the coniferous forest cover previously found on currently unstocked or marginally stocked lands. Thus, site indices based on existing stand characteristics may increase with management and time. Site Indices used for forest management under this INRMP will be derived from empirical measurements or from published sources, such as the USDA soil surveys.

Most of the soils on NAVBASE Kitsap components are well suited for tree production. The exceptions are soils that are seasonally very wet, wetlands, soils on geologically active slopes, soils on developed sites and restoration sites. Refer to the USDA Soil Conservation Service (USDA-SCS) or Natural Resources Conservation Service (NRCS), Soil Survey of Kitsap, Jefferson, and Mason Counties, Washington, for specific soils mapping units, profile descriptions, and pertinent land use information. Soils of some NAVBASE Kitsap components are not covered by available soil surveys.

Because seed sources of brush and red alder exist on or adjacent to NAVBASE Kitsap land components, it is highly likely that at least a portion of newly planted areas will be invaded by competing vegetation. Many species of conifer seedlings cannot survive in the shade created by competing vegetation. Planted areas should be checked annually for about 10 years following planting for the invasion of fast growing competing vegetation. If seedlings are being over-topped, the competing vegetation can be controlled either by hand cutting, girdling, goat or sheep browsing, or by the use of an approved, properly formulated, and timed, herbicide application.

3.2.5.3.12 Inventory

Forest inventory data is presented in Appendix G. It includes the legend and symbols for forest stand typing.

3.2.5.3.13 Authority and Requirement

The authority and requirement to have a Forest Management Plan is contained in an array of laws and DOD, DON, and NAVFAC instructions and directives cited elsewhere in this INRMP. For example, 32 CFR § 190 prescribes policies and procedures for an integrated program for multiple-use management of natural resources on property under DOD control. Title 10 USC, Section 2665, authorizes the sale of forest products as well as reimbursement for the costs of managing forest resources for timber production. This is administered in accordance with DOD Financial Management Regulation Volume 11A, Chapter 16 (August 2002), Accounting for Production and Sale of Forest Products. The Department of the Navy Financial Management Policy Manual, Volume 3, paragraphs 07150 and 035475-79, provide guidance on funding, accounting, and fiscal reporting procedures. The Timber Conservation and Shortage Relief Act of 1990 prohibit export of unprocessed timber originating from federal lands west of the 100th meridian. OPNAV M-5090.1, Environmental and Natural Resources Program Manual, discusses requirements, responsibilities, and policy for natural resources management for Navy ships and shore activities. NAVFAC P-73, Real Estate Procedures Manual Vol. II, provides contractual

guidance for timber sales. DODINST 4715.03 provides policy, requirements, and procedures on the use, sale, and disposition of Government forest products.

3.2.5.4 Forest Management Practices

A forest management system of area control will be used to foster desirable forest age classes, stand structures, and species composition; to develop and enhance understory vegetation; and to preserve relict old growth tree specimens and endangered species habitats. This will ensure sustainable production of the most desirable timber and other forest products, functions and values while protecting and conserving water quality, endangered species, relict old growth trees, structural and biological diversity, and outdoor recreation and education. It is not considered appropriate or advisable to fragment the forest into a number of stands equal to a rotation age. Rather, stand delineations will be the planning base for future age classes.

Commercial thinning will dominate forest activity over the next two decades. Most of the forestland is densely stocked second growth in need of thinning. It is anticipated that in most years there will be thinning and tree plantings. The typical prescription will specify that 100 of the best commercial species trees, “Leave Trees” will be left uncut and undamaged on each acre, spaced consistently and uniformly throughout the thinning area. In addition to the specified Leave Trees and marked “Wildlife Trees,” small non-commercial sized trees may be left intact. This includes less prevalent species such as wild cherry, willow, cottonwood, yew, madrone, etc. The purposes of this approach include:

a) Sustainable forest management without diminution of future diversity and productivity;

b) Minimizing stand disturbance while opening up the canopy sufficiently to allow more sunlight to reach the forest floor and establish understory vegetation;

c) Preserving and enhancing both horizontal and vertical structural diversity through retention of shade tolerant understory trees and development of grasses, forbs, and woody brush species;

d) Providing a population of understory and suppressed trees that are recruitment for snags in future decades; and

e) Providing botanical and structural diversity that will enhance forest stands for wildlife species.

Due to the extensive facilities development of NAVBASE Kitsap land components and the high value of urban and landscape tree specimens, urban forestry will be a significant effort. All urban forest and tree management issues and projects will be accomplished through NAVFAC Northwest professional foresters consulting with and advising facilities managers. This includes hazard tree assessments, pruning, removal, and replacement.

3.2.5.4.1 Snags, Hollow Logs, and Wildlife Trees

Snags and hollow logs play a very important role in forest ecology. Timber sale contracts will protect snags and downed large organic debris. In addition, trees deemed unique or of special interest for wildlife, such as advanced second growth specimens, isolated relict old growth, trees with large limbs or cavities, or less prevalent species (yew, cottonwood, bigleaf maple, wild cherry, willow, madrone, etc.) will be protected in timber sales contracts and field marked with signs or paint prior to advertisement of a timber sale. Some large standing trees with heart rot or butt rot will be conserved as snags for recruitment later as hollow logs for wildlife when they topple.

Snags and downed hollow logs, important to cavity-nesting birds and other animals, will be left uncut except when determined by the NAVFAC Northwest Forester, in consultation with the timber purchaser, to present a safety hazard and no alternatives are available for safe operation around the snag or hollow log. All naturally downed logs will be left on the forest floor, unless inadvertently moved as part of the logging process, to provide habitat for wildlife including small mammals, salamanders, insects, and other arthropods. Slash left from cutting the tops and branches off harvested trees will be left on the forest floor to allow it to decompose naturally for recycling of the nutrients therein.

3.2.5.4.2 Species to be Grown

Douglas-fir is the mainstay of the Puget Sound forest products industry. Superior to other local species in strength, growth and disease resistance, Douglas-fir is the most useful, and therefore the most valuable, species adapted to most stands on NAVBASE Kitsap land components. Red alder has recently become a viable and valuable commercial species, particularly when the average diameter breast height (DBH) is 14 inches or greater and the stem is straight with limited branching on the lower portion. The larger alder generally occurs near streams and on moist to wet sites in lower slope positions. When alder occurs on drier upland disturbed sites it typically demonstrates small diameters and poor form. Its short lifespan and pioneering properties provide an opportunity for management toward the pre-disturbance native conifer cover-types. Conversion of alder located on moist to wet areas or adjacent to streams and wetlands will be done only if there is a clear benefit to the stream or wetland and the habitats they provide. The alder sites will be evaluated in context with their surroundings and uniqueness. Tree removal in these areas will only be done in a manner that maintains the integrity of streams and wetlands. Documented BMPs are required to be included in contract language and will be diligently administered for compliance. Western redcedar is also a valuable tree for commercial products and structural diversity functions. Cedar will be usually grown on a rotation probably equal to twice that of any other species. Because of shade tolerance and persistent foliage, it contributes significantly to horizontal and vertical structural diversity in the forests. For this reason, western redcedar will be a preferred leave tree in thinning prescriptions. Road and landing locations will be designed to minimize the need for cedar removal.

Most stands on NAVBASE Kitsap components are dominated by Douglas-fir. In these areas, Douglas-fir will be, by default, the most common Leave Tree. Other less frequent species will be also emphasized in selecting leave trees to foster short-term and long-term biodiversity. Species for consideration as preferred leave trees depending on the stand context include, maple, alder, madrone, cherry, willow cottonwood, shore pine, and western white pine.

Natural regeneration of other native species such as alder, willow, wild cherry, cottonwood and maple is expected to diversify stands thinned or replanted, resulting in a species mix that will be more resistant to insect and disease attack through the synergistic effects of tree species and wildlife habitat diversities.

3.2.5.4.3 Reforestation

Reforestation and afforestation will use a mixture of site-adapted native conifer species. Plantings will be conducted the first planting season after harvest to achieve full stocking, which is defined as a minimum of 302 live stems of commercial species per acre. This amounts to a 12 foot on center spacing. Hand planting conifer seedlings will be the method used to reforest openings to fully stock deficient stands or to underplant if appropriate. Hand planting is more expensive than seeding, but affords more rapid and dependable stand establishment and can provide positive influence on stand species composition. Hand planting will be funded by the forestry program or any other fund source and accomplished by service contract. Occasionally, local civic, community service, or youth organizations may coordinate with the Navy to plant trees as a service project. Some planting areas may be site prepared with herbicide applications or cleared and scarified mechanically prior to planting.

3.2.5.4.4 Rotation and Cutting Cycle

It is not appropriate to set a rotation age or cutting cycle for the entire NAVBASE Kitsap forest area until the stands have been brought into a management system. Also, the setting of rigid rotation ages and cutting cycles may reduce the adaptive management needed to adequately strive for vigor, health and structural and biological diversity for all forest resources. Thus, this Forest Management Plan will focus on intermediate silvicultural treatments and thinning that will promote structural diversity and protect endangered species habitats and water quality. However, it is anticipated that pre-commercial and commercial thinning will be followed by a final harvest at a rotation age significantly in excess of 100 years. It is anticipated that rotations will be at ages 150 - 300 years. Some species such as western redcedar may have longer rotation ages. This will allow for development of high quality forest products and forest stands, which will provide superior structural and biological diversity supporting a mixture of consumptive and non-consumptive products, values, and functions.

3.2.5.4.5 Allowable Annual Harvest

The annual tree growth will improve as forest stands are thinned, stocked, and treated. Allowable annual cut will not be determined for this plan since the remedial and developmental treatments

may be considered intermediate. When the plan is revised subsequent to completion of all thinning and plantings, the stands may be in a condition favorable to determination of cutting cycle, rotation age, and allowable annual cut. It is not anticipated that an allowable final cut would involve harvests every year.

3.2.5.4.6 Silvicultural Treatments

Methods of Cutting

Clear-cut final harvest is the silvicultural system best suited to the regeneration of Douglas-fir. Partial cutting could favor the establishment of more shade-tolerant species and a gradual shift in stand species composition away from Douglas-fir towards more shade-tolerant but commercially less valuable species such as grand fir and western hemlock. Except in cases of salvage of timber due to natural wind throw, deadfall or pest infestation/outbreak, landslide, fire or other disturbance, it is anticipated that clear-cutting will not be used under this plan.

Selective cutting will be the system used in both pre-commercial and commercial thinning for the foreseeable future. Intermediate selective cutting will be used to thin stands for the concentration of growth on leave trees, development of horizontal and vertical structural diversity, and increase in value of the residual trees and to salvage mortality losses. Both commercial timber sale thinning and pre-commercial service contract thinning may be used. Thinning will improve stands by removing diseased trees, inferior species, and damaged trees. On mixed alder and conifer stands, located on upland or dry sites selective cutting may be used to remove the alder while leaving the conifers to mature. Additionally, this technique may be used to remove alder from any mixed stand and to make room for supplemental plantings prescribed to achieve site objectives. However, in wet areas or adjacent to streams and wetlands hardwood removal will only be done when there is installation support and a documented need.

In riparian corridors, special care and restrictions will be used, such as machinery exclusion or the use of draft animals, to ensure development of a healthy and vigorous stand of trees that will provide many opportunities for wildlife uses while shading watercourses to maintain preferred water temperature regimes. In the vicinity of a raptor perch or nest trees discovered in field surveys, selective cutting may be used to ensure development and perpetuation of vicinal large, open-grown trees similar to those already chosen as perches providing the treatment is in consonance with the management requirements and restrictions associated with the species.

Insect and Disease Best Management Practices (BMPs)

Insect and disease problems have not reached epidemic proportions in the NAVBASE Kitsap forests in recent years. The following specific forest pests are the most frequently encountered and are listed along with the prescribed control method. Surveys for insect and disease damage as well as control may be accomplished through the *Memorandum of Agreement between the USDA and the DOD for the Conduct of Forest Insect and Disease Suppression on Lands Administered by the U.S. Department of Defense* (1990).

Tent Caterpillar (*Malacosoma spp.*) is usually present in broadleaved trees and does considerable defoliation on a cyclic basis. Whole trees may be defoliated, causing an unsightly mess. Alder is seldom killed by this, and investment in pest control measures, notably spraying, usually is not warranted in forested settings. Urban forests or high value landscape areas may warrant such spraying. In addition, conversion of some ruderal alder areas to native coniferous species will reduce the number of host plants.

Root Rot (*Phellinus weirii)* is a persistent problem, especially on some of the heavier clay soils. Often, infected trees subsequently fall prey to bark beetles, which speeds loss of foliage and mortality and may offer the first outward sign of fungal infection. A great deal of control can be accomplished by clear-cutting the stand, tipping over the stumps to expose them to sunlight and air to kill the fungus and replanting the area back to a disease tolerant conifer species.

Douglas-fir Bark Beetle (*Dendroctonus pseudotsugae*) is frequently seen as a secondary invader of trees weakened by old age or disease. This insect has the potential for epidemic attack, but proper forest sanitation including thinning and harvest of weakened or diseased trees should keep it under control if it becomes a problem. In such cases, patch cutting will be used to salvage infested areas. They will subsequently be replanted with native conifers.

Douglas-fir Tussock Moth (*Orgy pseudotsugata*) has not yet been identified in NAVBASE Kitsap forests. If this defoliating insect does become a problem, control will be difficult. "BT," a biologic control agent may be adapted to use on Tussock moth and the best bet for control. At present, aerial application of insecticides is the only known control method. Any pesticide application will have to be thoroughly reviewed and approved prior to use.

White Pine Blister Rust (*Cronartium ribicola*), an introduced rust, has virtually eliminated white pine from serious management at this time. White pine was not detected in the inventory and is not really a species requiring attention at this time. Development of rust-resistant strains may allow planting white pine in the future.

White Pocket Rot [usually *Phellinus (Fomes) pini*] is a fairly common pathogen in Douglas-fir and is occasionally seen in young second growth. Patch cutting harvest of identifiably infested trees plus a surrounding transition area is the best control.

Fomes Root and Butt Rot (*Fomes annosus*) can infect many conifers and spreads through root grafts. The best control is to harvest the infected tree by toppling and then replant with native conifers. Particularly along roads and in recreation areas where pedestrians camp or walk, risk trees should be removed.

Gypsy Moth (*Lymantria dispar*) is an introduced forest pest that has shown great capacity for destruction and sudden epidemic growth in Washington. Both the European and Asian gypsy moths are of concern. They have not been detected in NAVBASE Kitsap forests. The Navy will continue to cooperate with State and Federal agencies conducting surveys for the moths. Control

is achieved by pheromone trapping, spraying with EPA approved insecticide as well as spraying with "BT" and in accordance with the *Memorandum of Agreement Between USDA and DOD for the Conduct of Forest Insect and Disease Suppression on Lands Administered by The U.S. Department of Defense* (1990).

Wildlife Damage Control

Deer browsing the growing tips of young Douglas-fir and other conifer seedlings may cause reduced height growth and in extreme cases may stop height growth completely until the size of the deer herd is reduced by harvest, disease or a hard winter. In general, this is not a severe problem in NAVBASE Kitsap forests. Deer hunting has been suspended for several years, but could happen in the future if the deer population condition would sustain hunting and the installation so desires. Depredation of deer is not anticipated nor is it considered necessary or feasible. There are not sufficient young plantations to warrant such. The incidence of animal damage on reforestation is one consideration in selecting hunting criteria. Small mammals such as voles, mice, moles, squirrels, rabbits, and mountain beavers also inhibit reforestation by eating seed and seedlings. Seeding is not anticipated as a means of regeneration. Raptor predation helps keep small mammal populations under control. Snags and scattered low-grade perch trees will be left in clear-cut areas as roosts and hunting perches. Further small mammal discouragement is not anticipated.

Fire Suppression

There have been no forest wildfires in the past at NAVBASE Kitsap. Forest fire detection would be by observation from close vicinity or adjacent lands. Given the controls on recreation, the most common source of ignition, human activity, is limited to developed areas. Suppression of wildfire would be accomplished by a combination of installation assets and local fire departments. Timber sale contracts require spark arrestors on all motorized equipment, fire tools (shovel and axe) for each worker, and suppression and reporting of any fire on the sale area. During periods of high fire danger, operations may be stopped or additional requirements such as a fire watch, tank truck with pump, hose, and nozzle may be required. Service contracts for silvicultural treatments also contain fire prevention and suppression requirements.

Slash Treatment

Logging slash, the residual tops, limbs, and non-merchantable logs, will be typically treated during harvest operations by lopping and scattering, or piling or windrowing. Piling or windrowing of slash and undesirable brush clears the soil for reforestation and breaks slash into manageable portions for fire safety. Windrows, broken every 200 feet, achieve the same end, but can also function as windbreaks for seedlings. Slash piles will decay over a period of years while slowly releasing organic nutrients back to the new cycle of growing trees.

Slash from partial cuttings such as selective thinning will typically be lopped and scattered within the forest. There is usually no need to prepare for reforestation in the selective cut areas.

The slash from thinning is of low fire hazard due to overhead shade, closeness to ground and compartmentalization by skid trails. Piled slash provides cover for songbirds and small mammals as well as foraging resources for insectivores such as the Bewick's wren. Slash within 25 feet of roads and structures will be lopped and scattered and will not be piled or windrowed.

3.2.5.5 Personal Use Forest Products Program

A personal-use-only forest products collection program (e.g., firewood) may be established at certain components of NAVBASE Kitsap. If so, it will be implemented, administered, and controlled as directed by COMNAVREG NW and NAVFAC Northwest instructions. The NAVFAC Northwest foresters, when available, may identify suitable and available material and produce a map that must accompany every forest product removal permit. This is an opportunistic program. Availability requires that the suitable material be in areas easily accessed by vehicles. This is not a guaranteed or year-round program. The number of permits allowed to be issued to each authorized patron will be limited. It will be implemented only in areas with suitable material.

In accordance with law and regulation, forest products are government property that may be disposed of through prescribed, legally sufficient, and compliant methods. For the forest products program, this means that a serially numbered permit/bill of sale must be issued. Fees are collected for the sale of Government forest products. These fees are collected by the NAVFAC Northwest foresters and tracked for deposits to the U.S. Treasury. The funds received are deposited to the *Navy Timber Sales Receipts Account Pursuant to DOD Financial Management Regulation* Volume 11A, Chapter 16 (August 2002), Accounting for Production and Sale of Forest Products.

While fruits and berries may be collected for personal use without a permit, certain areas of collection should be avoided. Off-limit areas include industrial areas, installation restoration sites, and residential areas which are off-limits to non-residents. NAVBASE Kitsap residents or employees with questions regarding fruit collection should contact the NRM.

3.2.6 Natural Resources Protection Considerations in Forest Management

3.2.6.1 Control of Non-Point Sources of Water Pollution

Pesticides

Pesticides have been used occasionally in past forest management to kill competing vegetation on tree planting spots. Currently, the only anticipated use of herbicides would be possible spot applications for planting trees in areas of heavy grass sod or competing vegetation. An installation’s desire to reduce grounds maintenance costs in developed areas may lead to additional tree plantings to convert mowed grass areas to nascent forest. Because of the fierce competition the grass poses to the seedlings, herbicides might be used in these situations. Knotweed should be removed very carefully if using mechanical equipment due to the potential

for spreading the invasive species. Careful chemical control may be the only application for removal combined with replanting the areas with native species. Areas near transient water should have a higher priority to limit the spread of knotweed. Shade provided by conifers is the ultimate control for most invasive species. Consequently, planting will occur in most instances following application of pesticides. If pesticides are used, they will be applied by trained and certified personnel in accordance with DOD, EPA, and the installation is Pest Management Plan.

Erosion Control

Erosion in forest areas has not been a problem on NAVBASE Kitsap land components because of the minimal disturbance to soils and roadbeds, the good vegetative cover, and infrequency of silvicultural treatments. Natural development of the forest, timing of silvicultural treatments, choices of low-impact technologies, and improving understory vegetation will protect the forest floor soils, roads, watercourses, and water quality. Improved road grading and maintenance practices have reduced the amount of disturbed soil. Wind erosion will be prevented by maintaining the vegetative cover, slash treatment, and windrows to provide windbreaks. The risk of erosion during the exposed period of logging and early regeneration is greatly reduced by lop and scatter slash treatment, careful planning of cutting unit boundaries, the use of uncut buffer strips, early planting or seeding, and the use of water bars on roads and skid trails steeper than 10% or as needed. Erosion from forest access roads will be minimal since existing graded roads are typically used. These roads were constructed during base construction. Haul spurs may be constructed or reconstructed to facilitate timber hauling. Erosion control requirements are included in timber sale contracts, so additional funds and projects normally should not be required.

Logging Debris

Logging slash will be treated as previously described above or in special cases will be treated or disposed of in a manner to reduce, trap, or repair historic erosion.

Riparian Zones

Restoration and enhancement of coniferous buffer strips around ponds, wetlands, and streams will be a direct benefit to wildlife. It is anticipated that such strips may be managed for wildlife and buffer purposes.

Horses

Due to their very low impact on the forest floor, certain logging or other silvicultural treatment might be accomplished using draught horses or mules instead of machinery such as skidders.

Wetland Protection

Wetlands will be protected in accordance with applicable law and regulation. The erosion control and buffer strip requirements included in the INRMP, and BMP’s included in timber sale and

forestry services contracts will protect wetlands from damage by forestry operations. Howellia is a plant which occurs within the Pacific Northwest, and has been listed as a threatened species since 1994. This plant grows in wetlands surrounded by forests, but has not been actively surveyed for. Our active management of wetlands within NAVBASE Kitsap would provide conservation measures for the species and opportunity for surveys during project walkthroughs.

Endangered Species Protection

Federally listed threatened and endangered (T&E) species will be protected, as described in other sections of this INRMP. Bald eagles and their nest sites will be protected in accordance with laws, regulations, and management guidelines cited herein. Marbled murrelets are not presently known to use the forested areas of the base, but relict old growth trees will be retained and younger forests will be managed as described in this section to become structurally more conducive to nesting use.

Cultural and Historic Site Protection

Prior to ground disturbing silvicultural treatments, the project area will be surveyed for visible or indicative cultural, archeological, or historic sites. Any sites identified in the pre-treatment survey will be reported to Navy archeologists for appropriate evaluation. These sites will be protected during silvicultural treatments by establishing them as exclusion zones. If sites or artifacts are discovered during presale investigations or other field inspections, they will be evaluated and protected from logging activity through restriction of treatments, machinery, and skidding in such areas. The activities under this plan will comply with pertinent law and regulation.

Aesthetics

As with any question involving beauty and appeal, the question of forest aesthetics may be viewed from several perspectives. The common public view of the Navy properties is from a distance. For base employees and visitors, the view is from the immediate foreground. From a distance, this affords a vista of evergreen and deciduous trees, the grassy open areas, shorelines, and housing areas surrounded by grass and trees. Overall, much of it presents a rather pastoral "natural" scene. It is hardly "natural," however, since it is the result of considerable land disturbance and a conversion of old growth forest and native meadows to second growth forest, farmland, open grassy areas, and facilities areas.

In areas thinned pursuant to this plan, it is not so much what is done to encourage structural and biological diversity, as the rate at which it is done that might upset some viewers. Up close, the thinning and reforestation efforts will appear somewhat harsher than from a distance. Logging slash or brush trimmed for tree planting site preparation will appear less attractive as it turns brown and loses its leaves than it did when green and upright. Lopped, piled, or windrowed slash will look better from afar than up close. These issues will be kept in mind when writing a prescription for silvicultural treatments.

Aesthetic considerations in forest management are intended to reduce visual impacts of logging and site preparation and include clean logging, placement, and layout of cutting areas, and buffer strips to create visual barriers, when possible, between work areas and main roads. Coupled with outdoor education, this should fully and fairly inform viewers of the forest's pretreatment condition, management techniques, and goals.

Wildlife Habitat

The silvicultural methods used for reforestation, timber stand improvement, and harvest will be supportive of wildlife. Dense timber stands shade out the understory plants, which provide food and cover for wildlife. Thinning and reforestation will provide young forest stands with a wide diversity of grass, forbs, woody shrubs, and trees for food and cover. This will encourage a diversity of animal species. Treatments to improve the stands will help open up the forest canopy to allow sunlight to reach the forest floor so that the understory will be stimulated, developed, and perpetuated as foraging, nesting, and thermal cover for all wildlife species. Timber harvest might temporarily displace wildlife from the operation area to adjacent undisturbed forest while operations are underway. Quite frequently, browsing and avian species will visit thinning areas during non-working hours to take advantage of the browsable foliage and insects available.

Following patch sanitation salvage clear-cuts, as the area seeds or sprouts to brush, weeds, and young trees, the rapidly growing young forest and decaying logging residues will provide increased forage for deer, granivores, and insectivores. Consequently, predators will benefit. Some species preferring closed canopy habitat will be displaced until the young trees reestablish a closed canopy.

Multiple Use

Within the constraints of mission and safety requirements, the forests are managed for multiple uses to produce sustainable yields of wildlife, timber, and other forest products, clean water, military operations and training, and recreational opportunity.

Road Construction

The roads developed for historic logging and construction and operation of NAVBASE Kitsap land components are usually sufficient for forestry activities. To implement silvicultural treatments, it may be necessary to place crushed rock on existing roads or to develop haul spurs. Haul spurs will be developed using old grades where possible. Where these do not exist or present unacceptable risks, new spurs will be created by meandering between Leave Trees. Road construction will be minimized in order to retain as much land as possible in production and to minimize land disturbance and costs. Reforestation will be up to road edges to reduce occluding ruderal vegetation and to fully stock the site. Full stocking will eventually function as a protector of the road corridor. Within cutting areas, road construction will be limited to temporary spurs and roads as narrow as possible. These temporary spurs will be water barred or otherwise treated (seeding, cross ditching, etc.) to prevent erosion. It is anticipated that forest roads and haul spurs

will also be used for military training, security, Anti-Terrorism/Force Protection, emergency response, fire suppression, recreation, etc.

3.2.6.2 Work Objectives and Thinning Criteria

3.2.6.2.1 Annual Objectives

The long-term forest management goal is to achieve fully stocked, healthy, productive, mix of conifer and hardwood stands of timber for: a sustainable yield of high quality forest products and wildlife habitats with other compatible forest uses and benefits; to protect and preserve relict old growth trees; and to provide land use opportunities for military operations, training, outdoor recreation, and education. The span of this plan will involve thinning, plantings, selective cuts and, in the case of natural disaster or pest infestation, small patch clear-cuts. The actual stands and projects will be spelled out in the annual increment addenda to this plan. Since the bulk of the prescriptions are remedial silvicultural treatments to improve the health, vigor, and structural diversity of the stands and forest as a whole, it is desirable that some work be accomplished each year under this plan.

Specific descriptive silvicultural prescriptions are given in Appendix G.

3.2.6.2.2 Sales Procedures

The NAVFAC Northwest Forester provides professional forestry services to manage and develop the forest resources for the economical production of forest products and the conservation of all forest resources. In coordination with the military mission, the Forester: chooses the areas to be treated based on overall goals, silvicultural needs, resource protection considerations, and stand inventory data; analyzes the potential for environmental impacts of proposed silvicultural treatments and develops protective measures; completes the field work, including volume and value estimates, project or sale boundary establishment, snag and wildlife tree marking, and access spur layout and design; and prepares and administers the forest products sales contract. All logging activities shall be carried out under contract issued by NAVFAC Northwest. Sales of forest products are accomplished in accordance with NAVFAC P-73, Volume II. Service contracts used to acquire forestry services are processed per DOD and federal acquisition regulations. Sales of forest products and forestry services are not combined under one contract. For construction or safety zone clearings, the project proponent will have to fund the survey and marking of the limits of clearing.

The Forester will prepare the timber sale contract and administer it from advertisement and award through operations and completion. The installation will be kept advised of the schedule and progress of all forestry operations. Following award, the Forester will inspect timber sale contract performance to ensure contract compliance and protection of the forest environment. Forestry services contracts will follow similar procedures.

3.2.6.2.3 Forestry Consultations and Support

The Forester will mark silvicultural project boundaries, assist with wetlands and riparian buffers, prepare and administer contracts, and coordinate forestry projects for commercial and pre-commercial thinning, plantings, and other forestry work as needed. This includes forestry consultations in support of base operations, maintenance, repair, and construction projects.

3.2.6.2.4 Public Relations

The Navy's forest management and other natural resources projects have generated significant interest over the years. This has resulted in visits and tours by high-level officials and a great deal of very positive press and media coverage for the Navy. As requested and approved, the Forester will provide docent forest tours, consultations and support for natural resources education events, and tours for school groups, VIPs, governmental agencies, conservation organizations, media, and freelance writers. All such events will be thoroughly coordinated in advance with the installation, COMNAVREG NW, and NAVFAC Northwest Public Affairs Offices.

3.2.6.2.5 Thinning Criteria

There may be approximately 15-200 acres thinned per sale area, typically leaving at least 100 stems per acre of merchantable species trees. Additionally, healthy less abundant species, wildlife trees, snags, and unique specimens will be marked or identified in the contract for retention in furtherance of the goal of improving biological and structural diversity. The following are typical but not exclusive contract provisions governing selection of Leave Trees. These criteria apply to all thinning and will be adjusted as needed in light of specific stand conditions.

3.2.6.2.6 Leave Tree Selection and Cutting

On the coniferous thinning areas, 100 of the best live conifer species shall be left uncut and undamaged as Leave Trees on each acre of the sale area. This equates to a spacing of approximately 20 feet on center between Leave Trees, which are to be uniformly and consistently spaced over the entire sale area. Trees marked with paint and/or signs are designated as wildlife and structural diversity trees, and are to be left uncut and undamaged. Live trees greater than 8 inches DBH so marked may be included in the 100 trees per acre. Dead wildlife trees may not be included in the 100 trees per acre count.

Leave trees shall be selected on the following basis and criteria and shall be marked or clearly designated by description:

a) The largest most vigorous coniferous trees free of defects, disease, or damage.

b) Fastest growth as evidenced by larger relative DBH, greatest height, and light colored bark with active, buff colored crevices.

c) Good form, straightness of the bole, and lack of forked tops.

d) Spacing as near as possible to 20 feet by 20 feet on centers, for a uniform and consistent distribution of 100 Leave Trees per acre.

e) Except for bigleaf maples larger than 18 inches DBH, deciduous trees may not be selected as Leave Trees.

f) No western yew or cedar trees may be cut except as needed for roads and landings.

g) Dead trees, non-merchantable culls, and understory trees less than 6 inches diameter on the stump are not to be selected as Leave Trees, but are to be left uncut when possible.

h) Pitch bleeding western white pine and dwarf mistletoe infected western hemlock shall not be selected as Leave Trees. Live wildlife and structural diversity trees marked with yellow signs and/or paint may be selected as Leave Trees.

i) Healthy, disease-free and non-hazard specimens of less abundant tree species such as madrona, dogwood, wild cherry, willow, bigleaf maple, western yew, and in some cases red alder may not be counted as Leave Trees and may be left uncut and undamaged in the residual stand. Such trees do not have to comply with spacing requirements.

Trees to be cut and removed shall be marked or designated by description and cut so as to avoid damage to all Leave Trees and designated or marked wildlife trees. Trees that are smaller than 6-inches stump diameter and not selected as Leave Trees shall be left uncut when possible. Dead trees and non-merchantable culls shall be left uncut unless they present an unavoidable safety hazard. Trees cut along sale area boundaries shall be felled into the sale area so as to contain slash and debris on the site. Stumps shall be cut as low as practicable and shall not exceed 12 inches high or the length of the diameter at DBH, whichever is greater. Limbs and tops are to be cut from merchantable stems and left in the woods. The Purchaser shall exercise skill, care, and directional felling to minimize damage to residual trees. All felled trees shall be utilized to 5-inch diameter inside bark at the small end by 24 feet in length. Bucking to reduce length or diameter is not allowed. If the Purchaser bucks felled trees to reduce diameter or length, the spoiled merchantable portion will be scaled as though it were whole and the Purchaser will pay for such material at the unit prices bid.

Yarding methodology will be draft horses or mules, skidders, feller bunchers, processors, or cable logging. The method, used will be operated in a manner that minimizes soil disturbance, compaction, and impacts to forest floor organic matter, large organic debris, and understory vegetation.

The only silvicultural clear-cutting permitted will salvage cuts due to fire, insect infestation, disease, blow down, or other natural causes. Clear-cut areas will be replanted the first planting season after harvest. Tree planting may be used in thinning cuts to supplement natural seeding

from the remaining trees. There may be other occasional interplanting to fully stock deficient areas.

No logging or salvage of snags, wind throw, or deadfall downed material will be allowed within the primary buffer zones of bald eagle nest trees. However, portions of these areas may be subject to silvicultural thinning if approved in advance through a very thorough and complete consultation process with the USFWS under applicable law and management guidelines cited elsewhere in this plan.

3.2.6.2.7 Silvicultural Stand Prescriptions

The following silvicultural prescriptions are somewhat general and may be adjusted on a case-by-case basis to address specific site characteristics as determined by site visits near the time of treatment. These prescriptions in general, apply to the forests of all NAVBASE Kitsap components.

Second growth coniferous stands will be thinned to fewer trees per acre in accordance with the guidelines and policies set forth herein. The objectives are to improve the health and vigor of retained trees, encourage structural and species diversity, and develop understory vegetation. The first thinning in areas dominated by conifers areas will result in an average stocking of 100 - 140 leave trees per acre, unless designated as a pole production area.

Stands of red alder (*Alnus rubra*) that are of lower quality in terms of form, health, vigor, and merchantability and are not located in wet areas may be converted to pre-disturbance coniferous forests; whereby, red alder stems are removed and native conifers are planted in the resulting open areas. Species such as bigleaf maple, wild cherry, willow, and other less prevalent hardwoods will be retained to provide habitat diversity in largely coniferous areas. Stands of broadleaved trees including red alder that are of higher quality in terms of form, health, vigor, and merchantability may be thinned using a system of habitat (leave) tree release; whereby a habitat (leave) tree will be selected and all nearby trees whose crowns either touch or are above the crown of the leave tree will be subject to removal. Thinning prescriptions will be designed with BMP’s to protect streams and wetlands.

Open or unstocked areas, to the extent allowable, will be planted with a mix of native species emphasizing those that reflect surrounding natural stands. Patches of disease or infestation may be clear-cut and replanted with the best possible mix of conifers depending on the pathogen present. The ecological and silvicultural principles expressed herein will also be adapted to urban forest settings as needed. The prescriptions may be adapted and adjusted as necessary to accommodate site-specific circumstances.

3.2.6.2.8 Stand Prescription Priorities

The following list outlines priorities intended to support decisions regarding which silvicultural prescriptions to execute and which prescriptions to wait for later implementation. All

prescriptions or planned forestry actions that are a part of a mission critical or hazard reduction project shall have the highest priority over all other projects. However, when projects are not mission critical or for hazard reduction, selection for implementation shall consider the list of priorities below. Implementation of multiple project priorities may occur at one time particularly when there is adequate funding available (e.g., reforestation, etc.). The priorities are as follows for prescriptions which:

a) Reforest or afforest an area that has previously been denuded of standing timber. In many areas this may include site preparation.

b) Rely on pre-commercial thinning to stop density dependent mortality as a means of increasing stand health and vigor.

c) Convert sites with invasive species as a major component into stands with native, healthy, and vigorous vegetation.

d) Open canopies to increase residual stand health, productivity, and form while increasing light for the development of a productive understory for vertical and horizontal structural diversity and wildlife habitat and reduce the incidence of competition caused mortality. Stands with the highest relative densities will be treated first.

e) Involve management for interior species habitat; whereby, treatments are utilized to attain old growth characteristics as outline in the Forest Service document PNW-RN447.

f) Contribute to the existing qualities of special or unique habitats such as riparian areas, etc.

g) Seek to attain high levels of horizontal and structural diversity through stratification of the stand whereby, large spaced selective thinning with inter-planting is utilized. This will occur primarily on second growth stands of larger DBH that have already been thinned.

3.2.6.2.9 Wildfires and Prescribed Burning

The forests of NAVBASE Kitsap land components have developed in response to particular physical and biological factors. These factors, and thus the forest structures and compositions, change over time with plant succession, natural and human disturbance regimes, and changes in weather patterns. The natural disturbance regimes of the plant communities have been significantly altered by human interference, largely in the form of fire suppression. Prescribed burning is not considered a viable management option for these areas due to the proximity of built structures and privately owned property. Prescribed burning has not been used to manage forests or forest understory fuel loads at NAVBASE Kitsap land components in the past and is not likely to be considered in the future.

The risk of wildfire to humans and built structures is not perceived as a serious problem on the NAVBASE Kitsap land components. The moist climate of the Puget Sound area is seldom conducive to the rapid spread of wildfires and the weather in the region rarely produces lightning storms during the dry months of the year. The topography is mostly flat enough that the rate of spread for a wildfire would be relatively slow. However, if a large-scale fire did occur, it would likely be driven by strong winds from the east through the dense and connected canopy and less effected by topography. Road systems would act as firebreaks and are anticipated to provide adequate access by firefighting equipment to virtually all of NAVBASE Kitsap land components. In addition, human access (the primary cause of fire starts) to the vast bulk of NAVBASE Kitsap forest areas is very restricted.

3.3 Grounds Maintenance and Related Activities

Active grounds maintenance activities with the potential to impact natural resources are carried out at all NAVBASE Kitsap properties with the exception of the Toandos Buffer Zone and Zelatched Point. These activities include landscaping, invasive species control, pest management, and control of nuisance species and feral animals at NAVBASE Kitsap installations.

3.3.1 Grounds Maintenance

The Navy maintains a regional contract for grounds maintenance that covers NAVBASE Kitsap installations with the exception of the Toandos Buffer Zone, Zelatched Point, and the Navy Railroad. Grounds maintenance along the rail line involves vegetation control adjacent to the tracks and is carried out by the railroad contractor under Navy supervision. Additionally, a contract with Kitsap County noxious weed group is working on invasive species around the installations. This contract is to control those areas that are not covered under active maintenance. At facilities with active maintenance, the grounds are divided into Improved, Semi-Improved, and Unimproved areas. Improved grounds are further divided into Prestige and Non-prestige areas. Examples of the land use in the above grounds classification areas are as follows:

a. Improved

    1. Prestige – base headquarters areas, main gate areas, and ball fields/parade grounds;

    2. Non-Prestige – high public use areas such as administration areas, and military and family support areas (e.g., commissary, Naval Exchange, base theater, etc.);

b. Semi-Improved – roadsides in less developed areas, ammunition magazines, and industrial areas; and

c. Unimproved – areas with little to no maintenance except at the boundaries (e.g., forest, fields).

The above land use designations dictate the level of landscape maintenance service an area is to receive. Prestige areas will receive the highest level of care with more frequent mowing, watering, trimming, pruning, fertilizer application (not currently applied), seeding, tree maintenance, and debris removal. Between the Prestige and Unimproved levels, where no service generally occurs besides infrequent debris removal and hazard tree maintenance, the allowable grass and hedge heights are incrementally increased and the frequency of maintenance is decreased. The regional grounds maintenance contract covers the areas outside of the base family housing developments at NAVBASE Kitsap Bangor, NAVBASE Kitsap Bremerton, and NAVBASE Kitsap Keyport. A Public-Private Venture (PPV) housing contractor is responsible for maintaining the grounds in the family housing areas at these locations. The Jackson Park Housing Complex and Naval Hospital Bremerton are included in the regional grounds maintenance contract. The PPV contractor is not subject to the above land use designations for defining the levels of grounds maintenance service; however, the family housing areas under their purview are considered to be maintained at the Prestige level.

The high levels of maintenance in Prestige areas around main gates, athletic fields, and command buildings will likely remain in the foreseeable future. In other areas, NAVBASE Kitsap is continually seeking opportunities to reduce maintenance, resource use, and costs by downgrading Non-Prestige, Semi-Improved, and family housing Prestige areas to lower grounds classification levels. Examples to reduce landscape maintenance include reducing the frequency of maintenance (e.g., mowing every two weeks versus every week), reducing landscaped areas and allowing forest cover to naturally dominate, and use of drought tolerant, native ground cover plants in place of lawn or high maintenance beds.

Current (2010) installation specific land use designations are available from Public Works grounds maintenance personnel. These land use designations will be considered a baseline for the purposes of this INRMP. Based on these designations NAVBASE Kitsap has the following INRMP goal and objective for grounds maintenance:

> **Goal 1**: Reduce the total amount of landscaped areas at each NAVBASE Kitsap installation by 10% by the year 2020.
>
> **Objective 1.1**: Develop a comprehensive Grounds Maintenance Management Plan that will reappraise the current land use designations at NAVBASE Kitsap and the level of grounds service per designation. The plan will also detail the landscape maintenance reduction plan and the methods to be employed to meet the above goal. This plan will supplement the INRMP and will be included as an Appendix in future revisions.

Projects with direct natural resource benefits identified by installation NRMs and listed in Appendix D are related to reducing grounds maintenance efforts at NAVBASE Kitsap.

3.4 Invasive Species

The Washington State Noxious Weed Control Board has developed the following classes depending on abundance, threat, and distribution for invasive and nonnative plant species in Washington:

Class A: Nonnative species limited in distribution in Washington. State law requires that these weeds be eradicated.

Class B: Nonnative species that are either absent from or limited in distribution in some portions of the state but very abundant in other areas. The goals are to contain the plants where they are already widespread and prevent their spread into new areas.

Class C: Nonnative plants that are already widespread in Washington state. Counties can choose to enforce control, or they can educate residents about controlling these noxious weeds.

The Washington State Noxious Weed Control Board's Web site should be checked regularly for updates to species and their status regarding control at http://www.nwcb.wa.gov/nwcb_nox.htm.

Invasive and nonnative species observed on NAVBASE Kitsap are presented in Table 3-4. If applicable, the Washington State Noxious Weed Control Board class is presented.

Table 3-4: Invasive and Non-native Species Found on NAVBASE Kitsap

Common Name	Scientific Name	Class
Plants		
Spotted knapweed	*Centaurea biebersteinii*	B
Thistle spp.	*Cirsium* spp.	C
Scotch broom	*Cytisus scoparius*	B
Common teasel	*Dipsacus sylvestris*	C
St. John's wort	*Hypericum perforatum*	C
Reed canarygrass	*Phalaris arundinacea*	C
Japanese knotweed	*Polygonum cuspidatum*	B
Tansy ragwort	*Senecio jacobaea*	B
Common groundsel	*Senecio vulgaris*	C
Animals		
European starling	*Sturnus vulgaris*	NA

Natural resources staff will survey NAVBASE Kitsap and create a plan with GIS components to prioritize areas with invasive species for eradication and subsequent restoration with native plants as consistent with resources allocated to the installation.

Information on these planned activities is contained in Appendix D.

3.5 Animal Management

3.5.1 Federally Listed Threatened and Endangered (T&E) Species

Federal agencies are required by the Endangered Species Act (ESA) to manage federally listed T&E species, and ensure consistency with plans for recovery of such species. This INRMP is meant to be used as a tool to identify at an early stage the potential impacts of the planned and ongoing Navy actions on T&E species and to provide avoidance and minimization measures.

3.5.2 Federal Candidate Species

Candidate species are plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities (USFWS 2011). NMFS also maintains a list of species of concern for which more information is needed before they can be proposed for listing (USFWS 2011). Candidate species receive no statutory protection under the ESA (USFWS 2011). USFWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the ESA (USFWS 2011). The NRMs at NAVBASE Kitsap are aware of candidate species potentially present at NAVBASE Kitsap, and work with the agencies on alleviating threates to the species. Those candidate species potentially present at NAVBASE Kitsap are listed in Table 3-5.

3.5.3 Bird Aircraft Strike Hazard (BASH)

Naval Hospital Bremerton has an occasionally used helicopter landing pad to the southeast of the main hospital building. The helicopters may present a danger to birds. The Naval Hospital participates in the BASH Program. As a result, the vegetation near the landing-pad has been removed to limit its attractiveness to wildlife. This program promotes land management practices to minimize bird attractants and safety procedures to recognize, control, and avoid hazardous bird concentrations.

3.5.4 Nuisance Wildlife and Feral Animal Management

At NAVBASE Kitsap, the BOSC only handles pest problems related to insects and rodents such as mice and rats. The IPMC and the NRM are notified when other agency's need to be involved for pest problems related to feral animals or other nuisance wildlife. The IPMC and/or NRM will coordinate with the Pierce, Kitsap, or Jefferson County Humane Societies for feral cat and dog

control as needed. Prevention and control of feral animals on NAVBASE Kitsap installations is detailed in Figure 3-3.

Chronic problems with birds and other nuisance wildlife are managed by USDA wildlife specialists under contract with NAVBASE Kitsap. NAVBASE Kitsap has a long standing contract with the USDA APHIS-WS. The USDA APHIS-WS maintains wildlife permits and Migratory Bird Depredation permits issued by the USFWS. Compliance with the permits, including reporting and recordkeeping, is the responsibility of the USDA APHIS-WS.

Typical activities carried out by USDA APHIS-WS staff on NAVBASE Kitsap include providing educational information, Canada geese hazing, bird deterrent system installation on critical facilities, nuisance animal (e.g., squirrel, raccoon, opossum) trapping and relocation, and assistance with injured birds and animals on base.

Though rarely needed on NAVBASE Kitsap, the USDA APHIS-WS and WDFW have the capability to deal with larger animals including black bear, bobcats, coyote, and mountain lion. Trapping, euthanasia, or relocation of larger animals requires the approval of the NRM who will work with WDFW to ensure the proper permits are in place. USDA APHIS-WS staff will incorporate non-lethal techniques as appropriate and lethal methods when warranted and approved by the NRM, which may include trapping and shooting. The USDA APHIS-WS staff work closely with the installation NRMs in carrying out their duties and provide valuable information on the presence and behavior of wildlife based on their observations. Bi-monthly reports of NAVBASE Kitsap nuisance wildlife management are sent to the installation NRMs. The feedback provided by USDA APHIS-WS staff generally involves observations of wildlife in the developed portions of the NAVBASE Kitsap installations. When conducting reviews of new activities or development at NAVBASE Kitsap, this feedback proves useful to NRMs in providing suggestions to program/project managers for ways to minimize or mitigate wildlife impacts with the goal of preventing further nuisance issues.

Site-specific discussion of pest and nuisance wildlife management at the NAVBASE Kitsap installations is provided in Sections 4 through 7.

3.5.5 Species of Concern

NAVBASE Kitsap installations manage for bats of the genus *Myotis*. The preservation of aquatic habitat promotes the conservation of bats. Maintaining standing dead trees, and increasing tree species diversity and varities contributes to the development of roosting and habitat for bat species in the area. In March 2016, white-nose syndrome was confirmed in a Little Brown Bat (*Myotis lucifugus*) near Seattle, WA. The fungal disease is primarily spread from bat-to-bat, and is unknown how it will affect bats in the state. NAVBASE Kitsap installations are working regionally to try and conduct surveys (Appendix D) on Naval Installations to obtain more data on species, numbers, and locations of colonies.

The Western Pond Turtle (*Acinemys marmorata*) is listed as a candidate species. It can be found in small isolated populations within slow streams, wetlands, ponds and lakes within the lowlands of Puget Sound. In Washington State the western pond turtle has been affected by shell disease. This disease is associated with a fungal or bacterial infection due to other environmental factors, and is more common in captive turtles than in naturally occurring populations. Surveys for reptiles & amphibians at the installations will include this species in further work.

The Fisher (*Pekania pennanti*) has not been listed and is a federal species of concern due to the states proactive conservation measures, such as reintroducing the species to its historic range (Olympic National Park in 2008). Currently the Fisher is listed as an endangered species by the State of Washington, and has the possibility of entering Zelatched Point or the Toandos Buffer Zone. Monitoring by the state was completed in 2013, and the home ranges of the tagged animals were not found to be within our sites at that time.

Dept. of Navy Feral Cat Policy

Department of the Navy
Office of the Chief of Naval Operations
2000 Navy Pentagon
Washington, D.C. 20350-2000

In Reply Refer To: 5090, Ser N456M/1U595620. 10 Jan 2002

From: Chief of Naval Operations
Subj: Policy letter preventing feral cat and dog populations on Navy property
Ref: (a) SECNAVINST 6410.1A, of 16 Aug 1994, Veterinary Health Services
(b) AFPMB TIM #37, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the U.S.
(c) OPNAVINST 6250.4B, of 27 Aug 1996, Pest Management Programs
(d) Executive Order 13112, of 3 Feb 1999, Invasive Species

1. This letter clarifies the application of reference (a) regarding the prevention of free roaming (also called wild, feral or stray) cat and dog populations on Navy installations. The objective is to prevent injury or disease to Navy personnel, and eliminate adverse impacts on native wildlife. It requires Navy commands to institute pro-active pet management procedures in order to prevent establishment of free roaming cat and dog populations. Free roaming cats and dogs pose a potential public health threat to personnel on Navy installations, and they pose a threat to wildlife including endangered species and migratory birds.

2. Existing policy at paragraph 4-2c(4) of reference (a) states Dogs, cats, and other privately-owned or stray animals will not be permitted to run at large on military reservations. Consistent with this policy, Navy commands must ensure the humane capture and removal of free roaming cats and dogs. Consistent with this requirement, Trap/Neuter/Release (TNR) programs will no longer be established on Navy land. All existing TNR programs on Navy land must be terminated no later than 1 January 2003.

3. Responsible pet ownership is a key factor in eliminating free roaming cat and dog populations. In consultation with supporting Army Veterinary Office, installations shall implement appropriate pet management measures to preclude establishment of feral cat/dog populations, including, but not limited to the following:

Require installation residents to keep and feed pet animals indoors or under close supervision when outdoors (such as on leash and collar or other physical control device - cage, fenced yard etc.).

Encourage neutering or spaying of cats and dogs before they reach reproductive age (exceptions to this policy can be made on a case by case basis as determined by the Installation Commander).

Require routine vaccinations of vats and dogs for rabies and other diseases as required by federal, state and local laws and ordnances. A current vaccination record is required at time of registration of pets.

Require microchipping registration (or other system of pet identification approved by supporting veterinary office) of all pet cats and dogs brought onto installations. Installation residents must register cats and dogs and have pets wear registration or identification tags at all times.

Prohibit the feeding of feral animals on the installation.

Provide educational materials to pet owners regarding installation regulations and general pet management.

Enforce prohibition of abandonment of animals on installations.

Comply with all humane and animal control regulations at the federal, state and local level (and their equivalents in host nation countries).

Navy installations in Europe that do not have a supporting veterinary office contact 100th Medical Detachment (VA HQ) (011) 49-622-177-2988; for all other locations that do not have a supporting veterinary office the POC is the VETCOM HQ, Commander (210) 221-6522.

4. Effective prevention, management and elimination of feral cat and dog populations requires close coordination and cooperation between natural resources, pest management, security, veterinary, and housing personnel to develop and implement an effective and humane program. Reference (b) provides information for preventing free roaming cat populations on military installations. General pest management guidelines are detailed in reference (c). Every effort should be made to work with other federal, state and local agencies to support reference (a) and reference (d) by eliminating free roaming cat and dog populations on Navy land. Navy commands should work with local animal control agencies to determine the best approach for the ultimate disposition of the captured animals. Every effort should be made, if practical, to find homes for adoptable feral cats and dogs.

5. My point of contact on this issue is Mr. Joe Cook, CNO N456M, at (703) 602-5335, or DSN 332-5335.

WILLIAM G. MATTHEIS
Deputy Director, Environmental Protection, Safety and Occupational Health Division

Don't Let Your Cat Go AWOL

https://www.denix.osd.mil/denix/Public/ES-Programs/Conservation/Legacy/SafeCats/safecats.html

Military bases often struggle with how to manage domestic cat populations. Frequent transfers of personnel often means cats are left behind, abandoned to fend for themselves. Lucky cats find a new human, but most are not so fortunate. Base commanders must deal with how to humanely and cost-effectively resolve the issue of too many free-roaming cats. ***As a cat owner, you are an important part of the solution.***

Figure 3-3: Department of Navy Feral Cat Policy

3.6 Special Management and Protection of Species

3.6.1 ESA Species Potentially Occurring on NAVBASE Kitsap

Table 3-5 provides the names and status of the federally listed ESA species potentially occurring on NAVBASE Kitsap:

Table 3-5: ESA and Sensitive Species Potentially Present within NAVBASE Kitsap Properties

Species	Status		Installation									
	Federal (critical habitat)	Washington	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Fauna												
Marbled murrelet	T	T			X	X	X		X		X	X
Bald eagle	SoC	S	X	X	X	X	X	X	X	X	X	X
Puget Sound chinook salmon	T	C			X	X	X	X	X	X	X	X
Hood Canal summer-run chum salmon	T	C					X				X	X
Puget Sound steelhead	T				X	X	X	X	X	X	X	X
Bull trout	T	C			X	X	X	X	X		X	X
Bocaccio	E	C			X	X	X		X		X	X
Canary rockfish	-	C			X	X	X		X		X	X
Yelloweye rockfish	T	C			X	X	X		X		X	X
humpback whale (Mexico DPS)	T	E			X	X	X	X	X		X	X
humpback whale (Central America DPS)	E	E			X	X	X	X	X		X	X
Southern resident killer whale	E	E			X	X		X	X			
Fisher	SoC	E									X	X

Species	Status		Installation									
	Federal (critical habitat)	Washington	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
yellow-billed cuckoo (riparian)	T	C		X	X	X	X		X	X	X	X
Burrington jumping-slug	PO-C						X					
Evening fieldslug	PO-C				X	X	X	X	X			
Cascades frog	PO-C										X	X
Flora												
Howellia	T	T		X		X	X		X	X	X	X
tall bugbane	SoC	S					X					
Torrey's peavine	SoC	T		X								
Yellow cedar	PO-C			X	X	X	X		X	X	X	X
pink sand-verbena	SoC	E									X	

C=Candidate, E=Endangered, S=Sensitive, SoC=Species of Concern, T=Threatened, PE=Potentially Extirpated, P=Proposed, PO=Potential

3.6.2 Special Management Criteria

Navy management & protection plans for TES species must demonstrate compliance with strict criteria, intended to ensure the adequacy of management for the benefit the species. The three criteria are:

1) Conservation Benefit: The plan must benefit the species.
2) Implementation of the Plan: Assurances must be in place to ensure implementation.
3) Management Effectiveness: Assurances the plan will be effective.

The original criteria language was written within USFWS Guidelines for Coordination on INRMPs (June 2015). The Navy has adopted the criteria to benefit the document development between the Sikes Act partners.

3.6.3 Marbled Murrelet

Marbled murrelets were listed as threatened under the ESA on 1 October 1992 {Federal Register (FR) 57[191]: 45328-45337, effective date 28 September 1992}. Marbled murrelets range from the Aleutian Archipelago in Alaska to central California. The majority of their lives are spent in the marine environment within 1.6 miles of shore, where they feed primarily on small fish such as sandlance and Pacific herring. Marbled murrelets nest in inland forests, typically in old

growth, mature stands at lower elevations. Nesting occurs from late March to late September when both parents tend a single young.

3.6.3.1 Critical Habitat

The primary constituent elements (PCEs) of critical habitat identified by USFWS are: (1) individual trees with potential nesting platforms, and (2) forested areas within one-half mile of individual trees with potential nesting platforms, and with a canopy height of at least one-half the site-potential tree height. The site potential tree height is the average maximum height for trees given the local growing conditions, and is based on species-specific site index tables. This includes all such forest, regardless of contiguity. These primary constituent elements are essential to provide and support suitable nesting habitat for successful reproduction (61 FR 26256).

Critical habitat has been designated for marbled murrelets but there is no designated critical habitat on or near NAVBASE Kitsap properties.

3.6.3.2 Marbled Murrelet Special Management and Protection Requirements

Criteria 1: Conservation Benefit

The NRM or designated staff will do the following (as needed and as resources allow):

- Continue to survey forested areas to identify potential nest sites during vegetation surveys and as needed by project requirements;
- Monitor for marbled murrelet use and implement special protection measures, such as timing restrictions on human activities and protection of trees;
- Record areas used by marbled murrelets, such as foraging areas along the shore, that may overlap with human activities; and
- Use information gained to update the INRMP and provide management guidance to the installation's command and departments.
- Monitors are placed during pile driving projects to avoid take of marbled murrelets. All pile driving activities are to cease upon detection of the murrelets within the monitoring zone. The Navy has limited installation of piles within the survey area to:
    - Summer (April 1 through September 30) – 75 days of total driving up to 90 minutes per day, and;
    - Winter (October 1 through March 30) – 30 days of total pile driving up to 90 minutes per day.

Murrelet surveys will assist USFWS in monitoring population trends. Although most murrelet nesting habitat has been eliminated by logging, by protecting potential habitat and foraging areas

from development, these areas could provide for an increase in suitable nesting habitat in decades to come.

The installation command will ensure that all proposed actions at the installations that potentially affect (including beneficially affect) marbled murrelets comply with Section 7 of the ESA, which requires, at a minimum, informal consultation with USFWS. This management action will benefit marbled murrelets because any action potentially affecting marbled murrelets will be reported to and reviewed by USFWS, possibly resulting in subsequent mitigation requirements. Navy personnel have worked in-depth with the USFWS over the past year to ensure planned actions do not significantly affect marbled murrelets.

Criteria 2: Implementation of the Plan

NAVBASE Kitsap annually funds and staffs the NRM positions. The NRM is responsible for implementation of the INRMP. The NRM is also able to call upon environmental planners and specialists within NAVFAC Northwest as well as USFWS and WDFW to assist in conservation and environmental compliance requirements. The NRM has the authority to implement maintenance and protection plans and obtain all necessary authorizations or approvals for proposed management actions.

The NRM annually develops projects and seeks funding for natural resources management issues, including habitat enhancement projects and special projects to assist in the recovery of T&E species, as circumstances require. The NRM will regularly meet with the installation's command and departments to ensure that proposed new or changed operations and missions consider marbled murrelet protection measures.

Criteria 3: Management Effectiveness

During the annual review of the INRMP, NAVBASE Kitsap will work with the regulatory partners to identify where management is effective and incorporate changes to the plan that would benefit murrelets.

3.6.4 Bull Trout

On 1 November 1999, the USFWS designated all populations of bull trout in the coterminous U.S. as threatened under the ESA (FR 64[210]: 58910-58933, effective date 1 December 1999).

As a species, bull trout exhibit primarily freshwater phases, including resident and migratory life cycles. A portion of coastal bull trout may use an anadromous life strategy that was not well documented in the past (Rieman and McIntyre 1993), but recent work by Goetz et al. (2004/2005) has tracked bull trout from Puget Sound river systems into marine waters and back again. This suggests that some bull trout utilize both freshwater and saltwater habitats for foraging within the same year or even within the same season. They have also been tracked from one river system to another, which also suggests that they are not bound to natal or birth river systems but are able to explore and forage in different watersheds in Puget Sound. While there

are no documented bull trout streams on NAVBASE Kitsap, marine waters along the shorelines are known to contain bull trout, which may spawn in the Skokomish River or in rivers along the Strait of Juan de Fuca.

3.6.4.1 Critical Habitat

On 30 September 2010, USFWS redesignated critical habitat for bull trout but final designation did not include areas on Navy installations covered by this INRMP (FR 75: 63898). The exclusion was based on data that the military activities occurring at the sites are courrently being conducted in a manner that minimizes impacts to bull trout habitat. Additionally, nearshore areas adjacent to Navy installations and those areas designated as marine security areas or restricted zones provide some additional conservation benefits, as recreational and commercial vessels are prohibited from entering. Our INRMPs will continue to provide a benefit to the species, and we will continue to discuss with the agencies regarding future designations.

Primary constituent elements (PCEs) are the physical or biological features essential to the conservation of the species, as identified within the critical habitat designation for the species. Within the boundaries of designated critical habitat, the USFWS determined that the following PCEs are essential for the conservation of bull trout and may require special management considerations or protection (75FR 63931):

(1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

(2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

(3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

(4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

(5) Water temperatures ranging from 2 to 15 ºC (36 to 59 ºF), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.

(6) In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and

juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

(7) A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.

(8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

(9) Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

3.6.4.2 Bull Trout Special Management and Protection Requirements

Criteria 1: Conservation Benefit

The lack of potential spawning habitat on NAVBASE Kitsap limits the ability to protect, restore, or maintain suitable habitat conditions for bull trout. To conserve and protect marine habitats that may contain bull trout, the NRM and/or WDFW will conduct forage fish spawning surveys as needed and as consistent with resources allocated to the installation to implement. The NRM will ensure that actions that may take place in or near forage fish spawning areas be restricted to the approved in water work windows or as agreed to with the regulatory agencies. To protect and restore coastal processes, the NRM will seek opportunities to replace armored shorelines with soft solutions and limit the installation of new armoring. The NRM will seek opportunities to conduct annual beach cleanups that remove manmade debris and potential contaminant sources, benefiting migrating and foraging bull trout. The NRM will seek and support opportunities to restore riparian vegetation and healthy forests that allow for natural erosional processes. Additionally, the NRM will seek funding and/or other opportunities to conduct fish surveys and aquatic vegetation surveys in the marine waters surrounding Naval Base Kitsap. The NRM will conduct or seek funding to conduct an evaluation of the unnamed stream on Toandos Peninsula to document existing conditions and identify potential enhancement opportunities.

The NRMs will work with NAVBASE Kitsap and PSNS & IMF stormwater managers in reviewing proposed projects and programs for stormwater or other discharges, and ensure that these discharges do not degrade the water or sediment quality of the waters surrounding an installation.The Environmental staff will also identify operations and infrastructure that could affect water quality (i.e., storm drains that release directly to marine waters or pesticide applications near intermittent streams), and coordinate with the command and NAVBASE Kitsap departments to minimize or eliminate releases to marine waters. The NRMs, under the direction of the Environmental Director, will provide assistance if required to the development of spill prevention, control, and countermeasures for the facility and for operations. The NRMs or other

designated environmental staff will regularly inspect any structures that extend below the mean higher high water (MHHW) line and keep the structures free of debris or other materials that could hinder movement along the shoreline.

NAVBASE Kitsap will ensure that all proposed routine construction and repair activities that will take place below the MHHW line be restricted to the approved in-water work time for bull trout, dependent upon tidal reference area as published by the USACE, Seattle Regulatory Branch. The installation command will ensure that all proposed actions that potentially affect (including beneficially affect) bull trout comply with Section 7 of the ESA, which requires, at a minimum, informal consultation with USFWS; this includes emergency repairs to structures and other activities that are required by the installation's mission.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.2.

Criteria 3: Management Effectiveness

During the annual review of the INRMP, NAVBASE Kitsap will work with the regulatory partners to identify where management is effective and incorporate changes to the plan that would benefit bull trout.

3.6.5 Chinook Salmon

On 24 March 1999, NMFS listed the Puget Sound Chinook salmon as threatened. This status was reaffirmed on 28 June 2005 (FR 70[123]: 37160-37204, effective date 29 August 2005) and again on 15 August 2011 (FR 76[157]: 50448-50449). The Puget Sound Chinook Endangered Species Unit includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Straits of Juan De Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington, as well as twenty-six artificial propagation programs.

3.6.5.1 Critical Habitat

On 2 September 2005, critical habitat for Chinook salmon was designated, with the exclusion of the waters within the boundaries of DOD managed lands and waters (FR 70[170]: 52630-52858, effective date 2 January 2006). Exclusion was based off the benefits provided within the INRMP, which include: erosion control, protect riparian zones, minimize stormwater and construction impacts, reduce contaminants, and monitor listed species and their habitats. In these areas, critical habitat consists of the water, substrate, and the adjacent riparian zone of accessible estuarine and riverine reaches and extends to a depth of 30 meters below the mean lower low water (MLLW) line.

Primary constituent elements (PCEs) are the physical or biological features essential to the conservation of the species, as identified within the critical habitat designation. Within the

boundaries of designated critical habitat, the primary constituent elements essential for the conservation of the Puget Sound ESU of Chinook salmon are those sites and habitat components that support one or more life stages, including (FR 70: 52630):

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

(2) Freshwater rearing sites with:

> (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
>
> (ii) Water quality and forage supporting juvenile development; and
>
> (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;

(4) Estuarine areas free of obstruction and excessive predation with:

> (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;
>
> (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and
>
> (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

(5) Nearshore marine areas free of obstruction and excessive predation with:

> (i) Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and
>
> (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

(6) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

3.6.5.2 Chinook Salmon Special Management and Protection Requirements

Criteria 1: Conservation Benefit

This is the same as the Criteria 1 section for bull trout, described in Section 3.6.3.2.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.2.

Criteria 3: Management Effectiveness

During the annual review of the INRMP, NAVBASE Kitsap will consult with the regulatory partners to identify necessary changes to the plan that would benefit Chinook salmon

3.6.6 Steelhead

On 11 May 2007, NMFS listed the Puget Sound Distinct Population Segment (DPS) of steelhead as a threatened species (FR 72[91]: 26722-26735). The Puget Sound steelhead DPS includes all naturally spawned winter-run and summer-run steelhead populations below natural and man-made impassable barriers, in streams in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, bounded to the west by the Elwha River and to the north by the Nooksack River and Dakota Creek, as well as the Green River natural and Hamma Hamma winter-run hatchery steelhead stocks.

Steelhead is the name commonly applied to the anadromous form of the biological species *Oncorhynchus mykiss*. Steelhead exhibits perhaps the most complex suite of life-history traits of any species of Pacific salmonid. Steelhead can be anadromous (steelhead), or freshwater residents (rainbow or redband trout), and under some circumstances yield offspring of the opposite life-history form. Those that are anadromous can spend up to seven years in freshwater prior to smoltification and then spend up to three years in saltwater prior to first spawning. Steelhead are also iteroparous (meaning individuals may spawn more than once), whereas the Pacific salmon species are principally semelparous (meaning individuals generally spawn once and die). Within the range of West Coast steelhead, spawning migrations occur throughout the year, with seasonal peaks of activity. In a given river basin there may be one or more peaks in migration activity; since these ‘runs’ are usually named for the season in which the peak occurs. Some rivers may have runs known as winter, spring, summer, or fall steelhead runs.

3.6.6.1 Critical Habitat

Critical habitat for the Puget Sound DPS of steelhead was proposed in January 2013 (78 FR 2725). The final ruling came on 24 February 2016 (81 FR 9251) for Puget Sound steelhead, and was effective on 25 March 2016. This includes approximately 2,031 miles of freshwater and estuarine habitat in Puget Sound, Washington. NAVBASE Kitsap has been excluded from this critical habitat designation as our INRMP addresses Puget Sound steelhead habitat and contains measures that provide benefits to the DPS. Examples of benefits are: actions that eliminate fish

passage barriers, control erosion, protect riparian zones, increase stream habitat complexity, and monitor listed species and their habitats.

Primary constituent elements (PCEs) are the physical or biological features essential to the conservation of the species, as identified within the critical habitat designation for the species. Within the boundaries of designated critical habitat, the primary constituent elements essential for the conservation of the Puget Sound DPS of steelhead are those sites and habitat components that support one or more life stages, including (81 FR 9251):

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

(2) Freshwater rearing sites with:

> (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
>
> (ii) Water quality and forage supporting juvenile development; and
>
> (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;

(4) Estuarine areas free of obstruction and excessive predation with:

> (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;
>
> (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and
>
> (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

(5) Nearshore marine areas free of obstruction and excessive predation with:

> (i) Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and
>
> (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

(6) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

3.6.6.2 Steelhead Special Management and Protection Requirements

Criteria 1: Conservation Benefit

This is the same as the Criteria 2 section for bull trout, described in Section 3.6.3.2.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.2.

Criteria 3: Management Effectiveness

During the annual review of the INRMP, NAVBASE Kitsap will consult with the regulatory partners to identify necessary changes to the plan that would benefit steelhead.

3.6.7 Bocaccio

On 28 April 2010, NMFS listed the Puget Sound DPS of Bocaccio as endangered (FR 75[81]: 22276-22290). Threats to the species include areas of low dissolved oxygen (DO), mortality associated with fishery bycatch, the reduction of kelp habitat necessary for juvenile recruitment, habitat disruption, derelict gear, climate changes, species interactions (including predation and competition), diseases, and genetic changes. The combination of these factors, in addition to the rockfish's particular life history traits, has contributed to declines in the species within Georgia Basin and Puget Sound.

The coloring of Bocaccio is olive brown on back, and pink on sides. The adult Bocaccio are most commonly found in depths of 160 to 820 feet, but also may be as deep as 1,560 feet, with rocky bottoms and outcrops as their main focus for habitats.

3.6.7.1 Critical Habitat

On 11 February 2015, critical habitat for Bocaccio was designated, with the exclusion of the waters within the boundaries of DOD managed lands and waters. The proposed critical habitat rule for the listed DPSs was published in the Federal Register on August 6, 2013 (78 FR 47635), and describes the final rule. This critical habitat excludes the waters within the boundaries of DOD managed waters in the nearshore zone due to Navy security zones. In these areas, critical habitat consists of the water and substrate from the extreme high tide datum down to the MLLW line. Benefits to the species that led to the exclusion are: actions that improve shoreline conditions, control erosion and water quality, prevention of and prompt response to chemical and oil spills, and monitoring of listed species and their habitats.

(1) Physical or Biological Features Essential to the conservation of adult Bocaccio (78 FR 47638) are: Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities

(2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, and reproduction, and feeding opportunities, and

(3) The type and amount of structure and rugosity that supports feeding opportunities and predator avoidance.

Physical and Biological features essential to the conservation of juvenile Bocaccio (78 FR 47638) are:

(1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities; and

(2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, and reproduction, and feeding opportunities.

3.6.7.2 Bocaccio Special Management and Protection Requirements

Criteria 1: Conservation Benefit

The NRM and/or WDFW will conduct forage fish spawning surveys along the shorelines of the installations, as agreed to in the annual metrics meeting and as consistent with resources allocated to the installation to implement. WDFW is conducting nearshore surveys (where access is feasible) to assess juvenile rockfish species and assemblages. Surveys are being conducted using non-lethal survey techniques (such as quantitative video surveys, scuba transects, etc.) as recommended by NMFS and WDFW due to rockfish susceptibility to barotraumas. Surveys include potential habitat mapping of rocky areas (with and without kelp) and sandy areas or areas that support eelgrass. Additionally, the conservation benefits discussed above for bull trout may also benefit Bocaccio, particularly those that occur within the nearshore environment.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.

Criteria 3: Management Effectiveness

During the annual review of the INRMP, NAVBASE Kitsap will consult with the regulatory partners to identify necessary changes to the plan that would benefit Bocaccio.

3.6.8 Yelloweye Rockfish

On 28 April 2010, NMFS listed the Puget Sound DPS of Yelloweye rockfish as threatened (FR 75[81]: 22276-22290). Threats to the species include areas of low dissolved oxygen (DO), mortality associated with fishery bycatch, the reduction of kelp habitat necessary for juvenile

recruitment, habitat disruption, derelict gear, climate changes, species interactions (including predation and competition), diseases, and genetic changes. The combination of these factors, in addition to the rockfish's particular life history traits, has contributed to declines in the species within Georgia Basin and Puget Sound.

Yelloweye rockfish are found in depths of 300 to 590 feet with rocky bottoms and outcrops. They are orange red to orange yellow in color with bright yellow eyes. The adults usually have a single light band on their lateral line.

3.6.8.1 Critical Habitat

On 11 February 2015, critical habitat for Yelloweye rockfish was designated, with the exclusion of the waters within the boundaries of DOD managed lands and waters. The proposed critical habitat rule for the listed DPSs was published in the Federal Register on August 6, 2013 (78 FR 47635) and describes the final rule. This critical habitat excludes the waters within the boundaries of DOD managed waters in the nearshore zone due to Navy security zones. In these areas, critical habitat consists of the water and substrate from the extreme high tide datum down to the mean lower low water (MLLW). Benefits to the species that led to the exclusion are: actions that improve shoreline conditions, control erosion and water quality, prevention of and prompt response to chemical and oil spills, and monitoring of listed species and their habitats.

(1) Physical or Biological Features Essential to the conservation of adult and juvenile Yelloweye Rockfish (78 FR 47638) are: Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities

(2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, and reproduction, and feeding opportunities, and

(3) The type and amount of structure and rugosity that supports feeding opportunities and predator avoidance.

3.6.8.2 Yelloweye Rockfish Special Management and Protection Requirements

Criteria 1: Conservation Benefit

The NRM and/or WDFW will conduct forage fish spawning surveys along the shorelines of the installations, as agreed to in the annual metrics meeting and as consistent with resources allocated to the installation to implement. WDFW is conducting nearshore surveys (where access is feasible) to assess juvenile rockfish species and assemblages. Surveys are being conducted using non-lethal survey techniques (such as quantitative video surveys, scuba transects, etc.) as recommended by NMFS and WDFW due to rockfish susceptibility to barotraumas. Surveys include potential habitat mapping of rocky areas (with and without kelp) and sandy areas or areas that support eelgrass. Additionally, the conservation benefits discussed above for bull trout may also benefit Yelloweye rockfish, particularly those that occur within the nearshore environment.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.2.

Criteria 3: Management Effectiveness

During the annual review of the INRMP, NAVBASE Kitsap will consult with the regulatory partners to identify necessary changes to the plan that would benefit Yelloweye rockfish.

3.6.9 Hood Canal Summer Run Chum

On 25 March 1999, NMFS listed the Hood Canal Summer Run ESU as a threatened species (FR 64[57]: 14508-14517). This listing was reaffirmed in 2005 (FR 70[123]: 37160-37204) and again in 2011 (FR 76[157]: 50448-50449. This ESU includes all naturally spawned populations of summer run chum salmon in Hood Canal and its tributaries, plus populations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington, and four artificial propagation programs: Hamma Hamma Fish Hatchery, Lilliwaup Creek Fish Hatchery, Union River/Tahuya, and Jimmycomelately Creek Fish Hatchery.

Chum salmon usually spawn in coastal areas and juveniles out-migrate to marine waters almost immediately after emerging from the gravel in February. For this reason, the survival and growth in juvenile chum salmon depends less on freshwater conditions than on favorable estuarine and marine conditions. The smaller chum salmon juveniles tend to remain in nearshore, shallow areas, while larger juveniles move into deeper water, similar to the Chinook salmon out-migrants.

3.6.9.1 Critical Habitat

Final critical habitat was published on 2 September 2005, with effective date of 2 January 2006, with the exclusion of the waters within the boundaries of DOD managed lands and waters FR 70[170]: 52630-52858). In these areas, critical habitat consists of the water, substrate, and the adjacent riparian zone of accessible estuarine and riverine reaches and extends to a depth of 30 meters below MLLW.

Primary constituent elements (PCEs) are the physical or biological features essential to the conservation of the species, as identified within the critical habitat designation for the species. Within the boundaries of designated critical habitat, the primary constituent elements essential for the conservation of the Hood Canal Summer Run ESU are those biological features essential to the conservation of the ESU. The specific PCEs include:

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.

(2) Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water

quality and forage supporting juvenile development; and natural cover such as shade submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

(3) Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

(4) Estuarine areas free to obstruction with water quality, water quantity, and and salinity conditions supporting juvenile and adult physiological transitions between fresh-and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

(5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic befetation, large rocks and boujlders, and side channels.

(6) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, support growth and maturation.

3.6.9.2 Hood Canal Summer Run Chum Special Management and Protection Requirements

Criteria 1: Conservation Benefit

This is the same as the Criteria 1 section for bull trout, described in Section 3.6.3.2.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.2.

Criteria 3: Management Effectiveness

During the annual review of the INRMP, NAVBASE Kitsap will consult with the regulatory partners to identify necessary changes to the plan that would benefit chum.

3.6.10 Southern Resident Killer Whale

Southern Resident Killer Whales (SRKW), a subpopulation of *Orcinus orca*, was designated as endangered by NMFS on 18 November 2005 (FR 70[222]: 69903-69912, effective date 16 February 2006). Factors that are thought to contribute to the decline of the SRKW population include prey availability, human-generated noise, vessel presence/harassment, and chemical contamination.

Orcas have been observed in Admiralty Inlet and the Strait of Juan de Fuca on numerous occasions, and they occasionally visit areas farther south in Puget Sound. The SRKW subpopulation are fish-eaters; other orca populations that visit the area are mammal-eaters (primarily seals in Puget Sound) and are known as the Transient population because they are not thought to be regular inhabitants of Puget Sound, as are the SRKW. Researchers have studied the SRKW and have documented the identification markings of each animal. To the casual observer, however, it is difficult to tell if a group of orcas are Transients or SRKW, unless feeding behavior is observed. The SRKW typically hunt for fish in deeper waters, but females and sub-adults have been observed hunting for salmon in rock crevices in shallow water (NMFS 2005). SRKW seem to prefer Chinook salmon when available, but will also consume lingcod, flat fish, rockfish, and herring (NMFS 2005).

3.6.10.1 Critical Habitat

On 29 November 2006, critical habitat for SRKW was designated with the exclusion of the waters within the boundaries of DOD managed lands and waters (FR 71[229]: 69054-69070, effective date 29 December 2006).

Joint NMFS-FWS regulations for listing threatened and endangered species and designating critical habitat shall consider those physical and biological features that are essential to the conservation of the species. Pursuant to the regulations, such PCEs include, but are not limited to the following:

(1) Space for individual and population growth, and for normal behavior;

(2) Food, water, air, light, minerals, or other nutritional or physiological requirements;

(3) Cover or shelter

(4) Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally,

(5) Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

3.6.10.2 Southern Resident Killer Whale Special Management and Protection Requirements

Criteria 1: Conservation Benefit

Food habits research indicates that SRKW prefer Chinook salmon. The conservation measures identified above for Chinook salmon are also expected to benefit SRKW. The NRM will monitor SRKW movements through use of the Orca Network to ensure Navy activities do not affect SRKWs that may be foraging in the marine water of NAVBASE Kitsap. The installation will ensure that all proposed actions at the installation that potentially affect (including beneficially

affect) SRKW comply with Section 7 of the ESA which requires, at a minimum, informal consultation with NMFS.

In addition, any action that may affect SRKW may also require a permit under the MMPA. All installations will ensure that all proposed actions at the installation that potentially affect (including beneficially affect) SRKW comply with the requirements of the MMPA.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.2.

Criteria 3: Management Effectiveness

The NRM or designated staff will record areas of SRKW use in the waters of or near the installation. The information will be used to update the INRMPs and provide management guidance to the installation's commands and departments. During the annual review of the INRMP, NAVBASE Kitsap will consult with the regulatory partners to identify necessary changes to the plan that would benefit SRKW.

3.6.11 Humpback Whale

In 1965, humpback whales were protected from hunting by the International Whaling Commission (commercial harvesting continued into the 1970s by the Soviet Union) and were listed as endangered under the ESA on 2 June 1970 (Berzin 2008, FR 35[106]: 8491-8498). In 2016, NMFS published a final decision changing the status of humpback whales under the ESA (effective October 11, 2016). Previously humpback whales were recognized as worldwide, but recent changes have recognized the existence of 14 distinct population segments (DPSs).

In the North Pacific, there are three distinct population groups: a Central America population (endangered), a population that migrates between Hawaii and Alaska (delisted), and a Mexico-California-Alaska population (threatened) that seasonally migrates past Washington State between breeding areas and feeding areas. During the summer, humpback whales in the North Pacific migrate and feed over the continental shelf and along the coasts of the Pacific Rim, from Point Conception, California, to the Gulf of Alaska, Prince William Sound, and Kodiak Island. Humpback whales spend the winter in three separate wintering grounds: the coastal waters along Baja California and the mainland of Mexico, the main islands of Hawaii, and the islands south of Japan (SAIC 2001).

In recent years, humpback whales have been intermittently sighted in Puget Sound. An analysis of data compiled by the Orca Network, a community based marine mammal monitoring effort, shows humpbacks are regular visitors to the Strait of Juan de Fuca (although in low numbers) but are infrequent visitors to Puget Sound (Orca Network data 2002-2004).

3.6.11.1 Critical Habitat

Critical habitat has not been designated for the humpback whale.

3.6.11.2 Humpback Whale Special Management and Protection Requirements

Criteria 1: Conservation Benefit

The installation will ensure that all proposed actions at the installation that potentially affect (including beneficially affect) humpback whales comply with Section 7 of the ESA, which requires, at a minimum, informal consultation with NMFS. In addition, any action that may affect humpback whales may also require a permit under the MMPA. All installations will ensure that all proposed actions at the installation that potentially affect (including beneficially affect) humpbacks comply with the requirements of the MMPA.

Criteria 2: Implementation of the Plan

This is the same as the Criteria 2 section for marbled murrelets, described in Section 3.6.2.2.

Criteria 3: Management Effectiveness

The NRM or designated staff will record areas of humpback whale use in the waters of or near the installation. The information will be used to update the INRMPs and also provide management guidance to the installation's commands and departments. During the annual review of the INRMP, NAVBASE Kitsap will consult with the regulatory partners to identify necessary changes to the plan that would benefit humpback whales.

3.6.12 State Species of Concern Management

Species of concern in Washington include those species listed as state endangered, state threatened, state sensitive, or state candidate, as well as species listed or proposed for listing by the USFWS or the NMFS. A complete list of Washington State species of concern may be found at http://wdfw.wa.gov/wlm/diversty/soc/soc.htm. The purpose of the listing is to identify and classify native wildlife species that have need of protection and/or management to ensure their survival as free-ranging populations in Washington and to define the process by which listing, management, recovery, and delisting of a species can be achieved.

NAVBASE Kitsap NRMs will cooperate with WDFW biologists in developing good management practices for State Sensitive Species. There are additional special status species (Birds of Conservation Concern (BCC), which identifies species, subspecies, and populations of all migratory nongame birds that are likely to become candidates for listing under the ESA. NRMs will stay familiar with the lists of species that may be found on the installation properties and strive to conserve, restore, and protect habitats important to these species subject to the military missions of each of NAVBASE Kitsap's installation properties.

The NRMs will contact the WDFW Shellfish biologists regarding management, conservation, and restoration of the Olympia oyster (*Ostrea lurida*), a state candidate species, found at NAVBASE Kitsap at Bangor, NAVBASE Kitsap Keyport, and the Jackson Park Housing Complex. NAVBASE Kitsap will support actions to restore the Olympia oyster on Navy

controlled property. Updated management strategies for the Olympia oyster will be included in future INRMP revisions.

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4 NATURAL RESOURCES ON NAVAL BASE KITSAP BANGOR

4.1 Physical Conditions

NAVBASE Kitsap Bangor and its associated facilities (Camp Wesley Harris, Toandos Peninsula, and Zelatched Point) lie in the Puget Sound lowland between the Cascade and Olympic mountain ranges and located along a 4.5-mile stretch of Hood Canal, approximately 20 miles west of Seattle, Washington (Figure 4-1). The Hood Canal is a long fjord-like body of marine water that borders NAVBASE Kitsap Bangor to the west. The physiography of NAVBASE Kitsap Bangor is characterized by flat-topped ridges that range in elevation of 300 to 500 feet above sea level in the northern portion, while the southern part of the base consists of a till plain, with several north-south trending rounded hills or drumlins. Across the Hood Canal are Toandos Peninsula and Zelatched Point in Jefferson County (on the west shore of Hood Canal and east shore of Dabob Bay, respectively. The terrain on the peninsula tends to be steeper than that on the main base of NAVBASE Kitsap Bangor with hills rising up to 500 feet above sea level. Camp Wesley Harris is one of the only NAVBASE Kitsap facilities not to have direct connection with marine water and is situated in the bed of a former lake with an elevation from 400 - 520 feet above sea level. The northern two-thirds of the camp consists of rolling hills and a marshy area of approximately 10 acres containing a shallow pond near the north-central end of the area.

4.1.1 Hydrology

NAVBASE Kitsap Bangor drainage consists of five small streams entering Hood Canal and two tributaries of Clear Creek exiting to the southeast, which empty into Dyes Inlet. The *TRIDENT Support Site Environmental Impact Statement* (USN 1974) identified 15 small streams affected by NAVBASE Kitsap Bangor included in the records of the Washington State Division of Water Resources with stream designations 128 - 140. Recorded stream flows range from a minimum flow of 0.01 cubic feet per second (cfs) to a maximum flow rate of 4.0 cfs derived from a 2.07 square mile drainage area for the stream passing through Devil's Hole Lake. Drainage areas for the streams vary from 0.03 - 3.68 square miles.

Clear Creek drains approximately 750 acres of NAVBASE Kitsap Bangor before exiting Navy property and entering Silverdale. Major drainages from NAVBASE Kitsap Bangor to Hood Canal include streams that flow through Cattail Creek estuary, Hunters Marsh, and Devil's Hole Lake. Overland flow from much of the western portion of NAVBASE Kitsap Bangor is routed to Hood Canal through a series of stormwater outfalls.

Within the boundaries of NAVBASE Kitsap Bangor are three lakes, a small pond, and four large marshes. Besides their primary functions to provide stormwater control, these bodies of water

also provide quality outdoor recreation opportunities and unique habitats for a variety of wildlife species. Brief discussions of these bodies of water are provided below:

- **Devil's Hole Lake.** In the early 1940s a reservoir, which has a surface area of about 2.6 hectares (15 acres) and known as Bangor Lake or Devil's Hole Lake, was created near the mouth of Devil's Hole Creek, when Sea Lion Road was constructed (DON-SBB 2000). Devil's Hole Lake is fed by a watershed area of approximately 3.0 square miles. There are approximately 3.5 miles of streams that feed into this lake. A water level control structure on the culvert draining Devil's Hole Creek created the lake and it effectively blocked the flow of these streams into Hood Canal. However, Devil's Hole had a fish ladder installed in 1979 at the outlet to Hood Canal, which afforded NAVBASE Kitsap the opportunity to attempt to reintroduce Coho salmon into this watershed area. Although the program was stopped in 1991, NAVBASE Kitsap continued to have returns until the catastrophic winters of 1993 and 1994, which caused a silting in of the spawning habitat and the returns of "wild" fish diminished substantially. The lake also provides habitat for otter, beaver, Canada goose, American wigeon, mallard ducks, and serves as great blue heron rookery. The lake is closed to recreational fishing from 15 September through 15 June. In 1998, the Navy hired WDFW to conduct an assessment of species use and habitat conditions at Devil's Hole (WDFW 2000). The report also describes factors that may limit anadromous salmonids use of Devil's Hole and provides recommendations for corrective measures to improve utilization and survival of salmonids (WDFW 2000).

- **Trident Lakes.** These lakes were constructed as stormwater retention facilities to prevent large fluctuations in volume and speed of stormwater entering the West Fork of Clear Creek. Trident lakes serve as the headwaters of this stream. The lower reaches of Clear Creek off of Navy property support steelhead trout, Chinook salmon, chum salmon, Coho salmon, as well as sea run cutthroat trout; however, these species have no access to the lake itself due to the outfall design. The Trident lakes area is currently used as a recreational area having such amenities as picnic tables, restrooms, outdoor cooking facilities, and playground equipment. The lakes are stocked with catchable rainbow trout in order to allow for a put-and-take fishing opportunity. In 2017, it was found that unknown people who have access to the lakes put pumpkinseed fish within them. These fish have accessed the downstream, and have ended up in Clear Creek. In 2018 the lakes will be drained down and the panfish will perish. After this, the lakes will be filled and restocked with sterile rainbow trout.

- **Wilkes Marsh.** Wilkes Marsh is a natural marsh that has been deepened in spots by a peat farming operation that took place prior to Navy ownership. It provides habitat for an amphibian population and nesting habitat for waterfowl such as mallards, wigeon, buffleheads, and northern shovelers. The overflow of this marsh flows to Cattail Creek

Estuary and due to the peaty soils, provides an excellent source of nutrients into the system.

- **Bullhead Marsh.** Bullhead Marsh is a wetland area created in part by the construction of Bullhead Road. This is an upland marsh, and has no obvious overland connectivity pathways. It is the home to an active osprey nest and contains a diverse reptilian population. It also provides nesting habitat for many species of waterfowl. In 1998, the southern portion of this marsh was dedicated to the memory of Sgt. Maj. Nicholas W. Shupe, who gave a great deal of support to the Fish and Wildlife program while serving as NAVBASE Kitsap Game Warden.

- **Hunters Marsh.** This marsh was created when the Navy constructed the Explosive Handling Wharf (EHW). The marsh is adjacent to a great blue heron rookery as well as providing habitat for many amphibian and waterfowl species. It is directly connected to Hood Canal via a drop culvert.

- **Lake Ruth.** The impoundment was built to serve as an interim sewage lagoon while the transition was made between an existing sewage treatment plant and the new plant built by Kitsap County. A unique feature is the lack of any incoming or draining streams. The lake has no surface connection to other fish habitat. After extensive sampling, the Navy decided to use this lake as a recreation outlet for spiny-ray fishing. Two thousand largemouth bass fingerlings were purchased and planted into the lake. Working with WDFW, the Navy determined that the bass numbers had increased, there were three distinct age classes, and the size of the fish had increased to about 1.5 pounds. Bluegills were then introduced as a forage species and a catch-and-release fishery program was started. This lake was opened to fishing until security restrictions increased and fishing was closed to lower base. The lake also supports waterfowl as well as amphibian species. It had bullfrogs introduced in the early 1980s, and is the only body of water on NAVBASE Kitsap at Bangor that has a non-native introduced species.

- **Floral Point Salt Water Marsh.** The salt marsh at Floral Point is less than 1 acre in size and supports a diverse population of both plant and bird species. Sedges, rushes, perennial pickleweed are a few of the plants that flourish here. Gulls, dowitchers, dunlin, and killdeer are bird species that are prevalent in this area. This marsh acts as a buffer between the uplands and the marine habitat. It serves as a reservoir of food and as a shelter when bad weather occurs. This is the largest salt marsh at NAVBASE Kitsap, with high levels of diversity.

Three distinct aquifer systems in superposition have been identified at NAVBASE Kitsap at Bangor. An intermediate groundwater zone has also been identified within the Kitsap Formation (USN 2001a). The aquifer systems found on the main base of NAVBASE Kitsap at Bangor have been designated, in order of increasing depth (USN 2001a):

- Vashon recessional outwash (seasonal aquifer) (perched aquifer)
- Vashon till (aquitard)
- Vashon advanced outwash (water table aquifer) (shallow aquifer)
- Kitsap Formation (Kitsap Formation aquitard and intermediate groundwater zones)
- Older sand and gravel (sea level aquifer).

To better understand the hydrogeology of NAVBASE Kitsap at Bangor and vicinity, the U.S. Geological Survey conducted hydrological studies during the years of 1998 (USGS 1998), 2002 (USGS 2002), and more recently in August 2006 (USN 2006a). These studies were conducted to provide the knowledge of the hydro-geologic framework and directions of groundwater movement to determine influx rates of salinity into freshwater systems, and to determine water movement within the local Hood Canal. For terrestrial waters, maps of water levels in wells indicate that groundwater moves from inland areas of higher altitude toward streams or near-shore areas of lower altitude with little influx from the Hood Canal (USGS 1998). The rates of this water movement were dependent on elevation and under normal situations; water movement was well-channelized with little chance of flooding. Local precipitation is the primary source of water recharging the aquifers with the bulk of the precipitation occurring during the winter months. The precipitation and subsequent infiltration directly recharges the seasonal zone in the Vashon recessional outwash and the water table aquifer beneath the till.

Regionally, the recharge to the intermediate groundwater zones is through flow from the water table aquifer as indicated regionally by vertical pressure gradients that are primarily downward (USGS 1998). Discharge occurs from the water table aquifer at springs along the shoreline and in stream drainages where the water table intersects the ground surface. The sea level aquifer regionally discharges to Hood Canal to the west and Puget Sound to the east. Simulation of groundwater flow systems indicated that for selected future groundwater pumping on and near the base, the risk is low that significant concentrations of on-base groundwater contamination will reach off-base public-supply wells and hypothetical wells southwest of the base (USGS 2002). The evaluation also shows that future saltwater encroachment of aquifers below sea level may be possible, but this determination has considerable uncertainty and the amount of time it would take for encroachment to occur is unknown. For water movement on the Hood Canal, regardless of the direction of flow, current velocities were relatively weak and changes in flow rates oscillated due to residual currents in the localized portion of the Hood Canal (USN 2006a). The magnitude of these fluctuating currents in the area of NAVBASE Kitsap at Bangor was on the order of 10 centimeters per second (cm/sec), with peak values of 20 - 25 cm/sec; a relatively slow rate of which only fine-grained sediments are typically resuspended above 20 cm/sec (USN 2006a).

NAVBASE Kitsap Bangor uses groundwater from sea level aquifers as a potable water source. The drinking water program is managed by the Public Works Department with direct oversight by NAVBASE Kitsap Environmental staff. There are six drinking water wells at NAVBASE Kitsap Bangor four of which are active. To protect the aquifer NAVBASE Kitsap Bangor maintains a Well Head Protection Plan (WHPP) that limits activities within certain distances of the wells (USN 2004c). The WHPP establishes several well head protection areas (WHPA) around each well. A WHPA is defined as the surface and subsurface area surrounding the water well through which contaminants are reasonably likely to move toward each well. The NAVBASE Kitsap Bangor WHPP establishes a sanitary control area (SCA) of 100 feet around each well. Groundwater modeling is used to calculate the time of travel (TOT) for groundwater to move from a point of entry at the surface to its point of withdrawal at the well. The results of the modeling provide three additional WHPAs around each well: 1, 5, and 10-year TOT rates. The following rules and guidelines have been established for the NAVBASE Kitsap Bangor WHPAs:

- Further development is restricted within the SCA around each well. Routine maintenance of existing structures is permissible. Storage of hazardous materials and use of pesticides in the SCA is prohibited.

- Eliminate potential sources of microbial and chemical contamination within the 1-year TOT boundary. Restrict new sewage lift stations, sewer lines, or sewage or stormwater management facilities within the 1-year TOT where possible. New development should be restricted as feasible. If new development is necessary, it should not include industrial type facilities that include significant material handling, storage, or outdoor laydown.

- Within the 5-year TOT area, potential chemical contaminant sources are controlled by pollution prevention and risk reduction management. New development should be limited to light industrial facilities that do not involve significant material handling, storage, or outdoor lay down areas.

- The NAVBASE Kitsap Bangor land use policy for the area within the 10-year TOT boundary is to encourage planners to recognize the long-term source of the drinking water supplying the installation when siting future facilities or operations with high-risk sources of ground water contamination.

Camp Wesley Harris is one of the only NAVBASE Kitsap facilities not to have direct connection with marine water and is situated in the bed of a former lake with an elevation from 400 - 520 feet above sea level. The northern two-thirds of the camp consists of rolling hills and a marshy area of approximately 10 acres containing a shallow pond near the north-central end of the area. Surface water resources at Camp Wesley Harris are tributaries to Chico Creek, a known salmon stream, and Wildcat Creek and drains to Dyes Inlet. Stormwater runoff flows overland, generally to the central portion of the facility to a topographically lower area. Beaver play a significant role

in preventing the flow from leaving the facility. A beaver deceiver was placed on a culvert, along a man-made ditch, that exits the main part of the facility, to prevent flooding of the site and surrounding areas. There are a few wetland areas on Camp Wesley Harris capable of retaining stormwater runoff (USN 2007a). Groundwater beneath Camp Wesley Harris largely results from infiltration from precipitation. The Vashon Recessional till provides for perched or seasonal shallow groundwater zones above the low permeability hardpan, which also acts as a confining layer for the deeper aquifers. The Salmon Springs formations create a sea level aquifer that has high capacity and is capable of supporting high groundwater yields. This aquifer receives recharge through leakage from the overlying zones. The Kitsap Formation acts as an aquitard for the sea level aquifer. Discharge from the shallow aquifer occurs at springs along the shoreline and in area streams (USN 2007a).

The Toandos Peninsula falls within the Dabob-Thorndyke Watershed of Water Resources Inventory Area (WRIA) 17 (Cascadia 2003). This sub-basin, located on the Bolton and Toandos Peninsulas in southeastern WRIA 17, takes its name from Dabob Bay and Thorndyke Creek. Beside Thorndyke Creek, the only other significant stream is Tarboo Creek; most of the other 30-plus streams in the sub-basin are less than a mile long. Streams on the Navy's Toandos property flow east to the Hood Canal, while those at Zelatched Point flow north and west to Dabob Bay. The Dabob-Thorndyke sub-basin receives 39.4 inches of annual precipitation but has a recharge rate of only 14.4 inches per year, largely because glacial till underlies about 70% of the sub-basin (Cascadia 2003).

4.1.2 Water Quality

4.1.2.1 NAVBASE Kitsap Bangor

In 2005 and 2006, a water quality study was conducted to establish a baseline and identify seasonal trends in certain chemical and physical water quality parameters along the Bangor shoreline (SAIC 2006). These data were used to quantify changes and potential impacts to water quality and to help with habitat characterization. The study area included an approximate 3-mile stretch of the shoreline in the vicinity of and including the NAVBASE Kitsap Bangor shoreline. The water quality sampling stations were collocated with the intertidal fish seining locations. The seining locations were selected to be comparable with historical surveys conducted in the 1970s, with some site modifications necessitated by Base security measures (SAIC 2006). This study was divided up into two phases to determine water quality for fish populations, they were:

- Phase I: Water quality and fish presence and habitat utilization studies were conducted at NAVBASE Kitsap Bangor in summer 2005 and winter/spring 2006. The studies were intended to characterize summer water quality based on fish occurrence and distribution, from June through September 2005. The Phase I survey was not conducted through the end of the established Hood Canal fish work window, but it did give an indication of the water quality for most of this window.

- Phase II: This phase was intended to document the water quality for fish species along the NAVBASE Kitsap Bangor shoreline, with a particular emphasis on the timing of the juvenile salmonid outmigration during the winter and spring months. The timing of the juvenile salmonid outmigration, based on past surveys, begins in late January to early February and concludes in late spring to early summer. This report is intended to be a comprehensive report incorporating both the 2005 summer and 2006 winter/spring surveys.

The Phase II study focused on the analysis of four water quality parameters: temperature, salinity, Dissolved Oxygen (DO), and turbidity. Temperatures during the two sampling phases differed seasonally, being predictably colder in the winter than the summer, and the average temperature at the beach seine station during summer months exceeded ecology water quality standards, possibly due to the shallow depth of most of the sites or freshwater inputs from proximal wetland outfalls. Salinity levels during both phases were comparable to the rest of the Puget Sound, while DO levels dropped below the fish stress level of 5 milligrams per liter (mg/L) twice during the summer sampling season, but returned to healthy levels in the winter (SAIC 2006). However, the average DO concentrations during both phases were above ecology water quality standards by an average of 7 mg/L (SAIC 2006). Turbidity readings averaged less than two Nephelometric turbidity units (NTU) for both seasons and were well within the water quality standards for marine waters of less than 50 NTU (SAIC 2006).

DO levels within the Hood Canal are known to reach very low levels in the summer months and early fall months (a.k.a. hypoxia). This is especially true in the southern Hood Canal where natural and manmade environments combine to create conditions that can be deadly to underwater species. The NRM will stay abreast of the Hood Canal Dissolved Oxygen Program and support future studies as deemed appropriate by the IEPD.

4.1.2.2 Camp Wesley Harris

A water quality study has not been conducted at Camp Wesley Harris. If further cleanup of the site, or additional activities to be held at the site, a study will be required at a later date.

4.1.2.3 Toandos Buffer Zone and Zelatched Point

A water quality study has not been conducted at Toandos Buffer Zone or Zelatched Point. If needed, a project will be submitted in future planning cycles.

4.1.3 Soils

4.1.3.1 NAVBASE Kitsap Bangor

The soils of NAVBASE Kitsap Bangor are the remains of a glacial till, which is characterized by a moderately compacted till layer, 20 - 40 inches below the surface. This is overlaying a very compacted till or hardpan layer that has been identified as Alderwood and Poulsbo soil types.

Above the till layer, water can move relatively easily but does not penetrate through the till layer as fast, creating a high water table during the winter months when precipitation is at its greatest and increasing the chance of erosion of upper soils. Lateral surface flows are evident in depressions, along hillside seeps, streams, and road cuts. Wetlands are often associated with areas where the topography is not steep enough to allow for lateral water flow; however, in most areas the till plains are nearly level or have gentle slopes allowing for sufficient drainage. In association with till plains are soils formed from glacial lake sediment deposits that are often the results of Pleistocene ice dam lakes; the largest of which has been named Glacial Lake Snoqualmie. These are identified as the Kitsap soil units and are often highly eroded; leaving remnant pocket areas of fine sediments characterized by silt loam and silty clay loam soils with depths to 60 inches. Within these soils, water also moves slowly and can show signs of pooling and/or flooding during the winter months with a potential of erosion or sluffing of soils during periods of extreme precipitation.

Soils that were deposited from glacial melt water as the glaciers retreated are referred to as glacial outwash terraces soils and classified into soil units as Indianola, Neilton, and Ragnar soils. These soils are composed of layers of gravel, sand, and silt that were deposited together and are often very deep, coarse in nature, well drained, and are not often associated with pooling water.

Alluvial deposition soils occur within stream bottoms and other low-lying areas that are characteristic of poor drainage and surface-water ponding. These soils are classified as Custer, Norma, and McKenna soil types, and are frequently associated with wetland and stream soil map units. In poorly drained bottomland areas, deep deposits of decomposed or slightly decomposed plant materials are often found producing a high organic soil; this soil type is identified as the Mukilteo soil unit. Many of these deposition-derived soils are classified as hydric soils, and as such were formed under conditions of saturation, flooding, or long-term ponding lengthy enough to develop anaerobic conditions. A second type of hydric soil with a lower organic content, beach soils, are often associated with sloping sands and gravels above mean high tide; and can be deposited by winds or flooding events. These beach soils can become tightly packed together, preventing oxygen replenishment and forming anaerobic conditions.

NAVBASE Kitsap Bangor has been listed twice on the EPA's National Priorities List for investigation and, if necessary, cleanup of past waste disposal sites (SAIC 2007). In January 1990, the Navy and the EPA entered into a Federal Facilities Agreement to ensure that environmental impacts associated with past practices at the base are investigated and remedial actions are completed as needed to protect human health and the environment.

A comprehensive sediment investigation was conducted in 1994, as part of the Remedial Investigation at NAVBASE Kitsap Bangor under the Comprehensive Long-Term Environmental Action Navy program to determine whether chemical contaminants from Navy activities and upland contaminated sites were introduced to marine sediments (SAIC 2007). During the

investigation, metals, polycyclic aromatic hydrocarbons (PAH), phthalates, phenols, and some chlorinated pesticides were detected in NAVBASE Kitsap Bangor sediments. The contamination within these sediment samples were below the state promulgated sediment quality standards (SQS) and cleanup screening level (CSL) standards for determining potential adverse effects to benthic organisms. The State of Washington sets the CSL criteria based on location and severity of the contaminant (WAC 173-204-520). A list of these criteria can be found at http://apps.leg.wa.gov/wac/default.aspx?cite=173-204-520. Sediment contamination was found to exceed the CSL guideline values at locations near the Service Pier, Marginal Wharf, and Keyport/Bangor Dock, although none exceeded the SQS levels. However, at locations near the Service Pier, Marginal Wharf, and Keyport/Bangor Dock, sediment concentrations for copper, lead, mercury, zinc, PAHs, bis(2-ethylhexyl)phthalate, and dibenzofuran exceeded the SQS and CSL guideline values (SAIC 2007). Service Pier sediments exceeded CSL guideline values for fluorene, phenanthrene, and total low molecular weight polycyclic aromatic hydrocarbons. Results from bioassay testing near the service pier also exceeded the CSL for minor adverse effects. Bis(2-ethylhexy)phthalate exceeded the CSL at Marginal Wharf, but bioassay testing results were below the SQS toxicity standards for no adverse effects (SAIC 2007, Hart Crowser Inc. 2000).

Monitoring results from the sediment quality investigation at NAVBASE Kitsap Bangor, at Service Pier, Marginal Wharf, and Keyport/Bangor Dock are indicated below (SAIC 2007):

- At Service Pier, surface sediment concentrations for PAHs and dibenzofuran were confirmed to be decreasing and found below the SQS standards in 1996 and 1998;
- At Marginal Wharf, surface sediment concentrations for mercury, copper, PAHs, dibenzofuran, and bis(2-ethylhexyl)phthalate were confirmed to be decreasing and found below the SQS standards in 1996 and 1998; and
- At Keyport/Bangor Dock, surface sediment concentrations for PAHs were confirmed to be decreasing and expected to be below SQS standards by 2005. Bis(2-ethyhexyl) phthalate was confirmed to be below SQS standards in 2000.

In general, the surface and subsurface sediment quality is good in the areas investigated along the NAVBASE Kitsap Bangor waterfront, with the exception of some surface sediment. None of the subsurface samples collected exceeded the numeric criteria, indicating that the material is suitable for open-water disposal if dredging were required (SAIC 2009).

4.1.3.2 Camp Wesley Harris

Soils at Camp Wesley Harris were derived in a similar fashion to those at NAVBASE Kitsap Bangor's main base. Soils are derived from a glacial till that is characterized by a moderately compacted till layer, 20 - 40 inches below the surface. This is overlaying a very compacted till or hardpan layer that has been identified as an Alderwood soil type, which makes up the majority of

the soils at Camp Wesley Harris. The Alderwood series consists of moderately deep soils with a cemented pan, is moderately well drained, and usually is found on glacially modified foothills and valleys with slopes of 0 - 65% (USDA-NRCS 1980). Taxonomic classification for this soil type is loamy-skeletal, isotic, and mesic Vitrandic Dystroxerepts soils. Although these soils are moderately well drained and have moderately rapid permeability to the densic layer (physically root restrictive zone due to soil compaction), they have very slow permeability at lower depths (USDA-NRCS 1980).

Camp Wesley Harris lacks attached bodies of water, and most of the terrain is generally rolling hills with some erosional drainage. Alluvial deposition soils occur within stream bottoms and other low-lying areas, which are characteristic of poor drainage and surface-water ponding. For this region, these soils are classified as Custer, Norma, and McKenna soil types that are frequently associated with wetland and stream soil map units. McKenna soils can be found at Camp Wesley Harris in the northern section of the camp and just outside the boundaries to the west. The McKenna series consists of moderately deep to dense till with poorly drained soils formed in glacial drift in depressions and drainage ways with slopes of 0 - 5% (USDA-NRCS 1980). Taxonomic classification for this soil type is loamy-skeletal, mixed, superactive, nonacid, and mesic Aquandic Epiaquepts soils. This soil type can drain slowly, and in areas with deep deposits of decomposed or slightly decomposed plant materials containing high organic matter, soils of the Mukilteo soil unit are formed. These soils are classified as hydric for Kitsap County. McKenna soils can also be classified as hydric when associated with Alderwood soils with a slope from 0 - 6% (USDA-NRCS 1980). The only other soils types at Camp Wesley Harris are soils in the Shelton series. These soils can be found in the southwest corner of the site and are moderately deep, moderately well drained soils that formed in glacial till that are found on undulating to rolling glacial moraines (USDA-NRCS 1980). Taxonomic classification for this soil type is medial-skeletal, mixed, and mesic Typic Haploxerands soils.

Camp Wesley Harris has been used for many years as a firing range. Remedial action to stabilize or remove lead from the soil took place in 1998. However, Camp Wesley Harris is listed in Washington's Hazardous Sites List (WDOE 2007) with a rank of 2. Sites listed with ranks 1 or 2 are considered the highest priority for cleanup. The status of Camp Wesley Harris is "Ranked, awaiting remedial action" (USN 2007a).

4.1.3.3 Toandos Buffer Zone and Zelatched Point

The Toandos Buffer Zone and Zelatched Point are across the Hood Canal from the main base of NAVBASE Kitsap Bangor on an isthmus of land called the Toandos Peninsula. The soils of this peninsula are similar to those soils across the Canal at the main base.

On the Navy's Toandos facility, there are 12 soil types identified by the USDA-Natural Resources Conservation Service (USDA-NRCS) Web Soil Survey (USDA-NRCS 1980). Within the boundaries of the facility, there is no dominant soil type, although Sinclair series is found on-

site and increases in frequency just west of the facility boundary. Sinclair series consists of moderately well drained soils that are generally found in uplands, are not hydric, and are developed from very compact Vashon gravelly glacial till in rainfall that ranges 45 - 55 inches (USDA-NRCS 1980). Another upland soil within the facility is the Dabob series that consists of moderately deep to cemented pan, moderately well drained very gravelly sandy loam associated with forested areas. Taxonomic classification for this soil type is loamy-skeletal, isotic, mesic Vitrandic Dystroxerepts soils that are not considered hydric (USDA-NRCS 1980). The Cassolary series is another dominant soil at the facility and tends to be found on terraces and terrace escarpments with a slope of 0 - 50%. These soils consist of very deep, moderately well drained soils formed in reworked glacial drift and marine sediments and are classified as coarse-loamy, mixed, superactive, mesic Vitrandic Haploxerepts soils (USDA-NRCS 1980). The only soils classified as hydric by USDA-NRCS for the county of Jefferson soils within the facility are McMurray and Belfast series soils (USDA-NRCS 1980). The McMurray series consists of deep, very poorly drained soils formed in partially decomposed woody and herbaceous organic material and are usually found in depressional areas on glacial till plains, on outwash plains, or in abandoned glacial stream channels (USDA-NRCS 1980). The Belfast series consists of deep, moderately well drained soils that formed in stratified alluvium and are usually found on nearly level floodplains (USDA-NRCS 1980). Both of these soil types make up only a small area of the facility and are found adjacent to the Hood Canal.

At Zelatched Point there are four main soils types found within the borders of the facility: Tidal Marsh series, Coastal Beach series, Hoypus soil series, and Cassolary soil series. The dominant soil type on-site is the Cassolary series. It is similar to the same soil found at the Navy's Toandos Buffer Zone facility and is generally associated with terraces (USDA-NRCS 1980). The Hoypus series consists of very deep, somewhat excessively drained soils, that formed in glacial outwash, and are usually found on outwash plains and hills with slopes of 3 - 50%. The taxonomic classification for this soil series is sandy-skeletal, isotic, and mesic Typic Xerorthents soils. The only hydric soils at Zelatched Point are the soils associated with the tidal marsh that are mucky silt loam for the first 6 inches and stratified sand to silty clay for the next 60 inches or so (USDA-NRCS 1980).

4.2 Habitats and Communities

4.2.1 Wildlife Habitat

NAVBASE Kitsap Bangor and associated installations consist of developed lands, but are dominated by terrestrial forest habitat types. Forested areas comprise 3,754 acres of NAVBASE Kitsap Bangor, 355 acres of Camp Wesley Harris, and 723 acres of Toandos. Most of the forests within the managed lands of NAVBASE Kitsap Bangor are in the western hemlock/salal plant association groups. Red alder (*Alnus rubra*) often dominates early seral stages in this association. Douglas-fir, a long-lived seral species, is common. Western hemlock and western redcedar (*Thuja plicata*) will dominate the climax stage of succession.

Land use is shown in Tables 4-1 through 4-3.

Table 4-1: NAVBASE Kitsap Bangor Land Cover

Description	Acreage	% of Land Use
Developed Land	1,500	24
Forest Land	3,754	61
Surface Water	54	1
Wetlands	254	4
Disturbed Lands	593	10
Total	6,130	100

Table 4-2: Camp Wesley Harris Land Cover

Description	Acreage	% of Land Use
Developed Land	3	1
Forest Land	355	92
Surface Water	0.2	0
Wetlands	22	6
Disturbed Lands	5	1
Total	388	100

Table 4-3: Toandos Land Cover

Description	Acreage	% of Land Use
Developed Land	37	5
Forest Land	723	94
Surface Water	0	0
Wetlands (Est.)	8	1
Disturbed Lands	0	0
Total	768	100

4.2.1.1 NAVBASE Kitsap Bangor

At present, NAVBASE Kitsap Bangor is dominated by forests, which are comprised of both evergreen and deciduous forest stands in which their distribution is dependent on soil moisture. Evergreen stands are common on the drier soils and are predominantly Douglas-fir with western hemlock, western white pine (*Pinus monticola*), western redcedar, lodgepole pine (*Pinus*

contorta), and grand fir. The deciduous stands inhabit about 1,500 acres, are usually found on the mesic soils, are predominantly red alder with bigleaf maple (*Acer macrophyllum*), and vary in age and understory composition dependent upon when the last timber harvest took place. Understory vegetation varies from salal or shallon (*Gaultheria shallon*) on the drier soils to sword fern (*Polystichum munitum*) and salmonberry (*Rubus spectabilis*) on the mesic soils, while other common understory species are hemlock and cedar seedlings, rhododendron (*Rhododendron spp.*), and evergreen huckleberry (*Vaccinium ovatum*).

The forest stands are not consistent over the base due to historical use and age stand development, with some younger stands in early successional development (i.e., Ecosystem Initiation Stage) while other stands are in more advanced successional development of very dense medium-aged stands (i.e., Canopy Exclusion Stage), with little or no understory component. As the forest matures, the canopy closes allowing less light to reach the ground and increasing competition for light. This results in a forest floor understory comprised of one or two species, mostly shade-tolerant plants, such as sword fern and salal. In the forest systems that have been managed and commercially thinned to increase light availability and tree health, these systems are in "Understory Reinitiation Stage" and allow for new seedling growth by removing competition. NAVBASE Kitsap Bangor uses this plan to manipulate forest stands to benefit wildlife. There are a few older unmanaged stands in the Toandos Buffer Zone that have possibly developed into the "Fully Functional Stage" which approaches "Old Growth" conditions. The primary disturbance to vegetation has been timber harvesting. Additional disturbances can include fire, insects, disease, wind throw, invasive plant species, and impacts from deer, mountain beaver, and black bears.

- **Upland Successional Forest Habitats.** These are habitats that are strictly defined by age of the timber stand. These stands are recently cut over stands having the understory impacted by the harvest operation. Having the canopy opened allows for sunlight to reach previously shaded forest floor, changing the understory composition from shade tolerant to sun species. Native blackberry, trailing blackberry, thimbleberry, orchard grass, and fescue make up the species list in these areas.

- **Grassland and Shrubland Habitats.** NAVBASE Kitsap Bangor contains many diverse grassland habitats. Some of these areas were left as remnants of pasture and orchard operations by inhabitants prior to the Navy's purchase of the property in the 1940s. Other grassland areas were created as a result of mitigation actions in the Installation Restoration Program. This program involves cleaning up and mitigating past hazardous waste sites. In areas where the mitigation involved was intrusive, the area was graded and planted with native grasses. These grasslands are found in outlying, non-industrial areas.

- **Orchard Habitats.** Small orchards left by early residents at NAVBASE Kitsap Bangor are important habitat for wildlife. Maintaining and/or enhancing the health of the orchards helps to offer beneficial habitat to various wildlife species. During a cultural

resource survey, it was suggested the orchard trees may be from original stock brought to this country, and the preservation of the genetic stock could have value.

- **Open Land Habitats.** These habitats tend to have trees scattered throughout the area, allowing sunlight to reach the forest floor. The number of plant species becomes more varied and consists of various grasses, blackberry, thimbleberry, horsetail, and both perennial and annual flowering plants. This provides forage for many animals and birds. All species from small to large mammals, seed eating birds, insectivores, as well as predator species gather in this habitat.

Provided below is a brief discussion on the various aquatic habitat types that make up the inland and shoreline habitats found on NAVBASE Kitsap Bangor:

- **Palustrine Forested Wetland Habitats.** These wetland habitats consist of primarily three types; deciduous forested, coniferous forested, and shrub-dominate wetlands. These wetlands that have been traditionally called marshes, swamps, bogs, fens, ponds, and sloughs. They are primarily found in heavily forested areas and are usually dominated by vegetation. Many of these small wetlands are scattered through the forested portions of NAVBASE Kitsap Bangor. Wilkes Marsh is identified as a noteworthy Palustrine wetland in the Upper Hood Canal watershed. Wilkes Marsh is a 4-acre, manmade marsh, partially deepened by a peat farming operation that took place prior to Navy ownership. It not only provides habitat for amphibian and reptile species but also provides nesting habitat for waterfowl including mallards, American wigeon, buffleheads, and northern shovelers. The overflow from this marsh flows into Cattail Creek Estuary, and due to the peat soils, provides an excellent source of nutrients into the system.

- **Saltwater Eelgrass Habitats.** According to underwater video surveys performed at NAVBASE Kitsap Bangor, patchy eelgrass beds were present at EHW North, EHW South, Delta Pier South, and Devil's Hole South (SAIC 2005a). With the exception of EHW South, continuous eelgrass beds were observed at all beaches. Overall, EHW North appeared to have the largest percentage of bottom showing the presence of eelgrass (35.4%). EHW North also showed the densest and largest areas of continuous eelgrass beds (20.8%). The lowest percentage of bottom showing the presence of eelgrass (13.1%) was observed at Delta South. Although continuous eelgrass beds were not observed at EHW South, the greatest percentage of bottom showing patchy eelgrass was observed at EHW South (21.4%) (SAIC 2005a).

- **Intertidal Habitats.** Intertidal habitats are one of the most diverse habitats within the boundaries of NAVBASE Kitsap Bangor and are highly diverse in both plant and animal species. Tidal fluctuations flush and feed this system, bringing in nutrients from other areas in the marine system, providing the vehicle nature uses for exchanging reproductive material (i.e., seeds, oyster and clam spat, crab, and snail eggs). This habitat also contains

eelgrass beds, which are vital to the survival of summer-run chum salmon smolt. This salmon species was added to the Endangered Species List as a "threatened" species in 1999.

- **Devil's Hole Creek Watershed Habitat.** The entire Devil's Hole Creek watershed is within NAVBASE Kitsap Bangor (DON-SBB 2000). Devil's Hole Lake has a surface area of about 2.6-hectares. It was created near the mouth of Devil's Hole Creek in the 1940s when Sea Lion Road was constructed (DON-SBB 2000). A fishway was constructed at the Devil's Hole Lake outlet in 1979 to provide access to the watershed for anadromous salmonids through various channel types (DON-SBB 2000). Channel types found in the Devil's Hole watershed include regime, braided, forced pool-riffle, plane-bed, and step-pool channels. The regime channel types found in Devil's Hole Creek, just upstream from Devil's Hole Lake, are characterized by sandy bottoms with a dune ripple pattern forming in the sand (DON-SBB 2000). Further upstream, the stream reach assumes a braided channel configuration and has a little more gradient feature. Downstream of the Snook Road culvert, Devil's Hole Creek assumes step pool channel morphology (DON-SBB 2000). This channel type occurs in higher gradient channels where the stream energy organizes fairly regular accumulations of larger substrates and wood at intervals approximately equal to the width of the channel (DON-SBB 2000). The remaining reaches surveyed were classified as either plane-bed or forced pool-riffle channels. Bank condition of the various stream reaches are considered to be in fair condition, having an adequate stream health with most having a mixed conifer/hardwood riparian zone consisting of mature or nearly mature trees (DON-SBB 2000).

4.2.2 Wetlands

4.2.2.1 NAVBASE Kitsap Bangor

NAVBASE Kitsap Bangor contains wetlands that have been in existence for a very long time and have been determined to be "naturally occurring," while other wetlands were created in the 1940s when the Navy acquired the property. These wetlands were manmade as the result of construction activity such as road building and have existed long enough that a diverse native plant species community has become established. NAVBASE Kitsap Bangor has delineated 254 acres of wetlands throughout forested-shrub and intertidal habitats. Hydric soils found within NAVBASE Kitsap Bangor boundaries include beaches, Custer sandy loam, McKenna gravelly loam, Mukilteo muck, and Norma fine sandy loam. Forested-shrub wetlands are located within the various terrestrial habitats that exist on NAVBASE Kitsap Bangor. Provided below is a brief discussion on the various types and components of each of these wetlands:

- **Deciduous Forested Wetlands.** These wetland areas consist of deciduous trees such as red alder or big-leaf maple. The trees provide shade, keeping water temperatures cool, and supplying a rich organic food source as they shed their leaves. As the wetland water

levels rise and fall, some trees are killed by having the root zones inundated with water. The trees quickly rot, providing homes for cavity nesters, food for insect foragers, and after they have fallen into the wetland, additional organic matter from which the other existing wetland plants feed.

- **Coniferous Forested Wetlands.** These wetlands have Douglas-fir and lodgepole pine in close proximity to their edge, and the waters are usually somewhat acidic and brackish in color. Acidic tolerant plants, such as hardhack, reed canarygrass, and water lilies, are indicators of the wetland community, but trees are still an important component as they provide a temperature regulation as well as providing necessary large woody debris as they decay and fall to the surrounding area.

- **Shrub Dominated Wetlands.** These wetlands are peat bogs in origin, containing hardhack, serviceberry, skunk cabbage, and cattails. The wetlands are usually open, providing easy access for waterfowl species. Due to the lack of canopy cover, they are warmer than other types of wetlands and provide habitat for the more water-dependent life cycles of amphibian and reptile species.

Estuarine Ecological System wetlands are deep-water tidal habitats and adjacent tidal lands that are occasionally diluted by freshwater runoff from the land, and these wetlands have been found to exist in front of Devil's Hole Lake and Hunters Marsh. Cattail Lake has been converted back to its original state as a creek, which drains to Hood Canal. It now functions like a natural creek with its lower reaches being inundated by tidal waters. Provided below is a brief discussion on the Riverine wetlands and their various components:

- **Riverine Ecological System Wetlands.** These systems include all wetlands within channels that have moving water. Within the boundaries of NAVBASE Kitsap Bangor there are five drainages to Hood Canal, and one drainage to Dyes Inlet. Three streams drain directly into Hood Canal and two drain indirectly through Cattail Creek estuary and Devil's Hole. The East, Middle, and West Forks of Clear Creek begin on NAVBASE Kitsap Bangor but flow off base. Camp Wesley Harris drains to Dyes Inlet through Wildcat Creek and Chico Creek. The Toandos Buffer Zone drains to Hood Canal through three unnamed streams.

4.2.2.2 Camp Wesley Harris

Camp Wesley Harris has the McKenna soils that are classified as hydric soils. Wetlands are present at the installation but have not been delineated.

4.2.2.3 Toandos Buffer Zone and Zelatched Point

Wetland surveys have not been conducted at Toandos Buffer Zone property and Zelatched Point.

4.3 Flora and Fauna

4.3.1 Flora

4.3.1.1 Terrestrial Flora

NAVBASE Kitsap Bangor, Camp Wesley Harris, the Toandos Buffer Zone, and Zelatched Point all contain terrestrial flora similar to that typically occurring in Kitsap and Jefferson counties. Forested and non-forested habitats exist with forested habitats being the largest land cover type. The forests are comprised of both evergreen and deciduous forest stands. The evergreen stands predominantly contain Douglas-fir with western hemlock, western white pine, western redcedar, lodgepole pine, and grand fir. The deciduous stands are predominantly comprised of red alder and bigleaf maple (USN 2001a).

Understory species include salal, evergreen huckleberry, Pacific rhododendron (*Rhododendron macrophyllum*), salmonberry (*Rubus spectabilis*), sword fern, Oregon grape (*Mahonia nervosa*), trailing blackberry (*Rubus ursinus*), elderberry (*Sambucus racemosa*), and stinging nettle (*Urtica dioica*) (USN 2001a).

For a complete listing of terrestrial flora potentially occurring on NAVBASE Kitsap Bangor facilities, see Appendix E.

4.3.1.2 Aquatic Flora

NAVBASE Kitsap Bangor, Camp Wesley Harris, the Toandos Buffer Zone, and Zelatched Point all contain aquatic flora similar to that typically occurring in all terrestrial lakes, streams, and rivers in Kitsap and Jefferson counties. Obligate wetland flora species that may be found on NAVBASE Kitsap properties include yellow pond lily (*Nuphar polysepalum*), skunk cabbage (*Lysichiton americanus*), pickleweed (*Salicornia virginica*), pondweed (*Potomogeton sp.*), and water cress (*Nasturtium officinale*) (USN 2001a).

Facultative wetland plants that may be found on NAVBASE Kitsap properties include hardhack (*Spiraea douglasii*), lady fern (*Athyrium filix-femina*), aspen (*Populus tremuloides*), Northwestern sedge (*Carex concinnoides*), Pacific Coast bulrush (*Scirpus pacificus*), alder, aster (*Aster subspicatus*), Puget Sound gumweed (*Grindela integrifolia*), saltgrass (*Distichlis spicata*), saltweed (*Atriplex patula*), coast willow (*Salix hookeriana*), and the invasive reed canarygrass (*Phalaris arundinacea*) (USN 2001a).

Eelgrass (*Zostera marina*) is the dominant marine flora species found in the Hood Canal. The 2005 Habitat Survey Report provides the abundance of eelgrass found in Hood Canal at the Delta South and Devil's Hole South sampling points.

Additionally, preliminary studies in support of the environmental analysis for the proposed Explosives Handling Wharf show Macroalgae straddling the eelgrass habitat (Hart Crowser

2011). The intertidal zone between 0 feet and -1 feet MLLW is dominated by macroalgae mostly composed of green ulvoids (*Ulva spp*.) and the occasional red alga (*Gracilaria sp.*). Drift laminarian kelp fronds were noted in deeper areas, perhaps suggesting a deeper presence where larger rock substrates (cobbles, boulders, and glacial erratics) may occur offering opportunity for colonization. Macroalgae within the survey area was more prevalent in the shallow subtidal/intertidal than at deeper depths (Hart Crowser 2013). It is not noted as a dominant habitat type. And, density comparisons between the 2011 report to the 2013 report showed no noticeable decrease or increase in aquatic flora.

For a listing of aquatic flora potentially occurring on NAVBASE Kitsap Bangor facilities, see Appendix E.

4.3.2 Fauna

4.3.2.1 Invertebrates

NAVBASE Kitsap Bangor, Camp Wesley Harris, the Toandos Buffer Zone, and Zelatched Point all contain invertebrate species similar to those typically observed in Kitsap and Jefferson counties. Species observed may include ants (family *Formicidae*), sweat bees (family *Halictidae*), jumping spiders (family *Salticidae*), and hobo spiders (*Tegenaria agrestis*). Other aquatic species that occur can include species of mosquitoes (family *Culicidae*), mayflies (family *Baetidae*), damselflies and dragonflies (order *Ordonata*), and water beetles (order *Coleoptera*) (USN 2001a, SAIC 2005a).

For a complete listing of invertebrates potentially occurring on NAVBASE Kitsap Bangor facilities, see Appendix E.

4.3.2.2 Fish and Shellfish

Species of shellfish found in the Hood Canal include the Pacific oyster (*Crassostrea gigas*), Manila clam (*Tapes japonica*), native littleneck clam (*Protothaca staminea*), butter cockle (*Saxidomus giganteus*), gaper clam (*Tresus capox*), helmet crab (*Telmessus cheiragonus*), Olympia oyster (*Ostrea lurida*), hairy shore crab (*Hemigrapsus oregonensis*), and the red rock crab (*Cancer productus*) (USN 2001a, SAIC 2005b).

A freshwater fish survey conducted in 2008 provides information on the species of fish found in the various water bodies on NAVBASE Kitsap Bangor. Species found in Devil's Hole Lake include Coho salmon (*Oncorhynchus kitsutch*), which are currently a NMFS Species of Concern, Chinook salmon (*Oncorhynchus tshawytscha*), rainbow trout (*Salmo gairdneri*), threespine stickleback (*Gasterosteus aculeatus*), Pink Salmon (*Oncorhynchus gorbuscha*), cutthroat trout (*Salmo clarki*), and species of sculpin (family *Cottidae*). Resident cutthroat trout are found in virtually every freshwater system along the west side of the Kitsap peninsula, north and south of NAVBASE Kitsap Bangor, and in the Hood Canal. Devil's Hole Lake has a fish ladder that allows the Devil's Hole watershed to support anadromous fish (SAIC 2005b, USN 2001a).

Cattail Lake contains species such as threespine stickleback and cutthroat trout. Species found in Lake Ruth include bluegill sunfish (*Lepomis macrochirus*) and released largemouth bass (*Micropterus salmoides*). According to WDFW, rainbow trout, largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and brown bullhead (*Ameiurus nebulosus*) are also present in the lake (WDFW 2009).

No species of fish were observed in Wilkes Marsh, Hunters Marsh, Bullhead Marsh, the EHW Retention Pond, Escolar Pond, or Darter Pond during the sampling for the 2008 freshwater fish survey.

A beach seine survey in 2005 found the most abundant fish species were shiner perch (*Cymatogaster aggregata*) (85.9%), surf smelt (*Hypomesus pretiosus*) (4.4%), Sculpin sp. (family *Cottidae*) (3.1%), gunnel species (family *Pholidae*) (2.9%), and threespine stickleback (*Gasterosteus aculeatus*) (3.1%). The five most abundant fish species caught in the 2006 beach seine survey were Pacific herring (*Clupea harengus pallasi*) (50.1%), chum salmon (19.3%), surf smelt (12.7%), shiner perch (6.2%), and Pacific sand lance (*Ammodytes hexapterus*) (5.9%) (SAIC 2005a).

Pacific sand lance and Surf smelt have documented spawning locations along the shorelines of the Hood Canal and Dabob Bay. Bangor environmental staffers have been continuously conducting forage fish sampling on the installations to provide additional data to the agencies, which includes areas that are not accessible to some.

For a listing of fish and shellfish potentially occurring on or in water adjacent to NAVBASE Kitsap Bangor facilities, see Appendix E.

4.3.2.3 Reptiles and Amphibians

NAVBASE Kitsap Bangor, Camp Wesley Harris, the Toandos Buffer Zone, and Zelatched Point all contain herpetofaunal species similar to those typically observed in Kitsap and Jefferson counties. Surveys have found native species such as northwest salamanders (*Ambystoma gracile*), long-toed salamanders (*Ambystoma macrodactylum*), rough-skinned newts (*Taricha granulosa*), red-legged frogs (*Rana aurora*), and Pacific treefrogs (*Hyla regilla*). The introduced bullfrog (*Rana catesbeiana*) was detected during a 1995 survey (SAIC 2005a, USN 2001a).

Chytridiomycosis disease is an infectious disease in amphibians caused by high levels of chytrid Batrachochytrium dendrobatidis (Bd). Surveys were conducted at NAVBASE Kitsap Bangor during the summer of 2013. Volunteers were trained by three online webinars, and were sent kits to conduct the sampling. Of the 20 samples taken during the summer of 2013, only 7 came back positive for Bd. Although Bd is present on the majority of military sites tested during this study, it is noted that tat this time the fungus does not appear to have a negative impact on amphibian species. Currently, there have not been reports of dead or dying amphibians on the installation. These recommendations are incorporated here as part of the natural resources management at *NAVBASE Kitsap properties*.

• Wet or muddy boots, fishing, and camping equipment may be contributing to the spread of the disease. Sterilize equipment with a solution of diluted bleach if the equipment is used in wetlands off the installation.

• Monitor wetland sites in the spring for dead/dying frogs. A high mortality rate of amphibians may indicate Bd infection.

• Do not allow the collection or translocation of amphibian species on or off the installation.

• Prevent the release of exotic amphibian pets on DoD installations.

• Increase the awareness of military personnel and installation residents about the disease.

For a complete listing of reptiles and amphibians occurring on NAVBASE Kitsap Bangor facilities, see Appendix E.

4.3.2.4 Migratory Birds

NAVBASE Kitsap Bangor, Camp Wesley Harris, the Toandos Buffer Zone, and Zelatched Point all contain bird species similar to those typically observed in Kitsap and Jefferson counties. NAVBASE Kitsap Bangor provides habitat for over 100 species of birds. There is a robust and diverse population of birds due to the base location on Hood Canal. The four marshes on the base also provide nesting habitat for waterfowl that include mallards (*Anas platyrhynchos*), wigeon (*Mareca spp.*), buffleheads (*Bucephala albeola*), and northern shovelers (*Anas clypeata*). Bullhead marsh is home to an active osprey (*Pandion haliaetus*) nest, and Hunters Marsh is adjacent to a great blue heron (*Ardea herodias*) rookery. Other species found in the marshes include gulls (*Laru spp.*), dowitchers (*Limnodromus spp.*), dunlin (*Erolia alpina*), and killdeer (*Charadrius vociferous*) (USN 2001a). There is an additional great blue heron rookery adjacent to the base. An active Bald eagle nest (Figure 4-4) is located on NAVBASE Kitsap Bangor, and though not protected by ESA, they are still managed by the Bald and Golden Eagle Protection Act.

Neotropical migratory birds pass through NAVBASE Kitsap Bangor managed lands on their annual migrations. The majority of neotropical migratory birds are songbirds, but there are also many shorebirds, some raptors, and a few types of waterfowl that migrate. Species of migratory birds that can be found on the base include Townsend's warbler (*Dendroica townsendi*), varied thrush (*Ixoreus naevius*), green-winged teal (*Anas carolinensis*), Hutton's vireo (*Vireo huttoni*), American Robin (*Turdus migratorius*), and the spotted sandpiper (*Actitis macularia*) (USN 2001a).

For a listing of migratory that occur, or pass through, NAVBASE Kitsap Bangor facilities, see Appendix E.

4.3.2.5 Mammals

NAVBASE Kitsap Bangor, Camp Wesley Harris, the Toandos Buffer Zone, and Zelatched Point all contain mammal species typically observed in Kitsap and Jefferson counties. Terrestrial mammals that have been found on NAVBASE Kitsap Bangor include black-tailed deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), cougar (*Puma concolor*), beaver (*Castor canadensis*), river otter (*Lutra canadensis*), short-tailed weasel (*Mustela erminea*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), fox (*Vulpes vulpes*), and bobcat (*Lynx rufus*).

Other species include bats (i.e., *Lasionycteris spp., Lasurus spp.,* and *Myotis spp.*), long-tailed vole (*Microtus longicaudus*), Pacific mole (*Scapanus orarius*), brush rabbit (*Sylvilagus bachmani*), and the deer mouse (*Peromyscus maniculatus*) (SAIC 2008). Marine mammal species recently observed near the base in Hood Canal include harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), gray whale (*Eschrichtius robustus*), white sided-dolphin (*Lagenorhynchus obliquidens*), killer whale (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*) and Dall's porpoise (*Phocoenoides dalli*) (SAIC 2008 and USN 2001a). Harbor seals are quite common and are often found in the water, on small boats and barges throughout NAVBASE Kitsap Bangor. California sea lions are also a common sight, hauling-out onto the hulls of the submarines (USN 2001a). Regular monitoring of the PSB and Delta pier is conducted to determine Steller and California sea lion usage.

For a listing of terrestrial and marine mammal species that potentially occur on NAVBASE Kitsap Bangor facilities, see Appendix E.

4.4 ESA Listed Species

Several ESA listed species have been observed or have the potential to occur at NAVBASE Kitsap Bangor, Camp Wesley Harris, the Toandos Buffer Zone, and Zelatched Point (Table 4-4) (USN 2001a, USFWS 2009, and WDFW 2009). Marbled murrelets (*Brachyramphus marmoratus*) have been identified on the Hood Canal south of Delta Pier. Potential nest platform trees have been identified on NBK Bangor adjacent to a proposed project area. Due to a contractual issue, the 2016 surveys were incomplete and were not conducted as required by the Pacific Seabird Group (PSG) Survey protocol. Additional surveys conducted by the PSG surveys protocol were conducted in the spring of 2017 and will continue in the spring of 2018. Due to known presence in water, pile driving within Hood Canal during the nesting season, April 1 – September 23, will not begin until 2 hours after sunset and will cease 2 hours prior to sunset (NOAA data: http://www.esrl.noaa.gov/gmd/grad/solcalc/). October 3, 2014 the final ruling on the listing of the western yellow-billed cuckoo as threatened under ESA. They require large blocks of riparian habitat for breeding (particularly woodlands with cottonwoods and willows) and dense understory foliage appears to be an important factor in nest site selection (USFWS 2011a). Surveys have not been conducted for the species, but current vegetation surveys will note any habitat on the installation. Additionally, the northern spotted owl is listed as threatened,

and the range is currently not within NAVBASE Kitsap properties. However, both of these bird species may occur within NAVBASE Kitsap Bangor or associated properties but are typically secretive and hard to detect. Surveys have not been conducted, but consideration is taken during maintenance timing and activities.

The Hood Canal contains three federally listed species of salmonids, the Puget Sound Chinook, the Hood Canal summer-run chum salmon, and the Puget Sound steelhead. These fish migrate through the tidal waters near NAVBASE Kitsap Bangor but are not known to inhabit steams flowing from the base. A small unnamed stream near the southern boundary of the Toandos Buffer Zone has been documented by WDFW as potential steelhead habitat. The federally listed bull trout (*Salvelinus confluentus*) is also present in Hood Canal and can pass through the tidal waters near NAVBASE Kitsap Bangor (USN 2001a), with a greater chance of occurrence in Dabob Bay near Zelatched Point. In addition, two species of rockfish, Boccaccio (*Sebastes paucispinis*) and yelloweye (*Sebastes ruberrimus*), have the potential to occur in Hood Canal near NAVBASE Kitsap Bangor, but have not been identified in recent surveys. ESA listed marine mammals that have been known to visit Hood Canal include the killer whale and the humpback whale (USN 2001a and USN 2007c). Hood Canal was an important part of the southern resident killer whale range until the late 1970s when visits declined. No confirmed reports of southern residents have occurred since 1995, and the Hood Canal is not designated as critical habitat.

Due to ESA listed salmon within Hood Canal, the in-water work window for NAVBASE Kitsap Bangor, Toandos Peninsula & Zelatched Point is July 16 – January 15.

Table 4-4 provides a list of ESA species that can potentially occur on or near NAVBASE Kitsap Bangor.

Table 4-4: ESA Listed Species Potentially Occurring at NAVBASE Kitsap at Bangor Facilities

Common Name	Scientific Name	Facility	Federal Status	State Status
Birds				
Marbled murrelet	*Brachyramphus marmoratus*	Bangor, CWH, ZP, TBZ	Threatened	Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	CWH, Bangor, ZP, TBZ	Threatened	Candidate
Northern Spotted owl	*Strix occidentalis caurina*	ZP, TBZ	Threatened	Endangered
Fish				
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Bangor, ZP, TBZ	Threatened	Candidate
Hood Canal summer run chum salmon	*Oncorhynchus keta*	Bangor, ZP, TBZ	Threatened	Candidate
Puget Sound Steelhead	*Oncorhynchus mykiss*	Bangor, ZP, TBZ	Threatened	-
Bull trout	*Salvelinus confluentus*	Bangor, ZP, TBZ	Threatened	Candidate
Bocaccio	*Sebastes paucispinis*	Bangor, ZP, TBZ	Endangered	Candidate
Yelloweye rockfish	*Sebastes ruberrimus*	Bangor, ZP, TBZ	Threatened	Candidate
Mammals				
Humpback whale (Mexico DPS)	*Megaptera novaeangliae*	Bangor, ZP, TBZ	Threatened	Endangered
Humpback whale (Central America DPS)	*Megaptera novaeangliae*	Bangor, ZP, TBZ	Endangered	Endangered
Southern resident killer whale	*Orcinus orca*	Bangor, ZP, TBZ	Endangered	Endangered
Flora				

Common Name	Scientific Name	Facility	Federal Status	State Status
Howellia	*Howellia aquatilis*	CWH, Bangor, ZP, TBZ	Threatened	Threatened

Key:
CWH: Camp Wesley Harris; ZP: Zelatched Point; TBZ: Toandos Buffer Zone

Figure 4-1: NAVBASE Kitsap Bangor Aerial Photo

Figure 4-2: Toandos and Zelatched Point Map

Figure 4-3: Camp Wesley Harris and Camp Mckean Map

Figure 4-4: NAVBASE Kitsap Bangor Bald Eagle Nest Locations

5 CURRENT CONDITION OF NATURAL RESOURCES ON NAVBASE KITSAP KEYPORT

5.1 Physical Conditions

NAVBASE Kitsap at Keyport, located on Liberty Bay near the inlet to Port Orchard Bay, encompasses 255 acres on Puget Sound (USN 2001b). The majority of NAVBASE Kitsap Keyport is situated at a 60-foot elevation, and the surrounding topography consists of gentle slopes (less than 5%) leading into Liberty Bay.

5.1.1 Hydrology

NAVBASE Kitsap Keyport is located within the 184,408-acre Olalla Valley-Frontal Puget Sound watershed (USN 2001b). Several upland areas serve as sources for stormwater infalls onto Navy property. The base lies at the bottom of a natural drainage basin for the Keyport area and receives run-on from the south, north, and west. Stormwater from agricultural areas, livestock areas, residential areas, and the town of Keyport flows onto Navy property. Also up-gradient from Keyport are several Kitsap County sewage lift stations that in the event of overflow would ultimately discharge onto Navy property (USN 2009a). Regional groundwater flows from upland areas in Kitsap Peninsula west towards Hood Canal and east towards Liberty Bay. Two aquifers (a shallow, unconfined sea-level aquifer and a deeper artesian aquifer) are present on NAVBASE Kitsap Keyport. In addition, Keyport Creek, a perennial stream, flows south to north and enters Keyport Lagoon (also known as Shallow Lagoon). Keyport Lagoon is connected to Liberty Bay by a spillway. Both the aquifers and Keyport Creek are recharged from local precipitation, the majority of which occurs during the winter months (USN 2001b).

NAVBASE Kitsap Keyport also uses groundwater as a source of potable water. Management of the aquifer and wellhead protection areas is similar to management at NAVBASE Kitsap Bangor and is described in Section 5.1.1.

5.1.2 Water Quality

NAVBASE Kitsap Keyport is primarily an industrial facility and has had impacts on water quality from its almost 100 years of continued operation. The Navy has conducted cleanups and is currently monitoring the water quality in various wells installed around the installation.

See Appendix F for more information on the clean-up sites.

Keyport Lagoon, located on the eastern side of NAVBASE Kitsap Keyport, is a brackish lagoon that is recharged from Keyport Creek and two emergent marsh wetlands on NAVBASE Kitsap Keyport (NAVFAC Northwest 2008). Surface water elevation on the lagoon fluctuates between 0.1 and 0.3 feet during tidal cycles due to the raised sill/spillway that prevents saline waters from

entering the lagoon except at high tides. Water quality for Keyport Lagoon, collected between 1993 and 2008, indicates that the lagoon contains well-mixed, oxygenated water with a salinity range of 16 - 20 parts per thousand (ppt), which is lower than the 26 ppt level traditionally found on the open Liberty Bay side of the lagoon (NAVFAC Northwest 2008).

5.1.3 Soils

Soils on NAVBASE Kitsap Keyport consist of glacial till soils that have been classified as Dysteric Xerothents, Kapowsin, and Kapowsin Variant soils (USN 2001b). These soils were formed during the last ice age and are characterized by a moderately compacted till layer, 20 - 40 inches below the surface, overlaying a very compacted till or hardpan layer. Water moves freely in the compacted till layer and tends to pool once it reaches the hardpan layer, particularly during winter months. These soils are generally found in depressions, hillside seeps, streams and road cuts, and wetlands (USN 2001b). The soils generally found along beaches in Liberty Bay are also hydric in nature and consist of sand and gravel (USN 2001b).

Sediment Quality

The marine waters of Port Orchard are listed on the CWA 303(d) list of impaired waters (NAVFAC Northwest 2008). During the early 1990s, NAVBASE Kitsap Keyport conducted studies to determine if contaminants were present in Keyport Lagoon. The data from these studies determined that only four chemicals of concern were detected in the lagoon. Sources of contamination were determined to be discharged from the sewer treatment plant and storm drainages (NAVFAC Northwest 2008).

5.2 Habitats and Communities

5.2.1 Wildlife Habitat

NAVBASE Kitsap Keyport is characterized by several habitat types including developed lands, forests, surface water, and wetlands (Table 5-1). The majority of land cover at NAVBASE Kitsap Keyport is developed land, which is suitable habitat for species accustomed to an urbanized environment. Forest habitat on NAVBASE Kitsap Keyport varies from newly established to mature second growth and includes upland successional, upland, and open forests. These habitats are comprised of evergreen and deciduous forest stands with Douglas-fir (*Pseudotsuga menziesii*) as the predominant species. Other habitat types on NAVBASE Kitsap Keyport include deciduous and coniferous-forested wetlands, shrub dominated wetlands, and intertidal, saltwater marsh, and marine habitats.

Table 5-1: Land Cover Types on NAVBASE Kitsap Keyport

Description	Acreage	% Of Land Use
Developed Land	164	64
Forest Land	53	21
Surface Water	22	9
Wetlands	16	6
Total	**255**	**100**

Habitats on NAVBASE Kitsap Keyport include (USN 2001b):

- **Upland Successional Forest Habitats:** These habitats are strictly defined by the age of the timber stand. These stands are recently cut over stands having the understory impacted by the harvest operation. Having the canopy opened allows sunlight to reach previously shaded forest floor, changing the understory composition from shade tolerant to sun species. Native blackberry, trailing blackberry, thimbleberry, orchard grass, and fescue make up the species list in these areas.

- **Open Habitats:** Open habitats occur where the trees are scattered throughout the area allowing sunlight to reach the forest floor. Plant species become more varied as a result and consist of various grasses, blackberry, thimbleberry, horsetail, and both perennial and annual flowered plants. This allows for many animals and birds to gather food. All species from small mammals to large mammals, seed eating birds as well as insectivores, gather in this habitat as well as those species that predate upon these species.

- **Upland Forest Types:** This habitat consists of a reasonably dry area containing Douglas-fir and western hemlock with a sword fern and salal understory. These habitats vary in age and understory composition dependent upon when the last timber harvest took place. This habitat is important for thermo-regulation for deer, provides nesting habitat for birds, and dependent upon downed large woody debris, provides living areas for various small mammal species.

- **Deciduous Forested Wetlands:** These wetland areas consist of wetland plants with an important component being large deciduous trees, usually red alder. The trees provide shade, keeping water temperatures cool, and supply a rich organic food source as they shed their leaves. As the wetland rises and falls, some of the trees are killed by having the root zones inundated with water. These trees quickly rot, providing homes for cavity nesters, food for insect foragers, and after they have fallen into the wetland, additional organic matter from which the other existing wetland plants feed.

- **Coniferous Forested Wetlands:** These wetlands have Douglas-fir and western redcedar in close proximity to their edge. The waters are usually somewhat acidic and brackish in color. Acidic tolerant plants such as hardhack, reed canarygrass, and water lilies make up this community. The trees are an important component of this habitat as they provide a temperature regulation as well as necessary large woody debris as they decay and fall to the surrounding area.

- **Shrub Dominated Wetlands:** These wetlands contain hardhack, serviceberry, skunk cabbage, and cattails. They are open and provide easy access for waterfowl species. Due to the lack of canopy cover, they are warmer than other types of wetlands and therefore provide habitat for the more water dependent life cycles of herptilian species.

- **Intertidal Habitats:** These habitats are some of the most diverse habitats within the boundaries of NAVBASE Kitsap Keyport. They are highly diverse in both plant and animal species. The tides both flush and feed this system, bringing in nutrients from elsewhere in the marine system, as well as providing the vehicle by which reproductive material is exchanged, i.e., seeds, oyster and clam spat, crab and snail eggs, etc.

- **Saltwater Marsh Habitat:** These habitats are utilized by waterfowl for nesting and feeding. Pickleweed, Puget Sound gumweed, seaside plantain, Pacific silverweed, and saltwater bulrush are located in the saltwater marshes.

- **Marine Habitat:** These habitats include the waters of Liberty Bay, Port Orchard, and Puget Sound. These marine waters sustain a large variety of fish, shellfish, avian, and marine mammal species.

5.2.2 Wetlands

NAVBASE Kitsap Keyport has Estuarine, Palustrine, and Riverine wetlands (USN 2008a). Estuarine wetlands are characterized as “deep-water tidal habitats and adjacent tidal lands that are occasionally diluted by freshwater runoff from the land” (USN 2001b). Palustrine wetlands are characterized as “wetlands that are usually dominated by vegetation, and includes areas that have been traditionally called marshes, swamps, bogs, fens, ponds, and sloughs.” Riverine wetlands include “all wetlands within channels, which have moving water” (USN 2001b). NAVBASE Kitsap Keyport’s wetlands are classified as (USN 1994):

- **E2USN:** A wetland of the Estuarine Ecological System, in the Intertidal Ecological Subsystem (2), Unconsolidated Shore Class, with a water regime modifier of Regularly Flooded

- **E2AB/USN:** A wetland of the Estuarine Ecological System, in the Intertidal Ecological Subsystem (2), Aquatic Bed and Unconsolidated Shore Classes, with a water regime modifier of Regularly Flooded

- **E10WL:** A wetland of the Estuarine Ecological System, in the Subtidal Ecological Subsystem (1), Open Water Class, with a water modifier of Subtidal
- **E2EMP:** A wetland of the Estuarine Ecological System, in the Intertidal Ecological Subsystem (2), Emergent Class, with a water regime modifier of Irregularly Flooded
- **PSSY:** Palustrine, with shrub/scrub vegetation, saturated/semipermenant/seasonal
- **PFO/SSY:** Palustrine, forested, with shrub/scrub vegetation, saturated/semipermenant/seasonal
- **PEMY:** Palustrine, emergent vegetation, saturated/semipermenant/seasonal

Wetlands on NAVBASE Kitsap Keyport consist of the following (USN 2001b):

- Sixteen acres of delineated wetlands found along beaches that consist of Belfast fine sandy loam, McMurray/Mukilteo muck, and Norma fine sandy loam soils (USN 2001b).
- A 20-acre, shallow, Estuarine lagoon, which is called both Shallow Lagoon and Keyport Lagoon (USN 2001b). The Keyport Lagoon currently supports two distinct habitat types. The first is emergent marsh, which is located at the fringe of the Keyport Lagoon, potentially providing habitat functions for birds, fish, and mammals. The second is near-shore, subtidal soft bottom. The lagoon is a brackish, artificially flooded tide pool that resembles a freshwater lake. A small perennial stream (Keyport Creek) enters the lagoon on the west between two Estuarine emergent marsh wetlands. There are several emergent marsh wetland areas in the southeast corner and along the western boundary. The permanently flooded areas of the emergent marsh wetlands contain salt-tolerant vegetation but have low salinity levels (NAVFAC Northwest 2008). The lagoon ultimately drains to Port Orchard Bay over a spillway at an elevation of 10.5 feet MLLW on the northwest. The lagoon is currently being studied for a restoration project that would remove the spillway and restore intertidal functions.
- A 10-acre marsh located on the western boundary of NAVBASE Kitsap Keyport, which is used by waterfowl for nesting and fishing habitat (USN 2001b).
- Six acres of tidelands at NAVBASE Kitsap Keyport to the extreme low water level of –4.5 feet. The beaches are composed predominantly of cobble, pea gravel, and sand.
- One perennial stream (Keyport Creek) in NAVBASE Kitsap Keyport. This stream originates off base and drains the southern portion of Keyport, flowing northeast into Keyport Lagoon and then into the waters of Liberty Bay and Puget Sound (USN 2001b).

The largely suburban layout of NAVBASE Kitsap Keyport and the relatively small nature of the wetlands, streams, and riparian areas make ensuring the health of these systems a primary goal for maintaining habitat and ecosystem health.

5.3 Flora and Fauna

5.3.1 Flora

5.3.1.1 Terrestrial Flora

The dominant habitats at NAVBASE Kitsap Keyport are forested and non-forested landscaped habitat. The forests are comprised of both evergreen and deciduous forest stands. The evergreen stands predominantly contain Douglas-fir with western hemlock and western redcedar. The deciduous stands are predominantly comprised of red alder and bigleaf maple (USN 2001b). Understory species include salal, evergreen huckleberry, Pacific rhododendron, salmonberry, sword fern, Oregon grape, trailing blackberry, elderberry, vine maple (*Acer circinatum*), Pacific madrone, yew, cascara, and stinging nettle (USN 2001b).

For a complete list of terrestrial flora potentially occurring at NAVBASE Kitsap Keyport, see Appendix E.

5.3.1.2 Aquatic Flora

NAVBASE Kitsap Keyport contains aquatic flora similar to that typically occurring in all terrestrial lakes, streams, and rivers in Kitsap, Mason, and Jefferson counties. Obligate wetland flora species can include yellow pond lily, cattail (*Typha latifolia*), skunk cabbage, bulrush, water parsley (*Oenanthe sarmentosa*), pickleweed, veronica (*Veronica spp.*), pondweed, duckweed (*Lemna spp.*), smartweed (*Polygonum spp.*), monkey flower (*Mimulus guttatus*), and water cress (USN 2001b).

Facultative wetland plants can include hardhack, lady fern, aspen, sedges (*Carex spp.*), rushes, alder (*Alnus spp.*), aster (*Aster subspicatus*), Puget Sound gumweed (*Grindela integrifolia*), saltgrass, saltweed, and coast willow (USN 2001b).

For a complete list of aquatic potentially occurring at NAVBASE Kitsap Keyport, see Appendix E.

5.3.2 Fauna

5.3.2.1 Invertebrates

Invertebrates that can be found on NAVBASE Kitsap Keyport can include ants (family *Formicidae*), sweat bees (family *Halictidae*), jumping spiders (family *Salticidae*), and hobo spiders (*Tegenaria agrestis*). Other aquatic species that occur can include species of mosquitoes

(family *Culicidae*), mayflies (family *Baetidae*), damselflies and dragonflies (*order Ordonata*), and water beetles (order *Coleoptera*) (USN 2001a, SAIC 2005a).

5.3.2.2 Fish and Shellfish

Species of shellfish can include the Pacific blue mussel (*Mytilus edulis*), Olympia oyster (*Ostrea lurida*), Pacific oyster, Manila clam, native littleneck clam, butter clams, gaper clam, helmet crab, hairy shore crab, and the red rock crab (SAIC 2005a). The fish species found in the marine and freshwaters of the installation are similar to the other NAVBASE Kitsap properties; Chinook salmon, Puget Sound steelhead, Chum, and Coho salmon may be found in the marine waters while sticklebacks, sculpins, and cutthroat trout are indicative species found in Keyport Lagoon.

Beginning in 2005, the Navy has collaborated with the Puget Sound Restoration Fund to help restore Olympia Oysters in Puget Sound. The Puget Sound Restoration Fund works with a number of groups including the Suquamish Tribe, Northwest Indian Fisheries Commission, Baywater Incorporated, and the WDFW to restore habitat in the Puget Sound. As the west coast's only native oyster, the Olympia oyster and has long been an important resource to Tribes throughout the Puget Sound. Overharvesting in the early 1900s combined with pollution and habitat loss has devastated oyster populations throughout the Northwest. In past efforts to help restore oyster beds, the Navy provided access to the main pier at NAVBASE Kitsap Keyport and the use of a Navy barge to transport hundreds of cubic yards of oyster shells. The shells were sprayed off the deck of the barge with a high power water hose to tidelands where they provide habitat for oyster larvae. The last iteration of this program occurred in June of 2009 with approximately 700 cubic yards of oyster shells seeded in the tidelands of Dogfish Bay just north of NAVBASE Kitsap at Keyport. The NRM will work with WDFW shellfish biologists, as needed, to ensure updated management strategies for the Olympia oyster are included in future INRMP revisions.

For a complete listing of fish and shellfish potentially occurring at NAVBASE Kitsap Keyport, see Appendix E.

5.3.2.3 Reptiles and Amphibians

Species of reptiles and amphibians found on NAVBASE Kitsap Keyport can include northwest salamanders, long-toed salamanders, rough-skinned newts, red-legged frogs, and Pacific treefrogs (USN 2001b).

For a complete listing of reptiles and amphibians potentially occurring on NAVBASE Kitsap Keyport, see Appendix E.

5.3.2.4 Migratory Birds

Species of birds found on NAVBASE Kitsap Keyport can include mallards, wigeon, buffleheads, northern shovelers, and osprey. Other species can include great blue heron, gulls, dowitchers,

dunlin, and killdeer (USN 2001b). The majority of neo-tropical migratory birds are songbirds, but migrating species include many shorebirds, some raptors, and a few types of waterfowl. Species of migratory birds that can be found on the base include Townsend's warbler, varied thrush, green-winged teal, Hutton's vireo, robin, and the spotted sandpiper (USN 2001b).

For a complete listing of migratory birds potentially occurring at NAVBASE Kitsap Keyport, see Appendix E.

5.3.2.5 Mammals

Terrestrial mammals that can be found on NAVBASE Kitsap Keyport include black-tailed deer, river otter, short-tailed weasel, coyote, raccoon, fox, and bobcat. Other species include species of bats, long-tailed vole, Pacific mole, brush rabbit, and the deer mouse (*Peromyscus maniculatus*) (USN 2001b). Marine mammal species that can occur near NAVBASE Kitsap Keyport include the harbor seal, California sea lion, white sided-dolphin, killer whale, and Dall's porpoise (SAIC 2008, USN 1994).

For a complete listing of mammals potentially occurring on NAVBASE Kitsap Keyport, see Appendix E.

5.4 ESA Listed Species

Several federal listed species have been observed at NAVBASE Kitsap Keyport or have the potential to occur (Table 5-2) (USN 2001b, USFWS 2009). Migratory and resident birds with potential to occur include marbled murrelets and bald eagle. Murrelets have been observed offshore during survey efforts. No upland surveys have been conducted to determine if nesting habitat is present on NAVBASE Kitsap Keyport. The yellow-billed cuckoo has potential to be present at NAVBASE Kitsap Keyport. They require large blocks of riparian habitat for breeding (particularly woodlands with cottonwoods and willows) and dense understory foliage appears to be an important factor in nest site selection (USFWS 2011a), but is very elusive and difficult to detect. Surveys have not been conducted, but consideration is taken during maintenance timing and activities.

Liberty Bay and Port Orchard Bay contain the federally listed species of salmonids, the Puget Sound Chinook salmon and steelhead. Neither species is known to inhabit Keyport Lagoon or Keyport Creek. In addition, two species of rockfish (Boccaccio, and yelloweye) have potential to occur in Liberty Bay and Port Orchard Bay near NAVBASE Kitsap Keyport but have not been identified in recent surveys. These species have been listed under the ESA and are listed as candidate species by WDFW. Marine mammals that have been known to visit Liberty Bay and Port Orchard Bay include the southern resident killer whale (rare visitor) and the humpback whale (very rare) (USN 2001b and USN 2007c).

Due to ESA listed salmon within the waters of Keyport, the in-water work window is: July 16 – March 2. Forage fish occur in the waters near Keyport, and therefore timing of forage fish species windows will be taken into account during project consultation.

While no longer listed under ESA, bald eagles are still protected under the MBTA and the Bald and Golden Eagle Protection Act.

Table 5-2: ESA Listed Species Potentially Occurring at NAVBASE Kitsap Keyport

Common Name	Scientific Name	Federal Status	State Status
Birds			
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Candidate
Fish			
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Threatened	Candidate
Puget Sound Steelhead	*Oncorhynchus mykiss*	Threatened	-
Bocaccio	*Sebastes paucispinis*	Endangered	Candidate
Yelloweye rockfish	*Sebastes ruberrimus*	Threatened	Candidate
Mammals			
Humpback whale (Mexico/Central America DPS)	*Megaptera novaeangliae*	Threatened/Endangered	Endangered
Southern resident killer whale	*Orcinus orca*	Endangered	Endangered
Flora			
Howellia	*Howellia aquatilis*	Threatened	Threatened

Figure 5-1: NAVBASE Kitsap Keyport Aerial Photo

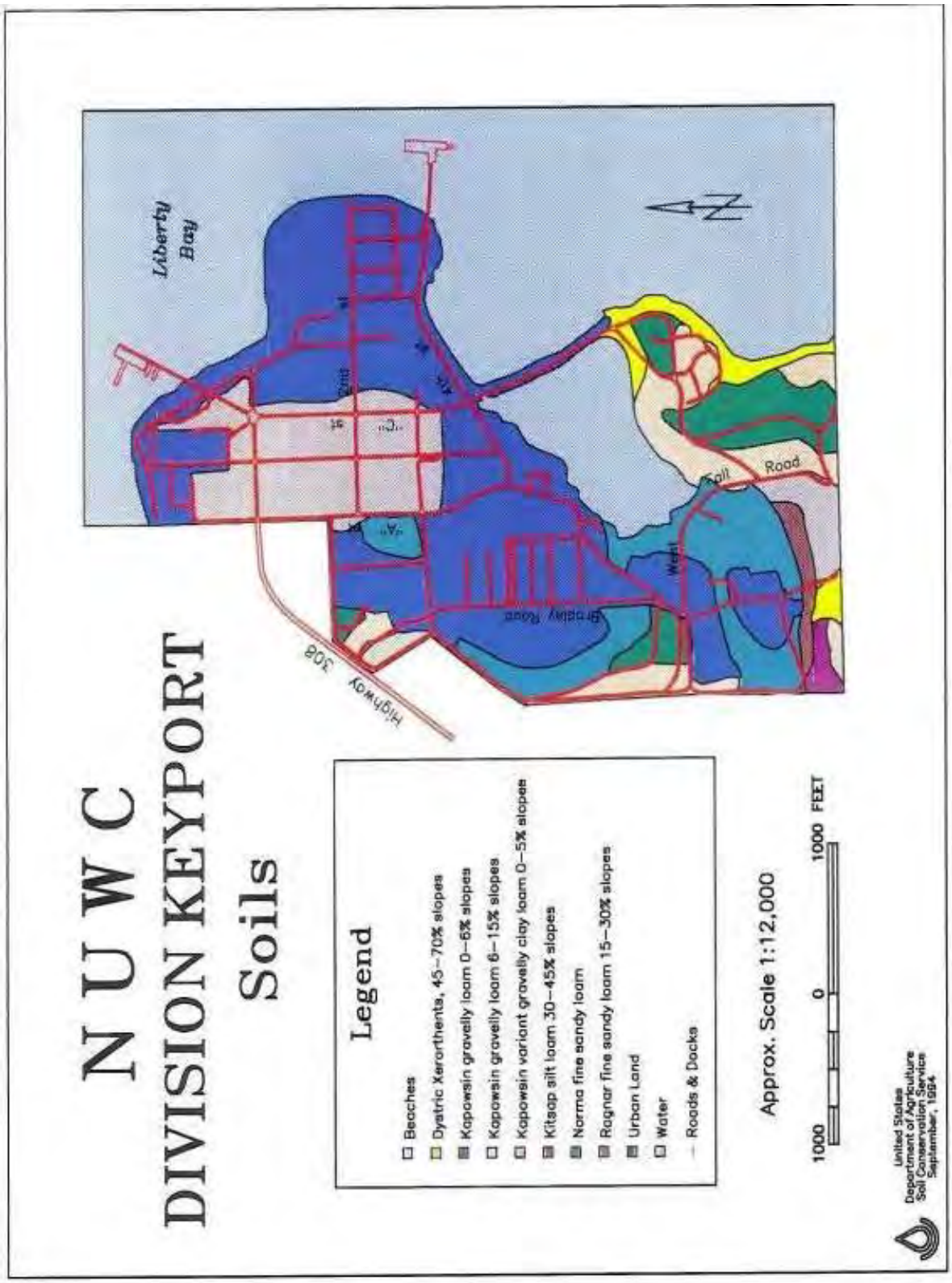

Figure 5-2: NAVBASE Kitsap Keyport Soil Maps

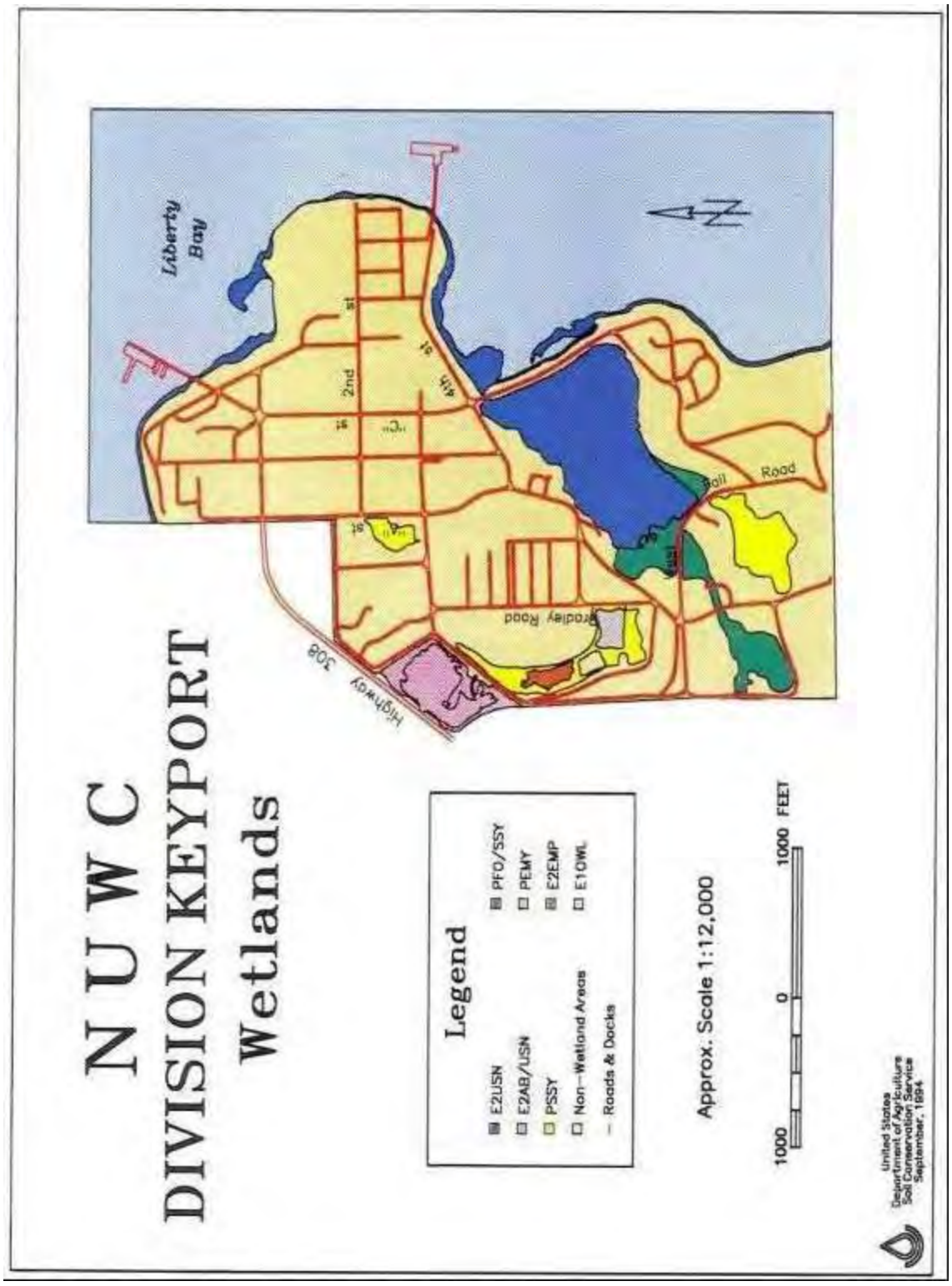

Figure 5-3: NAVBASE Kitsap Keyport Wetlands Map

Figure 5-4: NAVBASE Kitsap Keyport Osprey Nest Map

6 CURRENT CONDITION OF NATURAL RESOURCES ON NAVBASE KITSAP BREMERTON

6.1 Physical Conditions

NAVBASE Kitsap Bremerton is currently a homeport to multiple ships and provides regional administrative and logistical support to Department of Defense activities in the Puget Sound area. NAVBASE Kitsap Bremerton is a 400-acre facility located adjacent to the city of Bremerton, Washington (Figure 6-1). Although mainly an industrial facility, NAVBASE Kitsap Bremerton also has administrative buildings, personnel support and recreational facilities, bachelor housing units, and individual family housing. The industrial area includes a large steam utility plant, an industrial waste pretreatment facility, oily waste treatment systems, warehouses, fire stations, six dry docks, and piers for both active and inactive fleet maintenance. The Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) provides timely and cost efficient ship maintenance, modernization, and technical and logistics support. PSNS & IMF is responsible for managing natural resources in the Controlled Industrial Area (CIA), which is in the eastern portion of NAVBASE Kitsap Bremerton. Properties associated with NAVBASE Kitsap Bremerton include the USN Railroad to Shelton and Camp McKean.

NAVBASE Kitsap Bremerton is located on the north side of Sinclair Inlet. The northern boundary of the NAVBASE Kitsap Bremerton forms the southern boundary of the City of Bremerton. NAVBASE Kitsap Bremerton has several large tenant commands, including the PSNS & IMF, and the Naval Supply Systems Command Fleet Logistics Center (FLC) Puget Sound. With the exception of some recreational fields and housing areas, the upland area of NAVBASE Kitsap Bremerton is almost exclusively a paved industrial and administrative installation with maintained landscaped areas around buildings. There are groups of large trees, primarily Douglas-firs, at the housing/administration areas. Many trees within these areas are about 100 years old and qualify as contributing elements to the historic housing districts, which requires special landscaping management. Within NAVBASE Kitsap Bremerton are six dry docks and 12 moorings and piers.

There are 650 acres of off-site railroad right-of-way property belonging to NAVBASE Kitsap. This property is in the form of a partially forested buffer along 58 miles of railroad track. Approximately 350 acres are forested. The railroad runs from Shelton to Bremerton with three sidings before coming to a junction where it goes into Bremerton. PSNS & IMF Environmental staff manages the Bremerton to Shelton portion of the USN Railroad.

Camp McKean consists of about 5 acres of land with relatively shallow elevation changes and is adjacent to Kitsap Lake. Natural resource management of Camp McKean is provided by NAVBASE Kitsap staff.

6.1.1 Hydrology

The majority of NAVBASE Kitsap Bremerton is made up of impervious surfaces, requiring an extensive system for collection and distribution of surface water runoff. There are an estimated 156 stormwater outfalls within NAVBASE Kitsap Bremerton, all draining to Sinclair Inlet. Of these, there are 92 outfalls that drain an area greater than 5,000 square feet (0.11 acres) (EPA 2008). There are no streams, natural ponds, lakes, or wetlands located within NAVBASE Kitsap Bremerton. The majority of the waterfront is riprapped, contained by quay walls, has piers and wharves extending from the shore, or contains other manmade structures. The exceptions are on the west end of the installation at Charleston Beach, where the Navy removed riprap to restore a segment of the shore, and north of Pier 7.

Sinclair Inlet is a relatively shallow inlet approximately 3.5 miles long. Surrounding slopes are moderate, with steep bluffs along the shoreline at the inlets southern and western ends. Freshwater input is from stream runoff, direct precipitation, and groundwater flow. The two largest streams are Gorst Creek and Blackjack Creek. Gorst Creek flows into the westernmost end of the inlet, and Blackjack Creek enters the inlet just east of the city of Port Orchard. Most of the shallow flats in the inlet occur at the mouths of these two creeks. Other significant tributaries to the inlet are Ross and Anderson Creeks, which enter the inlet on the southern shore. The mouth of Wright Creek is on the northwest shore of the inlet.

6.1.1.1 USN Railroad

The USN Railroad was constructed in the 1940s and is approximately 48 miles long running from Shelton to Bremerton/Bangor, and has 21 major culverts of various sizes and configurations that convey streams and stormwater runoff under the railroad line. These allow transfer of water and, in some cases, allow for passage of juvenile and adult salmon into waters upstream of the culverts (USN 2004a). Cutthroat trout are present in all of the fish bearing streams along the railroad. During a 2004 survey of these culverts to determine the availability for these culverts to function as a fish-passage, five culverts were found to be complete fish-passage barriers and another six were found to be partial fish-passage barriers (mostly juvenile fish blockages under specific flow conditions) (USN 2004a). Not only are these culverts noted as a fish barrier, they also significantly alter the natural geomorphological process in each watershed. They cause scour immediately downstream, and starve further downstream reaches of important sediment and woody debris. A summary of the culverts conditions and general information is in Table 6-1.

Since the 2004 survey, a fish ladder has been installed at Heins Creek (milepost .71) and trash racks have been removed along several of the Deer Creek tributaries and at the Sherwood Creek Tributary (milepost 17.96). The culvert along the Airport tributary of the Union River was replaced in FY2014, and a 48-inch concrete culvert that blocked all fish movement was removed and replaced with a new a new arch culvert that meets WDFW design guidance for fish passage. Additionally, a new culvert survey for fish passage was completed for the entire rail line to Bangor and Bremerton in June 2015. This study is helping prioritize culvert project submittals

for replacement and assist future mitigation planning, and can be obtained by contacting NAVBASE Kitsap Bremerton Environmental Department.

6.1.1.2 Camp McKean

Camp McKean is located along the shoreline of Kitsap Lake. The lake is approximately 238 acres with a 29-foot maximum depth and is part of the Chico Creek watershed. Kitsap Creek, an outlet of Kitsap Lake, feeds Chico Creek, which flows into Dyes Inlet at Chico Bay. Camp McKean has no streams or wetlands. Stormwater flow from the parking lot is directed into storm drains that flow to Kitsap Lake.

Table 6-1: Summary of USN Railroad Culvert General Information

R&R Mile Post	Stream Watershed Description	Barrier Status
.39	Shelton Creek	Passable
.57	Tidal Backwater to Shelton Creek	Passable
.67	Cranberry Creek	
1.88	Tributary to Oakland Bay	Total Barrier
2.19	Tributary to Oakland Bay	Total Barrier
2.8	Stormwater	
3.79	John's Creek	Passable
5.2	Tributary to Cranberry Creek	Underwater. Same System as 5.36
5.36	Tributary to Cranberry Creek	Partial Barrier (67%)
6.42	Tributary to Lake Limerick	Total Barrier
6.6	Cranberry Creek	Passable
6.74	Stormwater	
6.91	Tributary to Cranberry Creek	Total Barrier
7.52	Tributary to Cranberry Creek	Total Barrier
8.2	Tributary to Cranberry Creek	Total Barrier
8.9	Tributary to Deer Creek	Partial Barrier (33%)
9.28	Tributary to Deer Creek	Partial Barrier (33%)
9.51	Unknown	
9.59	Stormwater	
9.76	Stormwater	
10.5	Tributary to Deer Creek	Partial Barrier (33%)

R&R Mile Post	Stream Watershed Description	Barrier Status
10.55	Tributary to Deer Creek	Not Located
12.01	Tributary to Deer Creek	Total Barrier
12.15	Stormwater	
12.73	Tributary to Deer Creek	Total Barrier
13.1	Tributary to Deer Creek	Total Barrier
13.77	Tributary to Deer Creek	Total Barrier
14.11	Stormwater	
14.89	Deer Creek Headwaters	Passable
15.75	Tributary to Sherwood Creek	Partial Barrier (33%)
16.5	Tributary to Sherwood Creek	No Usable Habitat
16.88	Tributary to Sherwood Creek	Partial Barrier (67%)
17.84	Tributary to Sherwood Creek	Total Barrier
17.96	Tributary to Sherwood Creek	Partial Barrier (33%)
18.1	Tributary to Sherwood Creek	Total Barrier
19.3	Tributary to Lake Anderson	Total Barrier
20.26	Tributary to Lake Devereaux	No Useable Habitat
21.67	Tributary to Hood Canal	Partial Barrier (33%)
21.84	Tributary to Hood Canal	Total Barrier

R&R Mile Post	Stream Watershed Description	Barrier Status
23.97	Tributary to Hood Canal	No Useable Habitat
25.65	Stormwater	
28.48	Tributary to Union River	Passable
30.04	Tributary to Union River	No Useable Habitat
31.55	Tributary to Gorst Creek	Partial Barrier (67%)
31.78	Tributary to Gorst Creek	No Useable Habitat
32.09	Tributary to Gorst Creek	Total Barrier
32.55	Tributary to Gorst Creek	Total Barrier
32.62	Tributary to Heins Creek	Total Barrier
33.06	Stormwater	
33.19	Tributary to Heins Creek	Partial Barrier (33%)
33.6	Heins Creek	Total Barrier
34.58	Tributary to Kitsap Creek	Total Barrier
36.09	Dickerson Creek	Partial Barrier (67%)
36.65	Tributary to Chico Creek	Total Barrier
37.48	Tributary to Chico Creek	Total Barrier
37.66	Tributary to Chico Creek	Total Barrier
38.11	Tributary to Dyes Inlet (North & South)	Total Barrier
38.36	Tributary to Dyes Inlet	Total Barrier

R&R Mile Post	Stream Watershed Description	Barrier Status
38.51	Tributary to Dyes Inlet	Total Barrier
38.91	Tributary to Dyes Inlet	Total Barrier
39.21	Tributary to Dyes Inlet	Total Barrier
39.xx		Not Located
40.25	Koch Creek	Total Barrier
40.74	Tributary to Dyes Inlet	Total Barrier
41.35	Tributary to Strawberry Creek	Total Barrier below RR
42.95	Strawberry Creek Headwaters	Partial Barrier (33%)
Bremerton Spur		
0.05	Tributary to Gorst Creek	Same as 32.09
0.08		Not Located
0.71	Heins Creek	Partial Barrier (67%)
1.04	Jarstad Creek	Total Barrier
1.58	Tributary to Gorst Creek	Partial Barrier (33%)
2.12		Not Located
2.24		Not Located
3.36	Wright Creek	Partial Barrier (33%)
3.64	Tributary to Sinclair Inlet	Total Barrier

6.1.2 Water Quality

The ecology of Sinclair and Dyes Inlet has been impacted by the historical releases of pollutants from past practices (point sources), which have resulted in a legacy of contamination in

sediments, fish, and shellfish. The WDOE assesses surface waters for impairments based on the Clean Water Act Sections 303(d) and 305(b) requirements. During the 2004 water quality assessment, WDOE determined that (USN 2008a):

> Sinclair and Dyes Inlet are listed as "impaired water bodies" by the State of Washington (WDOE 2008). Under Section 303(d) of the CWA, states, territories, and tribes are required to develop lists of impaired water bodies known as the 303(d) list (EPA 2009). The 1998 303(d) list for the inlets included listings for heavy metal and organic contaminants in the sediments and tissues of marine organisms, and many stream segments within the watershed were listed for fecal coliform and/or temperature (WDOE 1998). The CWA requires Total Maximum Daily Loads (TMDLs) to be developed for constituents that do not meet water quality standards (EPA 2009).

- Meanwhile, ongoing watershed development is leading to the loss of natural habitat, increases in runoff from the landscape, and more nonpoint source pollution. During the 2004 water quality assessment, WDOE determined that (USN 2008a): A Sinclair Inlet waterbody segment located east and south of the NAVBASE Kitsap Bremerton does not achieve WDOE's dissolved oxygen standard and is defined as impaired.

- There are number of waterbody segments in Sinclair Inlet where pH and temperature are a concern (waters of concern) but data are not sufficient for listing as impaired.

- There is a waterbody segment adjacent to the west end of the Shipyard where pH, temperature, fecal coliform, and dissolved oxygen are of concern.

- There are a number of segments that the available data shows that water quality is achieved for particular parameters. While this varies by segment, the parameters generally are fecal coliform, dissolved oxygen, and ammonia.

In addition, USGS assessed water quality parameters in Sinclair Inlet in 1998 and determined that turbidity levels met state standards for marine waters. However, DO levels were exceeded in Kitsap County in 1998, 2001, and 2003. Studies suggest that water quality parameters in Kitsap County near NAVBASE Kitsap Bremerton were adversely affected by runoff and sedimentation from highly urbanized areas, highways, commercial and residential areas, and industrial areas (USN 2008b).

In 2000, a collaborative partnership formed through Project Environment Investment (ENVVEST) partnership of PSNS & IMF, WDOE, EPA, and local stakeholders began conducting a comprehensive water quality improvement project for the watersheds of Sinclair and Dyes Inlet (Federal Register 2000, WDOE 2008). By addressing environmental concerns at the proper ecological scale, Project ENVVEST has made major contributions in addressing environmental concerns in Sinclair and Dyes Inlet by providing data to support TMDLs of priority constituents and developing a more efficient and effective means of protecting the

environment. The goal of Project ENVVEST is to create an alternative model for the development and implementation of environmental regulations and provide the technical data and information needed to implement TMDLs for the Sinclair/Dyes Inlet Watershed adjacent to the Shipyard (USN 2000, EPA 2000) and achieve real improvements in environmental quality with less cost.

Through this collaboration and cooperation, the ENVVEST working groups have improved the understanding of the Sinclair/Dyes Inlet Watershed. In November 2003, 1500 acres of shell fishing beds in Dyes Inlet were reopened for the first time in decades based on the elimination of combined sewer overflow events by the City of Bremerton and results of the ENVVEST modeling studies. The ENVVEST working group also completed a watershed monitoring and modeling effort that involved all the stakeholders in conducting a comprehensive sampling program throughout the watershed in support of the fecal coliform TMDL for Sinclair and Dyes Inlet (Navy, EPA, WDOE 2000) and produced an integrated model of the Sinclair and Dyes Inlet watershed. This model was used to simulate fecal coliform discharge scenarios needed for the TMDL (Johnston et al. 2008). In addition, the ENVVEST team completed a major effort to monitor storm event runoff of heavy metals, toxic organic contaminants, nutrients, and suspended particulates in the watershed to determine contaminant loads as a function of upstream land use/land cover and storm intensity (EPA 2000, Dunagan 2008). The ENVVEST team also evaluated ambient water and sediment quality, and assessed contaminant bioaccumulation and effects to marine organisms within the Inlet (Johnston et al. 2008).

6.1.3 Soils

There are three main soil types found at NAVBASE Kitsap Bremerton: Alderwood series, Neilton series, and Urban Land – Alderwood complex (USDA-NRCS 1980) (Figure 6-3). The soils around the piers and dry docks were placed to create the shoreline of the shipyard. The soil is considered a modified urban soil complex. In this case, it has been classified as an Alderwood derived soil and has some of the characteristics of the Alderwood series, such as formed from glacial till soils and a very gravelly sandy loam (USDA-NRCS 1980); although, soil characteristic such as drainage and hydric classification are not generally predicted by USDA-NRCS for altered soils. While classified as Alderwood, the soil is highly disturbed and contains fill from multiple sources. The natural soils of NAVBASE Kitsap Bremerton are the remains of a glacial till, which is characterized by a moderately compacted till layer, 20 - 40 inches below the surface. This is overlaying a very compacted till or hardpan layer that has been identified as an Alderwood soil type which makes up the majority of the soils at NAVBASE Kitsap Bremerton. The Alderwood series consists of moderately deep to a cemented pan, moderately well drained soils, and usually found on glacially modified foothills and valleys with slopes of 0 - 65% (USDA-NRCS 1980). Taxonomic classification for this soil type is loamy-skeletal, isotic, and mesic Vitrandic Dystroxerepts soils. Although these soils are moderately well drained and have moderately rapid permeability to the densic layer (physically root restrictive zone due to soil compaction) and very slow permeability below (USDA-NRCS 1980). Alderwood soils

with a slope from 0 - 6% can be classified as hydric when found near permanent water bodies (USDA-NRCS 1980). The Neilton series is the third soil type found at NAVBASE Kitsap Bremerton and consists of very deep, excessively drained soils that formed in glacial outwash and is often associated with terraces and terrace escarpments. Taxonomic classification for this soil type is sandy-skeletal, mixed, and mesic Dystric Xerorthents soils (USDA-NRCS 1980).

6.1.3.1 Camp McKean

Camp McKean is located on the banks of Kitsap Lake. Besides soils in the Alderwood series, soils next to Kitsap Lake are comprised of soils from the Harstine series. Soils in this series are characterized by a moderately deep to cemented pan, moderately well-draining soils, and usually found in sandy glacial till on uplands. Taxonomic classification for this soil type is coarse-loamy, isotic, and mesic Vitrandic Dystroxerepts type soil (USDA-NRCS 1980). In Kitsap County, Harstine soils are classified as hydric (USDA-NRCS 1980). Just east of Kitsap Lake and slightly higher in elevation are the soils in the Dystric Xerothents soil series. These soils are composed of deep, well-drained soils that formed in glacial till and are situated on the sidewalls of drainages.

6.1.3.2 Sediment Quality

The predominant substrate in Sinclair Inlet proper is mud and muddy sand. Biological communities in Sinclair Inlet are fairly typical of muddy embayments in central Puget Sound, which are primarily depositional environments (URS 1999). Sediments in Sinclair Inlet near NAVBASE Kitsap Bremerton have been placed on the Comprehensive Environmental Response, Compensation, and Liability Act National Priorities List (Superfund) for metal and organic chemical contamination resulting from industrial operations and other base activities in Sinclair Inlet (USN 2008b). As a result, six operable units have been designated at NAVBASE Kitsap Bremerton for cleanup (USN 2008b).

A summary of the operable units at NAVBASE Kitsap Bremerton is provided in Appendix F.

6.2 Habitats and Communities

6.2.1 Wildlife Habitat

Wildlife habitat on NAVBASE Kitsap Bremerton is limited based on the intensive development that has occurred on the base. The majority of the base is paved and the shoreline consists of quay walls and armor rock, which supports little vegetation growth and offers limited habitat to marine species when compared to undeveloped areas. While natural habitat is highly disturbed, a variety of plant and animal species make their home or migrate through NAVBASE Kitsap Bremerton at different times of the year.

Camp McKean is a recreational facility located along Kitsap Lake. Half of the property has been cleared for personal use and the area uphill of the lake is steeply sloped and forested. The main area of the camp is fenced in, preventing movement of species but the forested area provides

habitat for many birds and mammals. The forested section has a stream that collects stormwater from surrounding areas, but due to excessive slope has been inaccessible by fish.

The Railroad is comprised of forest, streams and wetlands. Most area of the railline is located in remote areas, where the only disturbance was from the railroad. A wetland survey was conducted to along the line to map where possibly wetlands may occur. Additionally, a culvert assessment for fish passage was completed in 2015 to assess the streams that are blocked by railroad culverts.

6.2.2 Wetlands

There are no wetlands within NAVBASE Kitsap Bremerton or on Camp McKean (USN 1994). The Navy Railroad, requiring a sturdy roadbed to support train and freight movement, does not have any wetlands within the boundary of the tracks and track shoulders. However, the rail line crosses many streams, and some have riverine and forested wetland complexes. The Navy has conducted a survey of those immediate wetlands that could be identified and mapped areas along the railroad. This information can be obtained by contacting the NAVBASE Kitsap Bremerton Environmental Department.

6.3 Flora and Fauna

6.3.1 Flora

6.3.1.1 Terrestrial Flora

Terrestrial flora species commonly found on NAVBASE Kitsap Bremerton are similar to species observed in other highly developed areas in Kitsap County. Douglas-fir, western hemlock, western redcedar, and western white pine are the principle native coniferous tree species. Native deciduous tree species include red alder, bigleaf maple, and Pacific madrone. Common native understory plants include Indian plum, elderberry, salmonberry, vine maple, snowberry, rhododendron, sword fern, and salal. Ornamental trees, fruit trees, shrubs, and grasses have been planted in most open area and are maintained under base landscaping contracts. Some landscaping, including shrubs, ivy, and trees are contributing elements to the historic districts in the upland areas of NAVBASE Kitsap Bremerton.

For a complete listing of potentially occurring terrestrial flora found at the NAVBASE Kitsap Bremerton, see Appendix E.

6.3.1.2 Aquatic Flora

Sinclair Inlet shorelines do not support significant populations of aquatic vegetation (URS 1999). Eelgrass does not occur within the inlet or on adjacent shorelines and macroalgae is limited to the photic zone where hard substrates (riprap bulkhead, cobbles, and gravel) are present. The most commonly found species include sea lettuce and kelp (*Ulva* and *Laminaria spp.*).

In 2008, an underwater survey was conducted near Pier B for a proposed construction project. Vegetation observed in the western and central transects included sparse amounts of sea lettuce (*Ulva sp.*) and red algae species (*Porphyra spp.*). Vegetation along the mole wall of Dry Dock 6 was generally in very low abundance and limited to only a few species. Vegetation observed along this transect includes sparse macroalgae growing on riprap and debris and included iridescent seaweed (*Iridaea cordata*) (USN 2008a).

6.3.2 Fauna

6.3.2.1 Invertebrates

Invertebrates that can be found at NAVBASE Kitsap Bremerton include brittle stars (*Amphiodia urtica*), snails (*Odostomia spp.*), sea anemones (*Anthopleura spp.*), shrimp (*Palaemon spp.*), nudibranchs (*Nudibranchia*), sponges (*Porifera*), and sea cucumbers (*Parastichopus californicus* and *Cucumaria spp.*). Rocky and hard intertidal substrates support barnacles (*Balanus* and *Semibalanus spp.*), mussels (*Mytilidae*), limpets (*Lottidae*), and snails (*Gastropoda*) (USN 2008b).

During a 2008 underwater survey to support construction of Pier B (USN 2008a), the following observations were made at Dry Dock 6: marine life within this transect were relatively sparse and indicated a low diversity of marine species using this riprap area adjacent to the mole wall. Marine organisms noted in this area included the California sea cucumber (*Parastichopus californicus*), sea anemone (*Anthopleura sp.*), starfish (*Pisaster ochraceus*), tubeworm (*Serpula vermicularis*), red rock crab (*Cancer productus*), and kelp crabs (*Pugettia producta*). Even though marine species presence was sparse, the selection present appeared healthy and active. The California sea cucumber was the most abundant species observed at the time of the survey. This is likely due to the accumulation of detritus trapped in the interstitial spaces of the riprap along the mole wall footing creating a favorable foraging condition for this species. Observations of marine life within transects along Pier B are very similar to Dry Dock 6 while other areas of the waterfront have extensive growths of barnacles, mussels, tubeworm, anemones, bryozoans, and other epibenthic organisms are present.

For a complete listing of potentially occurring invertebrate species found on NAVBASE Kitsap Bremerton, see Appendix E.

6.3.2.2 Fish and Shellfish

Species of shellfish in Sinclair Inlet include butter clams, gaper clams (*Tresus capax*), littleneck clams, cockles (*Clinocardium nuttallii*), geoducks (*Panopea generosa*), northern horse mussel (*Modiolus modiolus*) and bay mussels. Dungeness crabs (*Cancer magister*), graceful crabs (*Cancer gracilis*), red rock crabs, decorator crabs (*Majidae sp., Oregonia gracilis,* and *Chorilia longipes*), kelp crabs (*Pugettia producta*), snow crabs (*Chionoecetes bairdi*), porcelain crabs (*Petrolisthes eriomerus*), and pea crabs (*Pinnixia schmitti*) (USN 2008a). Mussels (*Mytilus spp.*) are the most frequently occurring shellfish species at NAVBASE Kitsap Bremerton and densely cover many pilings and waterfront structures.

Fish species include English sole (*Parophrys vetulus*), rock sole (*Lepidopsetta bilineata*), lingcod (*Ophiodon elongates)*, *starry* flounder (*Platichthys stellatus*), Pacific tomcod (*Microgadus proximus*), shiner perch (*Cymatogaster aggregata*), pile perch (*Rhacochilus vacca*), Pacific herring, Chinook salmon, coho salmon, chum salmon, steelhead trout, and cutthroat trout (USN 2008a). The littoral zone is generally dominated by shiner perch and juvenile salmon with the open water dominated by juvenile salmon, forage fish, and threespine stickleback. The most abundant fin fish species is rat fish; followed by English sole, skates, sculpins, and flounders (starry & sand).

Gorst Creek, to the southwest of NAVBASE Kitsap Bremerton, supports hatchery produced Chinook salmon. The Gorst Creek hatchery releases over 2 million Chinook salmon every year that pass through Sinclair Inlet. Charleston Beach, along with other local beaches in Sinclair Inlet, can be spawning areas for surf smelt and other forage fish. Ross Point, directly across the Inlet, supports a recreational surf smelt fishery.

A study of the distribution, abundance, size, and trophic relationships of juvenile salmonids in the marine near shore environment of Sinclair Inlet was conducted to increase the understanding of how juvenile salmon use shoreline environments in the Puget Sound (Fresh et al. 2003). The study found that juvenile salmon utilized littoral habitats in Sinclair Inlet from early spring through early fall, and both hatchery and wild juvenile Chinook salmon from throughout the Puget Sound foraged along Sinclair shorelines during late spring and summer. Diet analysis showed that the juvenile Chinook salmon fed on a diverse mixture of aquatic and terrestrial insects, decapod crustaceans, amphipods, polychaetes, and barnacle larvae. Underscoring the importance of the linkage between terrestrial habitats and the near shore environment, about one-third of the juvenile salmon's diet consisted of terrestrial insects and at least fifty insect families were identified in the stomach contents of juvenile salmon. Simulations of the hydrologic and tidal conditions present during the release of hatchery-reared, juvenile Chinook salmon from the Gorst Creek Hatchery (19 May – 30 June, 2002) showed that the out-migrating salmon remained in Sinclair Inlet about a week to 10 days longer than predicted from flushing alone (Washington Department of Health 2003). These results indicate that proper management of the near shore ecosystem is important not only on the local scale but also for the whole region.

At Camp McKean, chum salmon utilize the lower reaches of Kitsap Creek. Coho Salmon use the upper reaches of the creek as well as Kitsap Lake, which provides migratory and first-year habitat. According to WDFW, rainbow trout, largemouth bass, bluegill, and brown bullhead are also present in the lake.

Due to ESA listed species of salmon and the possibility of bull trout within Sinclair Inlet, the in-water work window for Bremerton is: July 16 – February 15.

Fish species found within Un-Named, Johns, Cranberry, Deer, Sherwood, Lake Devereaux, Gorst, Heins, and Jarstad creeks, and the Union River along the USN Railroad include Coho, Chinook, sockeye (*Oncorhynchus nerka*), and chum (*Oncorhynchus keta*) salmonids, and steelhead trout (*Oncorhynchus mykiss*) (USN 2004a).

For a listing of fish and shellfish potentially found at NAVBASE Kitsap Bremerton, see Appendix E.

6.3.2.3 Reptiles and Amphibians

The highly developed nature of NAVBASE Kitsap Bremerton limits habitat for reptiles and amphibians.

For a listing of reptiles and amphibians potentially occurring in the areas surrounding Sinclair Inlet, see Appendix E.

6.3.2.4 Migratory Birds

The industrial nature of NAVBASE Kitsap Bremerton limits the suitable habitat for avian species, though many species of birds can be seen in Sinclair Inlet at different times of the year. The flat rooftops of warehouses along the shoreline are used by great numbers of glaucous-winged gulls throughout the year and as nesting grounds. Since 2003, these flat roofs have also provided nesting grounds for a colony of Caspian terns that damage roofs and prevent work in those areas. To prevent further nesting, USDA Wildlife Services have created a wire grid system with flagging to dissuade Caspian terns from nesting on these roofs.

Species of birds that can be seen in Sinclair Inlet include greater scaups (*Aythya marila*), lesser scaups (*Aythya affinis*), ring-necked ducks (*Aythya collaris*), Caspian terns (*Hydroprogne caspia*), surf scoters (*Melanitta perspicillata*), white-winged scoters (*Melanitta deglandi*), American wigeons (*Anas americana*), Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), common goldeneye (*Bucephala clangula*), mergansers (*Mergus sp.* and *Lophodytes sp.*), and bufflehead. Other abundant species included glaucous-winged gulls (*Larus glaucescens*), mew gulls (*Larus canus*), western grebes (*Aechmophorus occidentalis*), double-crested cormorants (*Phalacrocorax auritus*), Pacific loons (*Gavia pacifica*), American coots (*Fulica americana*), and pigeon guillemots (*Cepphus columba*) (USN 2008a).

Shorebirds and waterfowl can include sandpipers (*Scolopacidae*), dunlins (*Calidris alpina*), snipe (*Gallinago gallinago*), egrets, and great blue herons. Birds of prey include peregrine falcons, bald eagle (*Haliaeetus leucocephalus*), and osprey.

Caspian terns (*Hydroprogne caspia*) are a gull-like species found throughout Washington from the Puget Sound to the Columbia River. While non-breeders can often be seen in small groups, the species is known for its large colonies in Grays Harbor, the Columbia River, and the Dungeness Spit. In the spring of 2003, Caspian terns were first observed in small numbers at NAVBASE Kitsap Bremerton. Caspian terns continued to return each spring in greater numbers with 723 observed in 2006 and close to 1,000 observed in 2007 nesting on the rooftops of buildings 970, 514, and 449. The flat roofs of these buildings provided nesting habitat safe from coyotes and other predators, while Sinclair Inlet offered an abundant food source. The large numbers of Caspian terns, a species protected under the Migratory Bird Treaty Act, created a major disruption to work inside the shipyard, damaged roofs, and created health and safety issues.

To prevent future problems due to nesting Caspian terns, the USDA-Wildlife Services and NAVBASE Kitsap Bremerton developed a strategy using non-lethal methods to discourage birds from nesting on rooftops at NAVBASE Kitsap (Steve Holtom, USDA-Wildlife Services, personal communication). On rooftops where Caspian terns had nested in the past, a wire grid system with Mylar flagging was installed. Effigies of coyotes and wolves were placed on other roofs and additional non-lethal techniques were authorized. The effectiveness of the effigies did

not work as well as the wire grid systems. The wire grid strategy was demonstrated in the summers of 2008 and 2009 as no nests were observed at NAVBASE Kitsap Bremerton. The wire grid strategy continues with repairs to the wire grid system performed annually. Regular monitoring for the presence of Caspian terns, and outreach to NAVBASE Kitsap workers on interactions with wildlife are actively in place. As of 2017, there have been no Caspian terns nesting on roofs at NAVBASE Kitsap Bremerton.

For a complete listing of birds that have been seen or could potentially occur on or near NAVBASE Kitsap Bremerton, see Appendix E.

6.3.2.5 Mammals

Mammals found on NAVBASE Kitsap Bremerton are typical of small mammals found in highly developed areas within Kitsap County and include squirrels, opossums, raccoons, river otters, and the occasional deer. NAVBASE Kitsap Bremerton is currently home to an unknown number of Northern River Otters who have established a burrow in the floating boathouse and docks at Mooring F. The otters use the walkways surrounding the boathouse as a haul out. This use has generated complaints from employees who use the area and must routinely clean excrement from the walkway. While currently a localized issue, if the problems persist or grow worse, NAVBASE Kitsap Bremerton natural resource staff will examine a number of solutions to stop river otters from entering work areas. Initial options will include, but will not be limited to, sealing all openings to burrows and/or work sites and using noise and light as deterrents.

For a complete listing of mammals potentially occurring on NAVBASE Kitsap Bremerton, see Appendix E.

6.3.2.6 Marine Mammals

Marine mammal species that have been observed in the vicinity of NAVBASE Kitsap Bremerton include Pacific harbor seal, California sea lion, gray whale, Dall's porpoise, southern resident killer whale, Steller sea lion, the humpback whale, and harbor porpoise (*Phocoena phocoena*) (USN 2008a). California sea lions and harbor seals are known to utilize the NAVBASE Kitsap Bremerton Port Security Barrier and submarine hulls as haul outs.

6.4 ESA Listed Species

Several ESA listed species have been observed or have the potential to occur at NAVBASE Kitsap Bremerton (Table 6-2) (USN 1994, USN 2008a, USFWS 2009). The only migratory and resident birds observed or with potential to occur are marbled murrelets. No marbled murrelets have been observed at NAVBASE Kitsap Bremerton and no habitat exists on or near the installation. The federally listed Yellow-billed cuckoo has the possibility to be found along the Navy Railroad. They require large blocks of riparian habitat for breeding (particularly woodlands with cottonwoods and willows) and dense understory foliage appears to be an important factor in

nest site selection (USFWS 2011a). Surveys have not been conducted, but consideration is taken during maintenance timing and activities. Sinclair Inlet contains federally listed species of salmonids, including the Puget Sound Chinook salmon and the steelhead. Puget Sound Chinook salmon critical habitat has been designated for Sinclair Inlet. Federally listed bull trout (*Salvelinus confluentus*) have the possibility to be found within Sinclair Inlet. Although very rare, they are still considered in project assessments. In addition, two species of rockfish, Boccaccio, and yelloweye may reside in Sinclair Inlet near NAVBASE Kitsap Bremerton; however, it is very unlikely due to no suitable substrate or habitat. Fish surveys have been recorded to date, with no occurences at Bremerton or associated properties. ESA listed marine mammals that have been known to visit or have the potential to occur in Sinclair Inlet include the southern resident killer whale (rare visitor), and the humpback whale (very rare visitor) (USN 2008a, USN 1994, and USN 2007b). Humpback whales are rare visitors to the Puget Sound.

6.5 Bald and Golden Eagle Act

While no longer listed under ESA, bald eagles are still protected by the MBTA and the Bald and Golden Eagle Protection Act. Currently one active bald eagles nest is being monitored on the facility (Figure 6-2).

Table 6-2: ESA Listed Species Potentially Occurring at NAVBASE Kitsap Bremerton

Common Name	Scientific Name	Site	Federal Status	State Status
Birds				
Marbled murrelet	*Brachyramphus marmoratus*	Bremerton	Threatened	Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	RR	Threatened	Candidate
Fish				
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Bremerton, RR	Threatened	Candidate
Puget Sound Steelhead	*Oncorhynchus mykiss*	Bremerton, RR	Threatened	-
Bull trout	*Salvelinus confluentus*	Bremerton	Threatened	Candidate
Bocaccio	*Sebastes paucispinis*	Bremerton	Endangered	Candidate
Yelloweye rockfish	*Sebastes ruberrimus*	Bremerton	Threatened	Candidate
Mammals				
Humpback whale (Mexico DPS)	*Megaptera novaeangliae*	Bremerton	Threatened	Endangered
Humpback whale (Central America DPS)	*Megaptera novaeangliae*	Bremerton	Endangered	Endangered
Southern resident killer whale	*Orcinus orca*	Bremerton	Endangered	Endangered
Flora				
Howellia	*Howellia aquatilis*	RR	Threatened	Threatened

6.6 Special Management Areas

These areas on NAVBASE Kitsap Bremerton contain natural resources that warrant special conservation or management efforts.

6.6.1 Charleston Beach

Charleston Beach was created in 2001-2002 as mitigation for the construction of Pier D. The beach consists of 12,000 square feet of intertidal habitat along 300 ft of shoreline on the western edge of NAVBASE Kitsap Bremerton. The creation of Charleston Beach included the placement of several feet of fish mix to provide habitat for juvenile salmon and as spawning ground for surf smelt. Along the shoreline, a soft embankment was installed and planted with native species.

The beach has shown substantial success with regular surveys finding evidence of surf smelt spawning. While showing success as spawning grounds, the steep angle of the beach, heavy wave action, and lack of natural sand supply has led to heavy erosion. In 2007, 2010 and again in 2015, much of the fish mix was completely eroded and active erosion of the embankment fill material was occurring. The major area of erosion is along the west end of the beach, while the eastern portion has shown more success with less erosion and establishment of saltwater tolerant vegetation. To mitigate this erosion, the Navy has completed interim repair actions to stabilize the bluff and enhance beach habitat with the placement of fish mix, which is ongoing, until a long-term solution is identified.

6.6.2 Dry Docks

NAVBASE Kitsap Bremerton includes six dry docks managed by PSNS & IMF. These parallel dry docks are arranged along the shoreline, oriented north to south, and open at their south ends to Sinclair Inlet. They are used predominantly for the maintenance and repair of Navy vessels and other assets. A typical dry dock operation includes four major actions: flooding, caisson removal, caisson replacement, and dewatering/pump down. Dry docks are swept, washed, and inspected prior to flooding in accordance with BMPs required by PSNS & IMF's National Pollutant Discharge Elimination System (NPDES) permit. A process-water collection system measures dry dock discharges for turbidity and diverts water to the City of Bremerton sanitary sewer system if the maximum turbidity level is detected. In addition, each dry dock has a bubble curtain installed at each dry dock entrance, which is turned on whenever a caisson is removed. The goal of the bubbles is to divert fish from entering a flooded dry dock.

In 2004, through consultation with NOAA Fisheries, the Navy determined that dry dock operations at NAVBASE Kitsap Bremerton are likely to adversely affect Puget Sound Chinook that may enter the dry dock during caisson removal and may be pumped out during dewatering. An incidental take statement was included in the Biological Opinion specifying Reasonable and Prudent Measures (RPMs) to minimize incidental take.

A new LOA was issued in 2011 following additional consultation with NMFS to continue the RPMs issued in the 2004 Opinion. The RPMs in the 2004 Opinion are still necessary and appropriate to minimize incidental take of all salmonid species, include Puget Sound steelhead. Terms and conditions from the 2004 LOA include proper maintenance of the process water collection system to minimize deleterious contaminants from entering Sinclair Inlet and

minimizing the period that caissons are removed from dry docks during periods of peak junveile salmonid migration, through contacting local tribal and WDFW habitat biologists to determine when migration are occurring. Within the 2011 LOA, there is a condition to document all listed salmonids encountered during dry dock operations. This also included consultation on three (now two) species of ESA listed rockfish, and states that dry dock operations are not likely to adversely affect these species. Puget Sound Steelhead and Souther Resident Killer whale were included in the scope of the Febraury 2011 LOA.

6.6.3 Historic Districts

Located in the uplands of NAVBASE Kitsap Bremerton are four historic housing districts: Officers Row Historic District, Old Puget Sound Radio Station Historic District, the Old Marine Reservation Historic District, and the Old Naval Hospital Historic District. With structures dating back to 1896 and through distinct building eras of World War I and World War II, these districts are highly intact both in their architectural and in their landscaping. Landscaping includes old growth deciduous trees, fruit trees, roses, ivy, and old growth shrubs and vines. The landscaping in these four districts is managed to maintain historical significance in compliance with the National Historical Preservation Act. The Puget Sound Naval Shipyard National Historic Landmark district does not include landscaping or additional vegetation of historic significance. Maps and information concerning historic areas are available from the NRM.

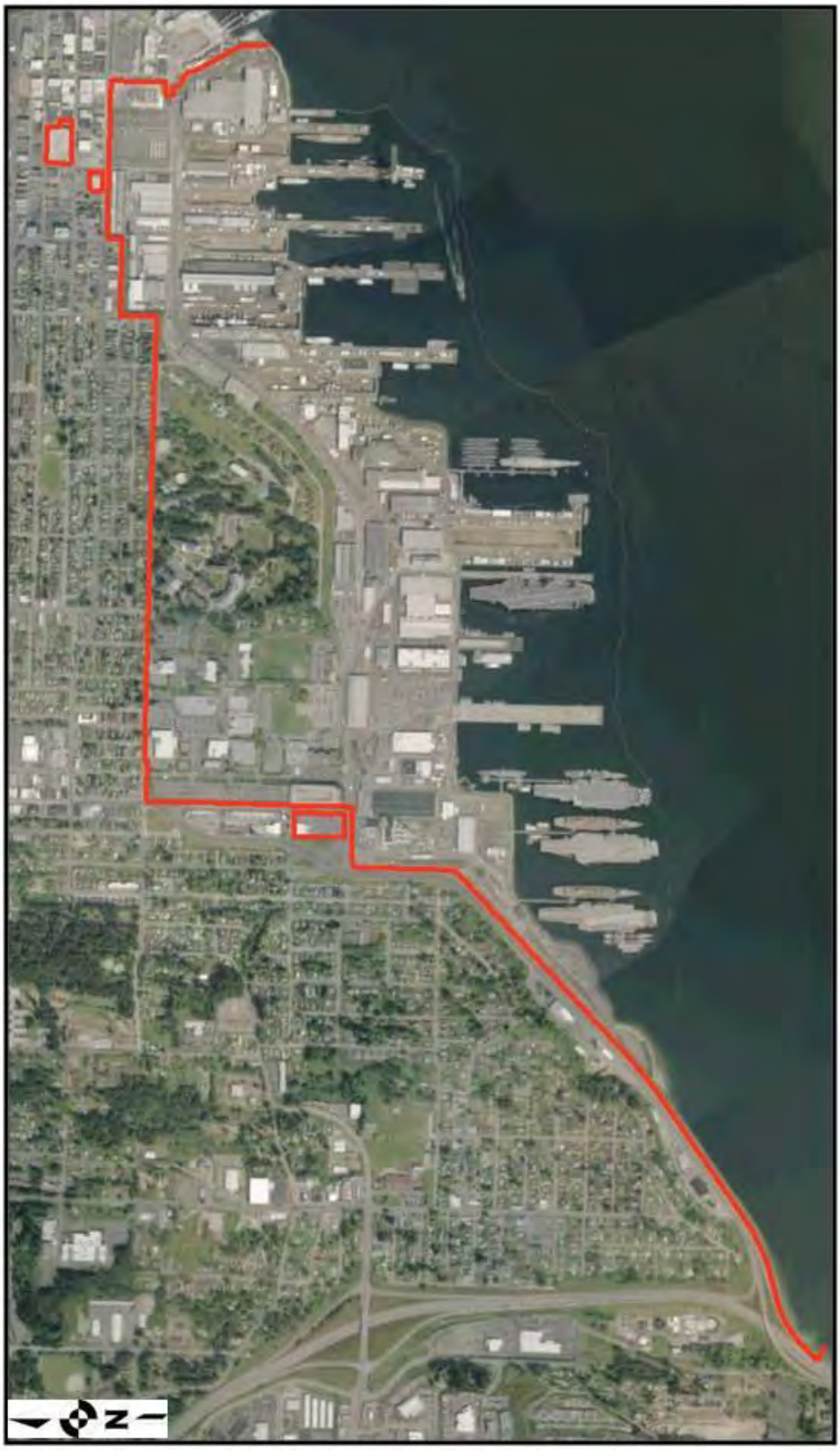

Figure 6-1: NAVBASE Kitsap Bremerton Aerial Photo

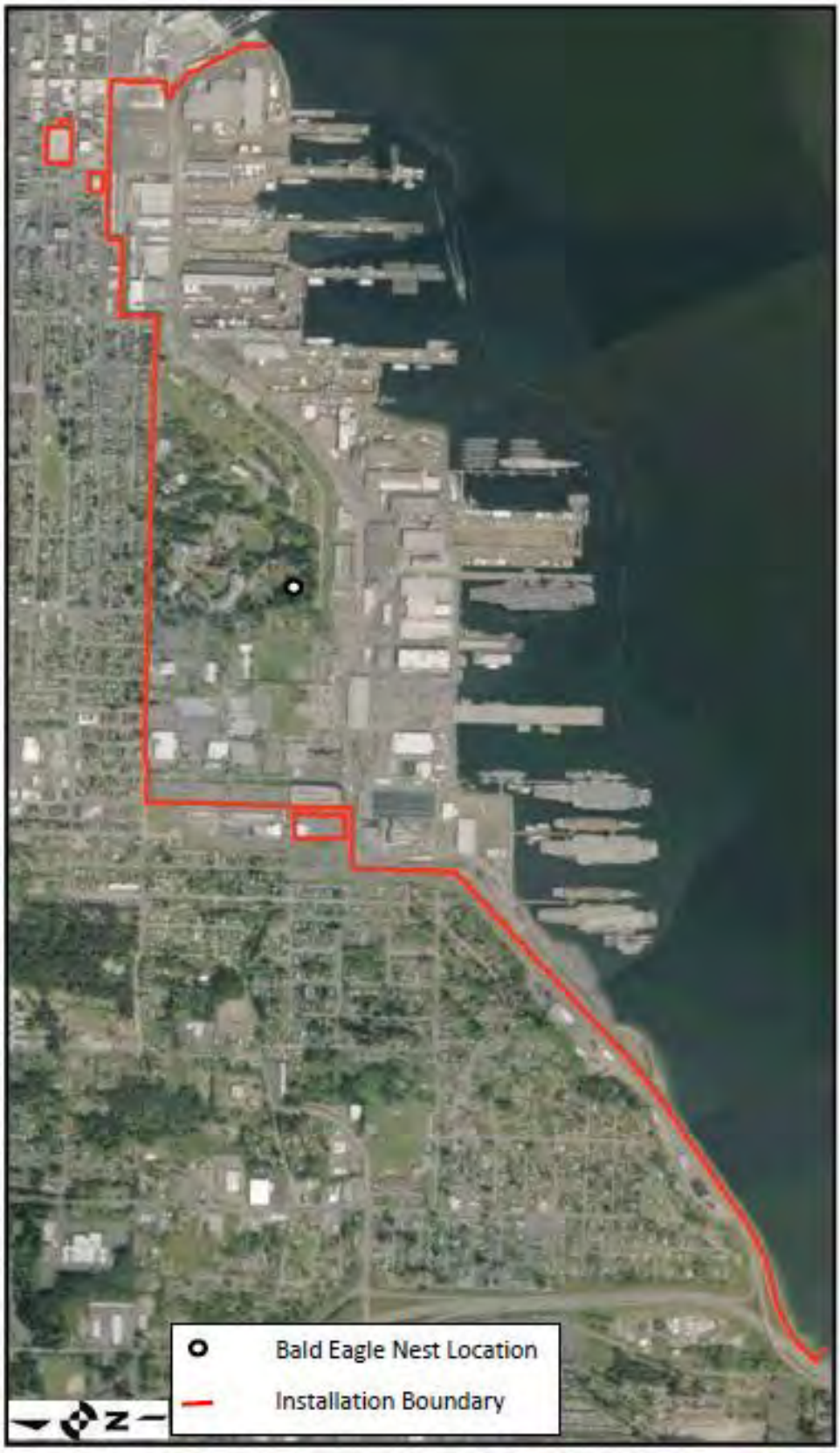

Figure 6-2: NAVBASE Kitsap Bremerton Bald Eagle Nest Location

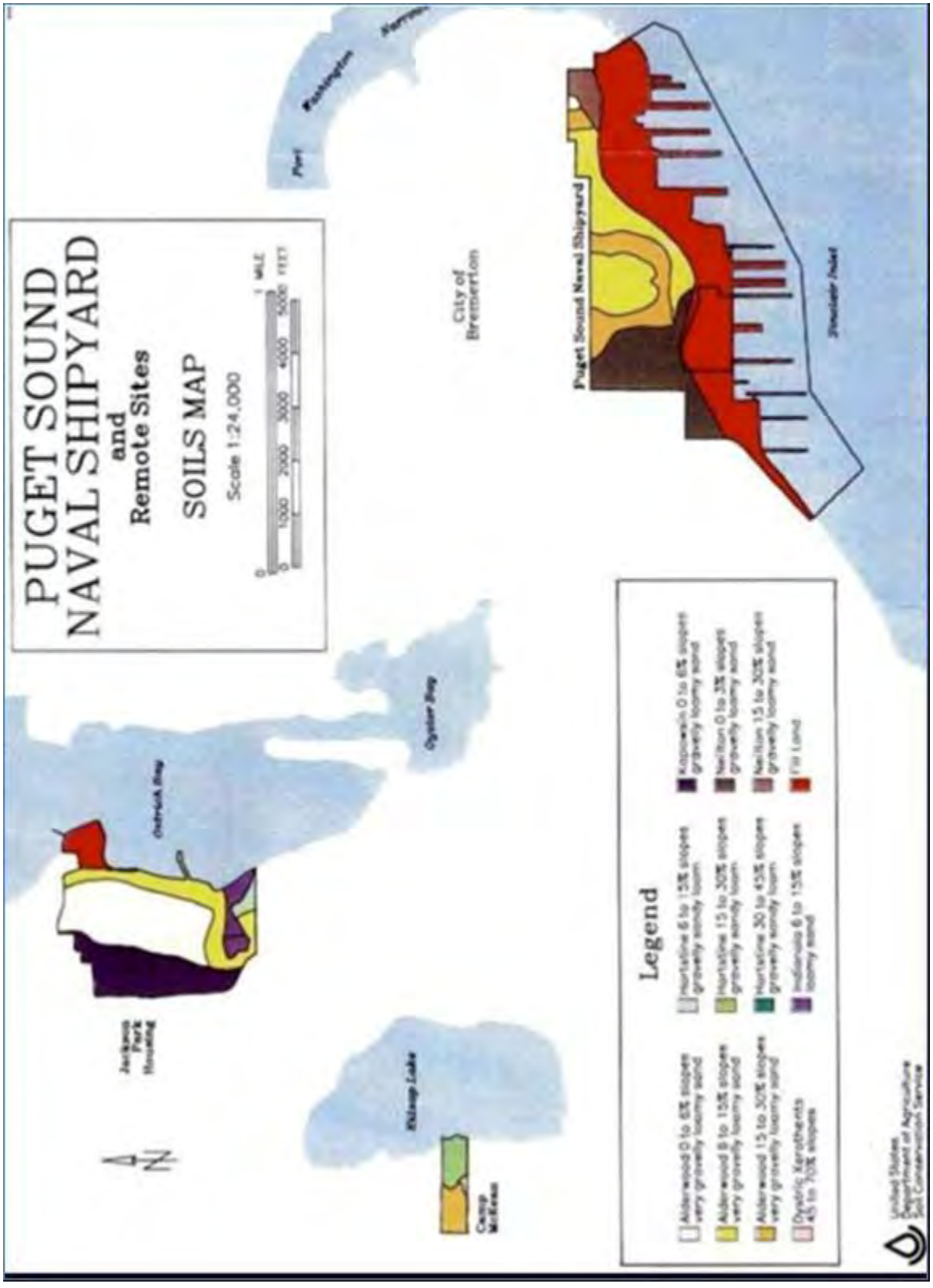

Figure 6-3: NAVBASE Kitsap Bremerton, Camp McKean, and Jackson Park Soils Map

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7 CURRENT CONDITION OF NATURAL RESOURCES ON JACKSON PARK HOUSING COMPLEX & NAVAL HOSPITAL BREMERTON

7.1 Physical Conditions

Jackson Park Housing Complex and Naval Hospital Bremerton are contiguous to one another along the west shoreline of Ostrich Bay in Kitsap County. Jackson Park is to the south of Naval Hospital Bremerton. Jackson Park Housing Complex is a residential housing facility for Navy and non-Navy families with support facilities that include a conference hall, child development center, store, fire station, and maintenance support facilities. In 2014, the Navy transferred ownership of the Jackson Park Housing to a Public-Private Venture (PPV) (USN 2013) housing program to ensure cost efficiency in compliance with Executive Order (EO) 13423. Naval Hospital Bremerton is the primary Navy health care facility in the Northwest and the only Navy teaching hospital. The hospital is a secondary care facility providing general, clinical, and hospitalization services for eligible active duty, retired military personnel, and their dependents. The mission of Naval Hospital Bremerton is to meet the healthcare needs of the fleet and all eligible beneficiaries within its area of responsibility and to provide graduate medical education for family practice interns and residents.

Before Jackson Park and Naval Hospital Bremerton were constructed in the 1970s and 1980s, the property was used as an ammunition depot where personnel made, cleaned, and destroyed military weapons, ammunition, and maintenance equipment. Waste products from these operations have left behind contaminates on Navy owned property. These areas have been addressed by the Navy's Installation Restoration Program and continue to be monitored.

The site occupies 239 acres with a topography ranging from a relatively flat section along the shoreline of Ostrich Bay to approximately 180 feet above mean sea level at the western edge of the site (USN 2002a) (Figure 7-1). While most of the property has been converted from its original use to suburban style housing and hospital, several of the original buildings remain including bunkers and concrete block buildings that are now used as a fire station, grounds maintenance, and storage. Elwood Point, a sandpit extending east from the shoreline of Jackson Park has long been a place of importance to the Suquamish Tribe who had established seasonal camps above the beach while clam digging, hunting, and fishing in the surrounding area.

7.1.1 Hydrology

Jackson Park and Naval Hospital Bremerton lie within the 184,408-acre Olalla Valley-Frontal Puget Sound watershed of the Puget Sound drainage basin. There are two perennial streams and three intermittent streams at Jackson Park. Two small streams on the south end flow into a

narrow wetland, which drains to Ostrich Bay via a culvert. The other streams flow into culverts that drain to Ostrich Bay.

Ostrich Bay is a small embayment on the south end of Dyes Inlet. Both Dyes Inlet and Ostrich Bay are relatively shallow embayments with an average depth less than 35 feet. The three largest salmon bearing creeks near Jackson Park are Chico Creek, Clear Creek, and Barker Creek. The water circulations within Ostrich Bay are mainly from the tidal current and wind with an average residence time of one to five days. Not including Elwood Point, the majority of the shoreline at Jackson Park is riprapped with one pier, closed to public use, extending into Ostrich Bay.

7.1.2 Water Quality

A 1998 marine water quality monitoring program of the Kitsap County Health District found that 83% of the stations sampled in Dyes Inlet (10 out of 12) met their turbidity standard. The two stations that did not meet their standard were at the mouths of Clear and Chico Creeks. Their higher rates could be explained by the proximity of the stations to stormwater and freshwater outfalls. In most cases, the turbidity levels were far below the threshold that had been previously identified; therefore, turbidity was considered to meet standards in Dyes Inlet.

DO or oxygen saturation is a relative measure of the amount of oxygen dissolved in the water in units of mg/L. The State of Washington has set the standard of DO for Class A marine waters, such as Dyes Inlet, at greater than 6.0 mg/L. Water quality sampling of Dyes Inlet by the WDOE's Puget Sound Ambient Monitoring Program (PSAMP) from January through September 1995 and by the Kitsap County Health District in 1998 found DO levels exceeding the standard level. The only station failing to meet this standard was at the mouth of Clear Creek. Possible explanations could include temperature changes or phytoplankton die-off. Based on these two sources of information, the DO habitat indicator was considered to meet standards in Dyes Inlet.

Due to the relatively dense human population along riparian areas and the former industrial nature of Jackson Park, numerous sources of point and non-point pollution have affected the water quality in Dyes Inlet. As a result, Dyes Inlet is on the WDOE 303(d) List of Contaminated Waters for exceedance of chemicals, such as polychlorinated biphenyls (PCBs), mercury, and zinc. In addition, there have been detectable levels of volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs), metals, PCBs, and ordnance compounds in the project area. Barker Creek, Clear Creek, and Dyes Inlet are on the 303(d) list for fecal coliform contamination. Although these rates are lower than past results, the Kitsap County Health District found fecal coliform concentrations exceeding Class A Surface Water Standards at two of their twelve stations (Chico and Clear creeks). The 2000 report (USN 2002a) concludes that, given the numerous chemicals that have been detected and the risk factors that have been identified for Dyes Inlet, the water quality/nutrient indicators may not meet state standards in Dyes Inlet.

7.1.3 Soils

The soils of Jackson Park Housing Complex and Naval Hospital Bremerton are the remains of a glacial till, which is characterized by a moderately compacted till layer, 20 - 40 inches below the surface. This is overlaying a very compacted till or hardpan layer that has been identified as Alderwood soil types which makes up the majority of the soils. The Alderwood series consists of a moderately deep to a cemented pan of moderately well drained soils usually found on glacially modified foothills and valleys with slopes of 0 - 65% (USDA-NRCS 1980). Taxonomic classification for this soil type is loamy-skeletal, isotic, and mesic Vitrandic Dystroxerepts soils. These soils are moderately well drained and have moderately rapid permeability to the densic layer (physically root restrictive zone due to soil compaction) and very slow permeability (USDA-NRCS 1980). Alderwood soils with a slope from 0 - 6% can be classified as hydric when found near permanent water bodies (USDA-NRCS 1980) similar to those soils near Ostrich Bay.

Sediment Quality

Marine surface sediments in Ostrich Bay range from medium and fine sands to silts, with the intertidal and beach zone above MLLW characterized by cobbles and coarse sand. Silts are more common at depths below -20 feet MLLW because the subtidal zone is generally unaffected by winds and tides.

Sediment contamination within Jackson Park waterfront has been documented in a number of studies, resulting in the closure of tidelands of Dyes Inlet to human harvest of shellfish (see USN 2009b for information on these studies). Within Dyes Inlet, clams and crabs have been shown to be contaminated with several compounds, including pentachlorophenol, 3,3-dichlorobenzidine, cadmium, mercury, and silver at concentrations exceeding SQS levels (USN 2009b). Sediments in Dyes Inlet are also listed in the 303(d) *Threatened and Impaired Waterbody List for Kitsap County* for contamination by a variety of chemicals, including bis(2-ethylhexyl)phthalate and mercury. Due to the multiple SQS exceedances reported in previous studies, the sediment contamination indicator is considered an environmental risk for Dyes Inlet (USN 2009b).

7.2 Habitats and Communities

7.2.1 Wildlife Habitat

The habitat characteristics found on and near Jackson Park Housing Complex and Naval Hospital Bremerton encompasses saltwater and freshwater wetlands, forested areas, and residential housing (USDA-SCS 1994). The native plant habitats consist of various coniferous, hardwoods, and understory species such as Douglas-fir, western hemlock, western redcedar, western white pine, red alder, bigleaf maple, Madrona, Indian plum, elderberry, salmonberry, snowberry, huckleberry, and various fern species (USDA-SCS 1994).

7.2.2 Wetlands

Jackson Park Housing Complex contains two small freshwater wetland systems that are characterized as Palustrine and Riverine wetlands (USDA-SCS 1994). The Palustrine System consists of two wetlands located within forested areas of Jackson Park and is the result of waters dammed behind an old concrete structure, culvert, and road (USDA-SCS 1994). The Riverine System includes the wetlands within channels that have moving waters, including the stream located behind the concrete dam impoundment (USDA-SCS 1994). Virtually all of the wooded wetlands at Naval Hospital Bremerton were created from a historic railroad bed/road built by the Navy. The road has been naturally reclaimed and now backs up water to form several wetlands.

In addition, Jackson Park Housing Complex and Naval Hospital Bremerton abut saltwater wetlands that are part of the Estuarine System. They are comprised of deepwater tidal habitats and adjacent tidal wetlands that are somewhat protected from, but have at least partial access to, open waters and occasionally undergo dilution by freshwater runoff (USDA-SCS 1994). A salt marsh (Estuarine intertidal emergent) along the northern end of the shore extends for approximately 60 feet out onto the tidal flat. The vegetation is almost entirely Lyngby's sedge (*Carex lyngbyei*), with some soft-stem tule (*Schoenoplectus tabernaemontani*), and seaside arrowgrass (*Triglocin maritima*) near the forested edge.

7.3 Flora and Fauna

7.3.1 Flora

7.3.1.1 Terrestrial Flora

The upland of Jackson Park and Naval Hospital Bremerton is dominated by mowed grass lawns. The forest habitat at Jackson Park Housing Complex and Naval Hospital Bremerton consists mainly of small, dispersed clumps and urban forests surrounded by maintained lawns. The exceptions to this are the 15 acres of continuous woodlands to the northwest of the main hospital building and a similar sized wooded area on the southern boundary of Jackson Park Housing Complex. Along fringe and undeveloped areas, terrestrial flora species can include Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), beaked hazelnut (*Corylus cornuta*), red alder, and bigleaf maple (USN 2000a). Understory species include salal (*Gaultheria shallon*), soft brome (*Bromus hordeaceus*), salmonberry (*Rubus spectabilis*), sword fern (*Polystichum munitum*), Oregon grape (*Mahonia nervosa*), trailing blackberry, and elderberry (USN 2000a).

Above the intertidal zone, vegetated mats composed primarily of seashore saltgrass and pickleweed occur in some areas, with fat-hen saltbush (*Atriplex prostata*) and saltmarsh sandspurry (*Spergularia salina*) present in certain spots. Still higher are some areas with salt-tolerant species such as Lyngby's sedge; Puget Sound gumweed; and tall pepperweed (*Lepidium densiflorum* Schrad. Var. *elongatum*) mixed with pickleweed, seashore saltgrass, and fat-hen saltbush. Vegetation of Elwood Point is dominated by a grass lawn occasionally used as a sports

field, with shrubby areas and a mixture of large trees. The largest trees are up to 3 feet in diameter. Native species include Douglas-fir, black cottonwood, western redcedar, madrone, and bigleaf maple. Non-native species are also present, notably black locust and holly. English ivy is dense and invasive in some areas.

For a complete list of potentially occurring terrestrial flora observed at Jackson Park Housing Complex and Naval Hospital Bremerton, see Appendix E.

7.3.1.2 Aquatic Flora

Wetland flora species can include, cattail (*Typha latifolia*), skunk cabbage (*Lysichiton americanus*), bulrush, water parsley, pickleweed, Pacific silverweed (*Potentilla anserine spp. pacifica*), and slough sedge (*Carex obnupta*) (USN 2000a). Facultative wetland plants can include redtop (*Agrostis gogamtea*), lady fern (*Athyrium filix-femina*), western crabapple (*Malus fuscas*), sedges (*Carex spp.*), rushes, alder, Puget Sound gumweed, saltgrass, saltweed, and Pacific willow (*Salix lasiandra*) (USN 2000a).

In 2000, an expansive bed of drifting and partially buried algae, dominated by *Ulva fenestrata* and *Ahnfeltia spp.* was observed south of Elwood Point in water depths from -0.5 feet to -11.5 feet MLLW. Scattered, but attached *Ulva fenestrata* was observed north of Elwood Point along a more erosional shoreline (Foster Wheeler 2000).

For a complete list of aquatic flora potentially occurring at Jackson Park Housing Complex and Naval Hospital Bremerton, see Appendix E.

7.3.2 Fauna

7.3.2.1 Invertebrates

Invertebrates can include ants (family *Formicidae*), sweat bees (family *Halictidae*), jumping spiders (family *Salticidae*), snails (*Littorina spp., Nucella spp.,* and *Polinices spp.*), and hobo spiders (*Tegenaria agrestis*) (USN 2000a).

In 2000, the substrate at depths greater than 12.5 feet MLLW was found to be generally fine grained and covered with a sometimes-dense mat of benthic diatoms. These benthic diatoms were being grazed by a significant population of small sea cucumbers (*Parastichopus califonicus*). The pier supported a luxurious fouling community, including a significant wild population of Mediterranean mussels (*Mytilus edulis galloprovincialis*). Hundreds of Cancer crabs, possibly *Cancer magister*, were observed on the perimeter of the pier foraging on the biological debris raining down from the fouling community (Foster Wheeler 2000). Other species include starfish, gastropods, and burrowing anemone.

For a complete listing of invertebrates potentially occurring at Jackson Park Housing Complex and Naval Hospital Bremerton, see Appendix E.

7.3.2.2 Fish and Shellfish

Species of shellfish can include the Pacific oyster, Manila clam, butter clam, bay mussel, native littleneck clam, gaper clam, butter cockle, shrimp (*Pandalus spp.* and *Crangon alaskensis*), and the red rock crab (USN 2000a). Ostrich Bay is under a shellfish closure advisory from the Washington State Department of Health.

Fish species include English sole (*Parophrys vetulus*), rock sole (*Lepidopsetta bilineata*), starry flounder (*Platichthys stellatus*), Pacific tomcod (*Microgadus proximus*), shiner perch (*Cymatogaster aggregata*), pile perch (*Rhacochilus vacca*), Pacific herring, Chinook salmon, coho salmon, chum salmon, steelhead trout, and cutthroat trout (USN 2008a). Nearby Chico Creek supports populations of four salmon species including chum, coho, steelhead, and cutthroat trout with the chum population being one of the largest in South Puget Sound.

For a complete listing of potentially occurring fish and shellfish observed on Jackson Park Housing Complex and Naval Hospital Bremerton, see Appendix E.

7.3.2.3 Reptiles and Amphibians

No recent reptile and amphibian survey has occurred at Jackson Park Housing Complex and Naval Hospital Bremerton. Species commonly found in urban areas in Kitsap County, such as the western toad (*Bufo boreas*), rubber boa (*Charina bottae*), red-backed salamander (*Plethodon vechiculum*), ensatina (*Ensatina eschscholtzii*), rough-skinned newt (*Taricha granulosa*), Pacific chorus/treefrog (*Pseudacris/Hyla reglla*), and northern red-legged frog have the potential to occur (USN 2007b).

7.3.2.4 Migratory Birds

The sheltered nature of Ostrich Bay from strong winds and currents combined with nearby forests allows many bird species to live or migrate through the embayment at different times of the year.

Species of birds that may be found on the installation include mallards, American wigeon (*Anas americana*), buffleheads, western grebe, osprey, great blue heron, and gulls (USN 2000b). Other species potentially occurring include greater scaups (*Aythya marila*), lesser scaups (*Aythya affinis*), ring-necked ducks (*Aythya collaris*), Caspian terns (*Hydroprogne caspia*), surf scoters (*Melanitta perspicillata*), white-winged scoters (*Melanitta deglandi*), Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), common goldeneye (*Bucephala clangula*), and mergansers (*Mergus sp.* and *Lophodytes sp.*). Other abundant species included glaucous-winged gulls (*Larus glaucescens*), mew gulls (*Larus canus*), double-crested cormorants (*Phalacrocorax auritus*), Pacific loons (*Gavia pacifica*), American coots (*Fulica americana*), and pigeon guillemots (*Cepphus columba*).

Shorebirds and waterfowl can include sandpipers (*Scolopacidae*), dunlins (*Calidris alpina*), snipe (*Gallinago gallinago*), peregrine falcons (*Falco peregrinus*), bald eagle (*Haliaeetus leucoephalus*), and purple martin (*Progne subis*).

For a listing of birds potentially occurring at Jackson Park Housing Complex and Naval Hospital Bremerton, see Appendix E.

Naval Hospital Bremerton has an occasionally used helicopter landing pad to the southeast of the main hospital building. The helicopters may present a danger to birds. The Naval Hospital participates in the Bird Aircraft Strike Hazard (BASH) Program. As a result, the vegetation near the landing-pad has been removed to limit its attractiveness to wildlife. This program promotes land management practices to minimize bird attractants and safety procedures to recognize, control, and avoid hazardous bird concentrations.

7.3.2.5 Mammals

Typical mammal species that may be observed on Jackson Park Housing Complex and Naval Hospital Bremerton are the species that have learned to adapt to areas with high human populations including: Douglas squirrel (*Tamiasciurus douglasii*), Townsend's chipmunk (*Tamias townsendii*), raccoon, deer, vagrant shrew (*Sorex vagrans*), opossum, and the deer mouse (USN 2007b). Marine mammal species that could occur in the vicinity of Ostrich Bay include Pacific harbor seal, California sea lion, gray whale, Dall's porpoise, southern resident killer whale (rare visitor), and harbor porpoise (*Phocoena phocoena*).

For a complete listing of mammals that could potentially occur at Jackson Park Housing Complex and Naval Hospital Bremerton, see Appendix E.

7.4 ESA Listed Species

Several federally listed species have been observed or have the potential to occur at Jackson Park and Naval Hospital Bremerton (Table 7-1) (USN 2000a, USFWS 2009, and WDFW 2009). There have been no observations of marbled murrelets, nor is there old growth habitat potential. The federally listed yellow-billed cuckoo also has the potential to occur at Jackson Park and Naval Hospital Bremerton. They require large blocks of riparian habitat for breeding (particularly woodlands with cottonwoods and willows) and dense understory foliage appears to be an important factor in nest site selection (USFWS 2011a). Surveys have not been conducted, but consideration is taken during maintenance timing and activities.

Ostrich Bay contains federally listed species of salmonids, including the Puget Sound Chinook salmon and steelhead. Puget Sound Chinook salmon critical habitat has been designated for Ostrich Bay. Bull trout are federally listed as threatened and though are unlikely to occur within Ostrich Bay, but will be noted as no formal surveys have been conducted of the waterway. In addition, two species of rockfish (Boccaccio, and yelloweye) have the potential to reside in

Ostrich Bay, though no recent fish survey has recorded their presence and habitat conditions would not suggest their presence. Southern Resident Killer whales and Humpback whale sightings are rare in the south Puget Sound and very rare in Ostrich Bay.

7.5 Bald and Golden Eagle Act

While no longer listed under ESA, bald eagles are still protected by the MBTA and the Bald and Golden Eagle Protection Act. A single bald eagle nest is located adjacent to the Naval Hospital, along the shoreline (Figure 7-2).

Table 7-1: ESA Listed Species Potentially Occurring at Jackson Park Housing Complex and Naval Hospital Bremerton

Common Name	Scientific Name	Federal Status	State Status
Birds			
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Candidate
Fish			
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Threatened	Candidate
Puget Sound Steelhead	*Oncorhynchus mykiss*	Threatened	-
Bull trout	*Salvelinus confluentus*	Threatened	Candidate
Bocaccio	*Sebastes paucispinis*	Endangered	Candidate
Yelloweye rockfish	*Sebastes ruberrimus*	Threatened	Candidate
Mammals			
Humpback whale (Mexico DPS)	*Megaptera novaeangliae*	Threatened	Endangered
Humpback whale (Central America DPS)	*Megaptera novaeangliae*	Endangered	Endangered
Southern resident killer whale	*Orcinus orca*	Endangered	Endangered
Flora			
Howellia	*Howellia aquatilis*	Threatened	Threatened

Figure 7-1: Jackson Park and Naval Hospital Bremerton Aerial Photo

Figure 7-2: Jackson Park and Naval Hospital Bremerton Bald Eagle Nest Location

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8 ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY

8.1 Supporting Sustainability of the Military Mission and the Natural Environment

The fundamental components of NAVBASE Kitsap's natural resources management program are personnel and funding. OPNAV M-5090.1 requires each installation to have a designated (in writing) NRM, one who is knowledgeable and trained in the particular resource issues for that area or region. At NAVBASE Kitsap, the NRMs occupy permanent, funded positions. These positions ultimately report to the installation CO through the Installation Environmental Program Director (IEPD) and the Public Works Officer (PWO). The NRMs can call upon other environmental professionals within Navy Region Northwest, NAVFAC Northwest, and outside experts or stakeholders to assist in the management of natural resources. The NRMs will integrate environmental protection, conservation, enhancement/restoration, and outdoor recreation within the constraints of the installation's military mission; at the same time, the NRMs will identify risks to the environment that may result from military activities and report these potential risks to the Command so that alternatives may be developed that reduce or eliminate the potential impacts.

8.2 Management Strategy

A past trend in resource management has been to select and manage a single species based on their perceived importance, either as products or commodities or their status as threatened or endangered species. While this approach can be successful in some instances, single-species management, whether a protected marine mammal or an endangered bird, has severe limitations recognized by the scientific and natural resources community. The health of a single species seldom acts as a good surrogate for the health of an entire ecosystem. This type of management often favors a handful of species at the expense of overall ecosystem health. Ecosystem management is a process that considers the environment as a complex system functioning as a whole (multiple species), not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole. The ecosystem management approach has the overarching goal of protecting the properties and functions of natural ecosystems. Over the long term, this approach will maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies and communities. Maintenance of healthy ecosystems supports realistic military training and testing, which in turn promotes mission readiness.

NAVBASE Kitsap's Natural Resources Management Program is based on the premise that responsible stewardship and ecosystem management are synonymous and are compatible with integrated natural resources management. Implementation of any type of management activity

whose impacts are not fully understood should be tied directly to implementation of a corresponding monitoring program. The intent is to integrate management activities with ongoing scientific monitoring to provide reliable data and identify trends and causal relationships including both positive and negative impacts of management activities. Acceptable levels or thresholds of management intensity will be identified for different species, taxa, ecosystems, and associations. The management guidelines and prescriptions in an installation's INRMP will be revised periodically as site-specific data become available. The INRMP is developed to provide ongoing management direction based on scientific data and a higher level of knowledge of the installation's ecosystems and their inter-relationships. The goal of this INRMP is to bring together and integrate all management activities (e.g., forestry and wildlife management) in a way that sustains, promotes, and restores or enhances the health and integrity of the ecosystems. Integrated ecosystem management is sound stewardship, and will enusure, over the long-term, the maximum return of ecosystems goods and services at minimum cost to the Navy's mission.

8.2.1 Early Review and Risk Assessment

Early review of proposed construction actions and the assessment of environmental risk are done by the installation's review process. This requires that all new projects, programs, and operations, or changes to existing projects, programs, and operations be reviewed by the Environmental Division staff for potential impacts to the environment including potential impacts to natural resources. The NRMs at NAVBASE Kitsap will review planned actions, assess the risks to natural resources, and provide comments and/or alternatives to the action proponents that will minimize or eliminate the risks, if possible. The early review process also allows the installation an opportunity to identify the appropriate NEPA documents that will be generated based on the proposed action and the alternatives.

8.2.2 Restoration and Enhancement of Resources

Restoration or enhancement of natural resources is planned and carried out through several different methods with projects that range from control of invasive species to beach and wetland restoration. NRMs coordinate with the public works staff to identify areas for weed control or native planting as discussed in the Grounds Maintenance section in Chapter 3. Other projects are identified by the NRM or Natural Resources staff as standalone projects with funding requested through sources identified in Section 9.4.

A large number of restoration projects are part of larger construction projects that provide the opportunity to enhance or restore wetlands, riparian areas, or wildlife habitat. Examples include replacing undersized culverts to ensure fish passage and revegetating disturbed lands with native plantings. The NRM will work with project managers as early as possible in the design phase to ensure opportunities for restoration or enhancement of natural resources are fully utilized.

Additional restoration is required under federal law for projects impacting wetlands, waterways, or Tribal Treaty rights. The size and effort of these efforts are dictated by the impact of the

project and must be approved by the regulatory agencies involved. Previous projects include beach and lagoon restorations, scientific studies, and interpretive displays.

8.2.3 Adaptive Management

Ecosystem management calls for enhanced efforts to understand complexity, to open up to new ideas and challenges, and to incorporate a broad diversity of perspectives into thoughtful, multidisciplinary management. Managers know enough about broad patterns of ecological systems to initiate well-considered management plans in an experimental fashion, monitor early results of those plans, and then modify them as more information accumulates. This process is known as adaptive management. Adaptive management is more than just monitoring the effectiveness of management actions. It requires that the assumptions underlying a management approach, as well as expected outcome, be made explicit before action is taken. Adaptive management involves establishing a hypotheses and a framework for analyzing differences between expected and observed outcome. Adaptive management is also about experimentation and probing ecosystems to understand how they operate.

8.3 Natural Resources Consultation Requirements

NEPA and Navy policy require early review and coordination for environmental considerations. This is achieved by the installation's environmental review process, which requires all new projects, programs, and operations, or changes to existing projects, programs, and operations be reviewed by the NRMs for potential impacts to the environment, including potential impacts to natural resources. The NRMs review planned actions, identify the risks to natural resources, and provide comments and/or alternatives to the action proponents that will minimize or eliminate the risks, if possible. The early review process also allows the NRMs an opportunity to work with other Navy personnel to identify the appropriate environmental documents that will be generated based on the proposed action and the alternatives.

The potential large amount of time needed to conduct consultations with regulatory agencies and stakeholders makes it imperative to initiate early environmental/natural resources review of proposed actions in order to assess risks, develop alternatives, and correctly identify mitigation costs in terms of both time and dollars. Regulatory agencies and/or affected parties may request changes or mitigation that could result in delays and additional costs. NRMs shall participate in early review of proposed actions in order to assess risks, develop alternatives, and correctly identify mitigation costs in terms of both time and dollars

8.3.1 Species Consultation Requirements

8.3.1.1 Threatened and Endangered (T&E) Species Consultations

Federal agencies are required by the Endangered Species Act (ESA) to manage federally listed threatened and endangered (T&E) species and their habitat in a manner that promotes conservation of T&E species and is consistent with species recovery plans. Section 7 of the ESA

requires all federal agencies to enter into consultation with the USFWS and NMFS whenever proposed actions may affect listed T&E species of plants and animals. Proposed projects, operations, or other actions are scrutinized for potential impacts to T&E species through a formal review process. ESA Section 7 consultations will be initiated if warranted, otherwise, written documentation that there are no effects to T&E species will be generated by the Natural Resources Manager and kept with the project files. The Natural Resources Manager will use this INRMP as a tool to identify the potential impacts of planned Navy actions on endangered or threatened species at an early stage and to provide a basis for altering the action to prevent or minimize those impacts. All injured or deceased T&E species observed on or adjacent to NAVBASE Kitsap will be reported to the appropriate State or Federal wildlife agency.

Risk to military mission: USFWS or NMFS (or both) may require changes or mitigation that could result in delays and additional costs. Because of this, it is imperative that the Command initiate early environmental/natural resources review of proposed actions, in order to assess risks, develop cost-effective alternatives, and correctly identify mitigation costs both in terms of time and dollars.

8.3.1.2 Essential Fish Habitat (EFH) Consultations

The Magnuson-Stevens Fishery Conservation and Management Act requires that federal agencies consult with the U.S. Secretary of Commerce (which has been delegated to NMFS) on any action proposed to be undertaken that may adversely affect essential fish habitat (EFH). The objective of this EFH assessment is to determine whether or not the proposed project may adversely affect designated EFH for relevant commercial, federally managed fish species within the proposed action area. It also describes conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed project. At each installation, proposed projects, operations, or other actions, are scrutinized for potential impacts to T&E species and EFH through a formal review process. Section 7 consultations will be initiated if warranted, otherwise, written documentation that there are no effects to T&E species will be generated by the NRM and kept with the project files. EFH impact review will be consolidated with the ESA review and combined with ESA consultation documents sent to NMFS when possible. For projects that may adversely affect EFH habitat and not T&E listed species, the EFH consultation will be sent with a determination of no effect for ESA listed species. The timeframe for completion of an ESA/EFH consultation can range from 30 days for an informal consult to over 6 months for a formal consult.

Risk to military mission: NMFS may require changes or mitigation that could result in delays and additional costs. Because of this, it is imperative that NAVBASE Kitsap initiate early environmental/natural resources review of proposed actions, in order to assess risks, develop cost-effective alternatives, and correctly identify mitigation costs both in terms of time and dollars.

8.3.2 Marine Mammal Protection Consultation

The Marine Mammal Protection Act (MMPA), subject to limited exceptions, prohibits any person, (including federal agencies) or vessels subject to the jurisdiction of the United States from "taking" marine mammals on the high seas, in U.S. waters, or on land under U.S. jurisdiction. "Taking" includes the "harassment" of a marine mammal. Section 101(a)(5) of the MMPA directs the Secretaries of Commerce and Interior to allow upon request, the incidental (but not intentional) taking of marine mammals by U.S. citizens who engage in a specified activity (exclusive of commercial fishing) within a specified geographical region if certain findings are made and regulations are issued. Permission may be granted to "take" marine mammal(s) incident to Navy activities if the regulatory agencies Secretary determine that the Navy action:

a) Will have a negligible impact on the species or stock(s); and

b) Will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses.

Marine mammals may also be subject to the ESA requirements discussed in Section 3.6.1.

The installation NRMs will review planned construction projects or operations that have an in-water component to them such as pile driving, removal, demolition, or dredging, and the potential for marine mammals to be present in the vicinity of the action area. If projects are identified and marine mammals are present, the NRMs will determine if an Incidental Harassment Authorization (IHA) or Letter of Authorization (LOA) is required for the action. LOAs are issued for up to 5 years and IHAs for 1 year or less; however, NMFS needs more time to issue LOAs than IHAs. If an IHA or LOA is required, additional coordination with NAVFAC Northwest may be required to ensure the proper level of NEPA documentation is obtained.

The MMPA requires a consultation and application to obtain an IHA or LOA through the NMFS headquarters in Washington D.C. The MMPA website notes that it takes 6-9 months for NMFS to issue an IHA and 12-18 months to issue an LOA.

8.4 Planning for National Environmental Policy Act Compliance

The NEPA of 1969 (42 USC § 4321 et seq.) requires federal agencies to evaluate the impacts of their proposed actions on the quality of the human environment. The Navy's policies regarding NEPA including OPNAV M-5090.1, Secretary of the Navy Instruction (SECNAVINST) 5090.6A, *Environmental Planning for Department of the Navy Actions* (26 April 2004), and *Navy's Supplemental Environmental Planning Policy* (23 September 2004), echo NEPA and emphasize environmental planning at the earliest stages of projects. The Navy recognizes that the NEPA process includes the systematic examination of the likely environmental consequences of implementing a proposed action. To be an effective decision-making tool, the Navy integrates the process with other Navy-Marine Corps project planning at the earliest possible time. This

ensures that planning and decision-making reflect environmental values, avoid delays, and avoid potential conflicts. The Navy is able to achieve its mission at home, at sea, and abroad more efficiently when environmental planning is properly integrated into Navy decision-making for those Navy actions that have the potential for adverse environmental consequences.

The NRMs are not exempt from the review process, or from the requirements of NEPA. For example, commercial logging actions must be reviewed for environmental risks and impacts. The process is the same as if the proposed action is a building project or a new training operation.

Impacts to the military mission: Alternatives to proposed actions must be identified and investigated for projects that require an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). This translates into time and money, and because of this, it is imperative that the installation's Command initiate early environmental/natural resources review of proposed actions, in order to assess risks, develop alternatives, and correctly identify mitigation costs both in terms of time and dollars.

8.5 Coordination and Planning for Construction and Facility Maintenance

Planning actions are reviewed for natural resource implications. Common facility maintenance actions are assessed during the proposal review. This ensures that the installation is in compliance with environmental laws and regulations, and provides feedback for length of time to receive permits, and conflicts with natural resources issues that may have been overlooked. For in-water maintenance projects that require a permit from the US Army Corps of Engineers, ESA and EFH consultations must be completed prior to permit request.

When maintenance is not reviewed upfront, then maintenance actions are reviewed as a project. Required permits and consultations are identified during this project review and actions are documented in this manner.

Major construction projects (MILCONs) are reviewed during the project development. At this time NEPA planning and processing is occurring to identify environmental elements that may affect the scope, schedule, and budget. Early communication between action proponents and NRMs is vital in order to ensure a thorough review of the project alternatives and to enable NAVFAC Northwest planners to secure funding for NEPA actions.

8.6 Public Access and Outreach

Use of recreation areas on NAVBASE Kitsap installations (within access limited sites) are limited to military, civilian employees of DOD, and retired military, including their dependents, relatives, and guests. Sponsors must accompany dependants, relatives, and guests. General civilian use of the installation is not permitted at this time. Tribal access is addressed through separate agreements.

Successful implementation of this INRMP relies upon educating and raising awareness about protecting and enhancing the natural environment among NAVBASE Kitsap residents, tenants, and employees. Public outreach regarding natural resources is typically accomplished through the installation Public Affairs Office. Outreach activities include participation with Earth Day events and invitations to local officials and newspapers to view restoration or protection measures. Additional Navy publications such as The Salute and Currents newsletter can be utilized for outreach and natural resources education.

8.7 Beneficial Partnerships and Collaborative Resource Planning

The NRM will maintain contact with the DoD Partners in Flight (PIF) program and Partners in Amphibian and Reptile Conservation (PARC) program to stay situationally aware of project and program opportunities as they develop. USDA Wildlife Services provides support for pest issues where animals may need to be removed from the installations.

8.8 Outdoor Recreation

NAVBASE Kitsap provides some outdoor recreation opportunities for military personnel, their families, and DOD civilian employees. To encourage outdoor recreation, NAVBASE Kitsap operates an active outdoor recreation and rental equipment program with organized boating trips, skiing, and hiking activities. People and social uses/needs are an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Among the outdoor recreation activities provided are recreational fields, tennis courts, picnic areas, hiking, jogging, cycling, fishing, and wildlife viewing. Security requirements limit the geographical extent of these activities to certain areas. Unfortunately, high levels of recreational use can have negative impacts on the environment so constant monitoring of recreational use is necessary to ensure permanent damage to the natural and cultural resources does not occur.

Camp McKean is available for summer day use in support of Navy commands and authorized Fleet & Family Readiness patrons. The site includes a seasonal swimming beach, large pavilion, gazebo, upper picnic field with two shelters, restrooms, fire rings, BBQ grills, children’s playground, fishing pier, boat dock, sand volleyball court, and horseshoe pits. Boats carried from the parking lot to the beach are allowed to launch, all other boats can use the public boat launch found on the south end of the lake. Unless an area is reserved, all park areas (except the pavilion) are available on a first come, first served basis. Facility reservations are made at Pacific Edge Outfitters.

8.9 Law Enforcement

Several organizations on NAVBASE Kitsap provide enforcement capability to help ensure compliance with laws, regulations, and management initiatives. Violations documented by NAVBASE Kitsap organizations responsible for compliance are reported in accordance with

existing regulations to the appropriate state or federal agency. Violations are referred to the NAVBASE Kitsap CO for determination regarding investigation, adjudication, and corrective and/or punitive action. Law enforcement aboard NAVBASE Kitsap associated with individual actions beyond official federal duties, including poaching, is the responsibility of base security or other entity as directed by the CO and with technical assistance from the IEPD and NRM. Occasionally, the services of state and federal fish and wildlife agency or other regulatory enforcement personnel are involved where their technical expertise or manpower is needed.

8.10 State Wildlife Action Plans

As a stakeholder in the management of natural resources on the installation, WDFW works closely with NAVBASE Kitsap on various fish and wildlife conservation issues, ranging from onsite habitat protection to invasive species control. WDFW also cooperates with the installation on developing and conducting wildlife and habitat research and surveys.

8.11 Encroachment Action Plan

Because growth continues to surround the installations, the potential for the community to impact and to be impacted by the Navy increases. In addition, demands on Navy facilities, transportation networks, utilities, and natural resources often accompany increasing density inside and outside the fence (NAVFAC Northwest, April 2010). To learn more about the specific encroachments issues and other encroachment details please refer to the NAVBASE Kitsap Encroachment Action Plan. Use of an In-Lieu-Fee (ILF) Program is the Navy's preferred compensatory mitigation for unavoidable impacts to aquatic resources from proposed actions that may encroach upon the community.

8.12 Achieving No Net Loss of the Military Mission

Implementation of this INRMP by NAVBASE Kitsap will ensure proper management of natural resources while maintaining no net loss to the military mission of NAVBASE Kitsap, as well as providing for "environmentally wise" growth, development, and redevelopment activities. Supporting the elements contained within this plan will require not only that the INRMP be implemented but that development is conducted in an environmentally sensitive way with cooperation between environmental, engineering, operational, and planning personnel.

8.13 Natural Resources Personnel Training

Training for natural resources personnel is vital to ensuring that NAVBASE Kitsap staff are knowledgeable and kept abreast of current natural resources laws, regulations, and guidance. NAVBASE Kitsap natural resources personnel would benefit from attending professional conferences and meetings including the annual National Military Fish and Wildlife Association conference, regional natural resources seminars and training, Geographic Information System (GIS) classes, and training related to management of wetlands, forests, and invasive species.

Training needs for the NAVBASE Kitsap NRMs will be assessed on an annual basis in coordination with their supervisors. OPNAV M-5090.1, section 12-3.15 lists the minimum training requirements that are required by all NRMs to complete. Funds for natural resources training will be allocated on an as-needed basis.

8.14 GIS, Data Integration, Access & Reporting

The US Navy Geographic Readiness Exchange (GRX) currently provides general mapping resources for site planning purposes. Currently, data coverage of Natural Resource media is limited. It is currently necessary to "data mine" for datasets and coverage from other public sources in order to improve the utility of GIS for natural resource management purposes and as a tool to enable informed decision making. A spatial data standard has been developed to ensure contracts have consistent information regarding these tasks, as provided below:

Data development, mining and integration will be an on-going effort. As the INRMP is expanded and adapted to accommodate information and objectives new data requirements will become apparent. Data and analysis developed will be archived and maintained by GRX.

Given the adaptive nature of natural resource management, there are sometimes several concurrent scientific efforts underway to evaluate, describe, classify, and manage resources, processes, and measures. Eventually, certain standards will become favored and may be either entirely new or replace and succeed a previous standard. This has GIS implications.

8.15 Natural Resources Management Goals and Objectives

The following goals detail the overall natural resources management elements at NAVBASE Kitsap and provide specifics on natural resource constituents found at each installation as identified in the previous sections. The general philosophies and methodologies used throughout the NAVBASE Kitsap natural resources management program focus on conducting required military activities while maintaining ecosystem viability. These goals are supported by objectives and projects, which provide management strategies and specific actions to achieve these goals. The following list of goals and supporting objectives along with the projects identified in Appendix D of this INRMP willensure the success of the military mission while conserving natural resources:

Goal 1: Protect, sustain, and enhance the natural resources at NAVBASE Kitsap to ensure that these resources are maintaining ecological integrity, while supporting existing and future military needs with no net loss.

Objective 1.1 *Manage for no net loss in NAVBASE Kitsap's capability to support the military mission.*

Objective 1.2 *Sustain and enhance healthy wetland, riparian, and shoreline areas and buffers.*

Objective 1.3 Redesign existing landscaped areas so they are low-maintenance. Incorporate native trees, shrubs, and herbaceous plants where appropriate. Selection of plant species used in landscape design should be drought tolerant to limit need for irrigation after establishment.

Objective 1.4 Prioritize areas with invasive species for eradication and subsequent restoration with native plants.

Objective 1.5 Protect soil resources from erosion through prevention and control practices.

Objective 1.6 Minimize the amounts of fertilizers, nutrients, and pesticides applied on NAVBASE Kitsap.

Objective 1.7 Assess and enhance the biological conditions of aquatic and terrestrial ecosystems.

Objective 1.8 Promote and implement alternative stormwater management approaches, including low impact development, to minimize adverse impacts of surface runoff from impervious areas. Maintain or mimic natural systems when possible.

Objective 1.9 Promote management practices to control the damage caused by feral animals and nuisance wildlife, both to NAVBASE Kitsap facilities and to sensitive wildlife populations.

Objective 1.10 Ensure compliance with the Federal Endangered Species Act, the Migratory Bird Treaty Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Marine Mammal Protection Act in all construction, maintenance, operations, and landscaping activities at NAVBASE Kitsap.

Objective 1.11 Review all planned construction projects for natural resources impacts. The review will focus on meeting the goals and objectives of this INRMP.

Goal 2: Increase awareness of natural resource issues, programs, and responsibilities for sustaining natural resources among the public and NAVBASE Kitsap employees, residents, and tenants.

Objective 2.1 Provide opportunity for Tribal consultation on the INRMP.

Objective 2.2 Conduct annual INRMP metrics meetings with USFWS, WDFW, and NMFS.

Objective 2.3 Provide information on base wide natural resource initiatives to NAVBASE Kitsap employees, residents, and tenants (e.g., Earth Day activities).

Goal 3: Integrate the NAVBASE Kitsap natural resources program with local, state, and regional environmental programs and initiatives to sustain biodiversity and the ecosystem to the maximum extent practicable while meeting the needs of the military mission.

Objective 3.1 Partner with local city, county, and tribal governments and with non-governmental organizations for natural resource enhancement projects.

Objective 3.2 Partner with state and federal agencies for natural resource projects.

Goal 4: Provide sustainable natural resources-related outdoor recreation opportunities.

Objective 4.1 Provide quality outdoor recreation experiences through the trails, picnic areas, and fishing areas while sustaining ecosystem integrity.

Goal 5: Improve natural resources management and compliance through enhanced management tools.

Objective 5.1 Maintain or acquire adequate funding and resources to ensure natural resources staff have access to Global Positioning System (GPS) units, GIS support, and training.

Objective 5.2 Maintain existing data layers with the most up-to-date natural resources data and develop layers for natural resources data not currently in the base GIS database.

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9 IMPLEMENTATION

9.1 Project Prescription Development

The most recent policy on INRMP implementation is contained in DOD Manual 4715.03: *Integrated Natural Resources Management Plan (INRMP) Implementation Manual* (Nov 2013). According to this guidance, an INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for natural resources management projects, activities and other requirments in support of goals, and objectives identified in the INRMP;
- Ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP;
- Invite annual feedback from the appropriate cooperating offices on the effectiveness of the INRMP;
- Documents specific INRMP accomplishments undertaken each year; and
- Evaluate the effectiveness of past and current management activities and adapting those activities as needed to implement future actions.

Key elements of INRMP implementation (e.g., projects) are addressed in Appendix D, NAVBASE Kitsap INRMP Projects, Schedules and Implementation Table. All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under Federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 USC 1341 et seq.).

9.2 Priority Setting and Funding Classification

Project priority within this INRMP is initially determined by funding classification, as defined in Department of Defense Instruction 4715.03, *Natural Resources Conservation Program* as follows (DOD 2011):

> ***1. Recurring Natural Resources Conservation Management Requirements.*** *Includes activities needed to cover the recurring administration, personnel, and other costs associated with managing DOD's natural resource conservation program that are necessary to meet applicable compliance requirements* (*federal and state laws, regulations, Presidential [Executive Orders] EOs, and DOD policies*) *or which are in direct support of the military mission.*

Priority will be given to recurring natural resources conservation management requirements associated with the operation of facilities, installations, and deployed weapons systems. These activities include day-to-day costs of sustaining an effective natural resources management program, as well as annual requirements, including manpower, training, supplies, permits, fees, testing and monitoring, sampling and analysis, reporting and recordkeeping, maintenance of natural resources conservation equipment, and compliance self-assessments.

2. Non-Recurring Natural Resources Management Requirements*. Non-recurring requirements will be prioritized using the below classifications:*

a*. Current Compliance. Includes installation projects and activities to support:*

(1) *Installations currently out of compliance (e.g., received an enforcement action from an authorized Federal or State Agency or local authority).*

(2) *Signed compliance agreement or consent order.*

(3) *Meeting requirements with applicable Federal or State laws, regulations, standards, E.O.s, or DOD policies.*

(4) *Immediate and essential maintenance of operational integrity or military mission sustainment.*

(5) *Projects or activities that will be out of compliance if not implemented in the current program year. Those activities include:*

(a) *Environmental analyses for natural resources conservation projects, and monitoring and studies required to assess and mitigate potential impacts of the military mission on conservation resources.*

(b) *Planning documentation, master plans, compatible development planning and INRMPs.*

(c) *Natural resources planning level surveys.*

(d) *Reasonable and prudent measures included in incidental take statements of biological opinions, biological assessments, surveys, monitoring, reporting of assessment results, or habitat protection for listed, at-risk, and candidate species so that proposed continuing actions can be modified in consultation with the USFWS or NMFS.*

(e) *Mitigation to meet existing regulatory permit conditions or written agreements such as those required in chapter Title 33 USC, Chapter 26.*

(f) *Nonpoint source pollution or watershed management studies or actions needed to meet compliance dates cited in approved State coastal nonpoint source pollution control plans, as required to meet consistency determinations consistent with Coastal Zone Management.*

(g) *Wetland delineation critical for the prevention of adverse impacts to wetlands so that continuing actions can be modified to ensure mission continuity, as required by chapter Title 33 USC, Chapter 26.*

(h) *Compliance with missed deadlines established in DOD executed agreements.*

b. Maintenance Requirements. *Includes those projects and activities needed to meet an established deadline beyond the current program year and maintain compliance. Examples include:*

(1) *Compliance with future deadlines.*

(2) *Conservation, GIS mapping, and data management to comply with Federal or State laws, regulations, standards, E.O.s, or DOD policies.*

(3) *Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives.*

(4) *Wetlands enhancement to minimize wetlands loss and enhance degraded wetlands as required by chapter Title 33 USC, Chapter 26.*

(5) *Conservation recommendations in biological opinions issued pursuant to ESA.*

c. Enhancement Actions Beyond Compliance. *Includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required by law, regulation, or E.O., and are not of an immediate nature. Examples include:*

(1) *Community outreach activities, such as International Migratory Bird Day, Earth Day, National Public Lands Day, Pollinator Week, and Arbor Day activities.*

> ***(2)*** *Educational and public awareness projects, such as interpretative displays, oral histories, Watchable Wildlife areas, nature trails, wildlife checklists, and conservation teaching materials.*
>
> ***(3)*** *Restoration or enhancement of natural resources when no specific compliance dictates a course or timing of action.*
>
> ***(4)*** *Management and execution of volunteer and partnership programs.*

To further facilitate project funding, the Navy has developed four Environmental Readiness Levels (ERL) (DON 2014a). Descriptions of each of the four Navy ERLs are described below (USN 2006a).

a. Environmental Readiness Level 4 (absolute minimum level of environmental readiness capability required to maintain compliance with applicable legal requirements):

1. Supports all actions specifically required by law, regulation or Executive Order (DOD Class I and II requirements) just in time.
2. Supports all DOD Class 0 requirements as they relate to a specific statute such as hazardous waste disposal, permits, fees, monitoring, sampling and analysis, reporting and recordkeeping.
3. Supports recurring administrative, personnel, and other costs associated with managing environmental programs that are necessary to meet applicable compliance requirements (DOD Class 0).
4. Supports minimum feasible Navy executive agent responsibilities, participation in [Office of the Secretary of Defense] OSD sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts.

b. Environmental Readiness Level 3:

1. Supports all capabilities provided by ERL4.
2. Supports existing level of Navy executive agent responsibilities, participation in OSD sponsored inter-department and inter-agency efforts, and OSD mandated regional coordination efforts.
3. Supports proactive involvement in the legislative and regulatory process to identity and mitigate requirements that will impose excessive costs or restrictions on operations and training.
4. Supports proactive initiatives critical to the protection of Navy operational readiness.

c. Environmental Readiness Level 2:

1. Supports all capabilities provided under ERL3.

2. Supports enhanced proactive initiatives critical to the protection of Navy operational readiness.
3. Supports all Navy and DOD policy requirements.
4. Supports investments in pollution reduction, compliance enhancement, energy conservation, and cost reduction.

d. Environmental Readiness Level 1:

1. Supports all capabilities provided under ERL2.
2. Supports proactive actions required to ensure compliance with pending/strong anticipated laws and regulations in a timely manner and/or to prevent adverse impact to Navy mission.
3. Supports investments that demonstrate Navy environmental leadership and proactive environmental stewardship.

9.3 Project Development and Tracking

Once identified, natural resources projects and funding allocations are tracked via the Navy Environmental Program Requirements Web Database (EPRWeb) (USN 2006b). The Navy uses the database to determine programming and budgeting requirements for projects under the Planning, Programming, Budget, and Execution System (PPBES) process (DON 2014a). The Navy also uses the database information to develop its annual Environmental Quality Report (EQR) for Congress (DON 2014a).

Natural resources management projects identified in Appendix D of this INRMP will be entered into the EPRWeb database. This ensures that projects are reviewed by the chain of command and are documented for inclusion in the annual EQR report to Congress (USN 2006b). Once funding has been allocated, natural resources staff at NAVFAC Northwest will update the EPRWeb with the date project funding was received and the progress made towards project completion (USN 2006b).

The Navy has developed the Navy Conservation Website to assist installations with INRMP development and implementation. Annual NRDCS updates show installations where they stand with regard to INRMP implementation. The NRDCS also requires each installation to answer specific questions related to implementation to ensure that INRMP implementation meets all regulatory requirements. Navy guidance suggests that project progress be updated at least twice per year in EPRWeb.

9.4 Funding Sources and Mechanisms

The PPBES budget process employed by the DOD is an ongoing, continuously reviewed process. The process can be summarized as follows (DOD 2005):

- The PPBES process consists of long-range planning to anticipate and secure requirements to meet security threats and accomplish program goals.
- Resources to meet these requirements are estimated and programmed by program managers in the Future Year Defense Plan (FYDP). The FYDP is a list of resource requirements for the next 6 years. Specifically, the FYDP comprises the subsequent fiscal year budget and funding requirements projected out 5 years.
- The FYDP resources are then analyzed via the Programming Process. In the Programming Process, program managers reassess their requirements, reprioritize planned activity, reevaluate existing funding guidance, and estimate their funding needs for the next budget year and the subsequent five fiscal years (referred to as Program Objectives Memoranda (POM) 1–5).
- The POM process takes place within Defense Components beginning in the fall of each year. Then each DOD component submits the POM in the spring to the OSD. The OSD reviews the budget submissions and develops the President's budget that will be submitted to Congress. At the installation level, data submissions to support this are made to the Major Commands twice annually, in fall and spring.
- Based on POM decisions of each component, budget controls are issued to the field commands for budget preparation.

The time scale of an INRMP fits well into the DOD PPBES forecasting process. One full cycle of the DOD budget process includes the next budgeted fiscal year and projections for the following five fiscal years. One full cycle of the INRMP, with upper command approval, covers a 5-year period. This means that by relying on an INRMP that is updated regularly, you should be able to project relatively accurate funding requirements for natural resources management for 5-year periods, at a minimum (DOD 2005).

The Regional Commander (N45) is responsible for requesting NAVBASE Kitsap sufficient staff and other resources to implement the INRMP. NAVBASE Kitsap is responsible for annual coordination with USFWS and WDFW, requesting funds for INRMP implementation, and documenting implementation actions. However, due to funding limitations, the projects and schedules proposed in this revised INRMP are targets to facilitate natural resources program objectives. When requested funds are not received, natural resource management projects and the programming schedule may be reexamined. In addition, plans may be adapted to account for the

revised project schedule, and the proposed budget may be adjusted to account for available funding.

9.4.1 Funding Sources

Once a project has been placed into the EPRWeb database, a funding source needs to be determined. In general, ERL level 3 and 4 projects will receive funding, but it is up to natural resource managers to find funds for ERL level 1 and 2 projects (USN 2006b). The following are the primary funding sources for Navy natural resources programs (USN 2006b):

a. **O&MN Environmental Funds**. The majority of natural resource projects are funded with Operations and Maintenance, Navy (O&MN) environmental funds. These appropriated funds are the primary source of resources to support must-fund, just-in-time environmental compliance (i.e., Navy ERL 4 projects). O&MN funds are generally not available for Navy Environmental Readiness Level 3 - 1 projects. In addition to the restriction to Environmental Readiness Level 4 requirements, there are other limitations placed on the use of O&MN funds:

   1. Only the initial procurement, construction, and modification of a facility or project are considered valid environmental funding requirements. The subsequent operation, modification due to mission requirements, maintenance, repair, and eventual replacement is considered a Real Property Maintenance funding requirement. For example, the cost of initially installing a BMP can be funded through O&MN, but future maintenance or repair of that BMP must be paid by Real Property Maintenance funds.

   2. When natural resource requirements are tied to a specific construction project or other action, funds for the natural resource requirements should be included in the overall project costs. For example, if a permit for filling wetlands is required as part of a military construction (MILCON) project, the costs of obtaining the permit and implementing required mitigation should be paid by MILCON funds as part of the overall construction project costs.

b. **Legacy Funds.** The Legacy Resource Management Program (Legacy Program) is a special congressionally mandated initiative to fund military conservation projects. Although the Legacy Program was originally funded 1991 - 1996 only, funds for new projects have continued to be available through this program. The Legacy Program can provide funding for a variety of conservation projects, such as regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, monitoring and predicting migratory patterns of birds and animals, and national partnerships and initiatives, such as National Public Lands Day. If the installation plans to request Legacy Program funds, it should be aware of the following:

1. The availability of Legacy funds is generally uncertain early in the year.

2. Pre-proposals for Legacy projects are due in March and submitted using the Legacy Tracker Web site: http://www.dodlegacy.org/.

3. Project proposals are reviewed by the Navy chain-of-command before being submitted to the DOD Legacy Resources Management Office for final project selection.

4. The Legacy Website provides further guidance on the proposal process and types of projects requested.

c. **Forestry Revenues.** Revenues from the sale of forest products on Navy lands are a source of funding for forestry and potentially other natural resources management programs. Forestry revenues provide funds for two different funding programs:

1. Annual Navy Forestry Funds. These funds support commercial forestry operations at installations. Borrowed from NAVFAC Headquarters (NAVFAC HQ) O&MN funds at the beginning of each fiscal year, the funds are reimbursed when the forestry revenues are received. The NAVFAC field offices solicit funding needs each year from installations with commercial forestry programs in place. Forestry operations must be commercially viable to be eligible for these funds. The NAVFAC field offices can work with installations to make a work plan, known as an annual increment, for the commercial forestry program and ensure that all funding needs are included. Funding recommendations are forwarded from the field offices to NAVFAC HQ for final approval and disbursement of funds, based on revenue from timber sales.

2. DOD Forestry Reserve Account. Forestry revenues are first used to reimburse commercial forestry expenses. Then, as directed by DOD Financial Management Regulation 7000.14-R Volume 11A, 40% of installation net proceeds for the fiscal year are distributed to the state that contains the installation. The funding is used to support road systems and schools. Once the commercial forestry expenses are reimbursed and a portion of the proceeds are distributed among the state counties, any remaining amount is transferred to a holding account known as the DOD Forestry Reserve Account. Reserve account funds can be used for the following:

- Improvement of forest lands.

- Unanticipated contingencies in the administration of forest lands and the production of forest products for which other funding sources are not available within an acceptable timeframe (e.g., actions necessary as a result of a storm or wildfire).

- Natural resources management that implements approved plans and agreements. To be eligible for funding, these project must (1) be specifically included in an approved management plan, such as an INRMP, and (2) provide for at least one of the following purposes: fish and wildlife habitat improvements or modifications; range rehabilitation where necessary for support of wildlife; control of off-road vehicle traffic; specific habitat improvement projects and related activities; and adequate protection for species of fish, wildlife, and plants considered threatened or endangered.

- Projects included in a) and b) are generally given preference in the allocation of these funds. The amount available through this account varies from year to year, but the amount remaining for natural resources management as described in c) is relatively small. The NAVFAC field offices usually solicit project proposals for the Forestry Reserve Account once there is an indication of the level of funding available (usually January or February). Installations need not harvest timber to be eligible for Reserve Account funds. Proposals are submitted to NAVFAC HQ via the field office where they are reviewed and forwarded to the DUSD (I&E) for final selection. The installation should contact a NAVFAC field office or consult reference (f) for more information on funding availability and timelines. It is important to note that these funds may not be used for "must fund" projects.

d. **Agricultural Outleasing.** Money collected through the leasing of Navy-owned property for agricultural use is directed back into the natural resources program and reallocated throughout the Navy by NAVFAC HQ. These funds are available to natural resource managers primarily for agricultural outlease improvements and potentially for natural resources management and stewardship projects once the primary objective is met. Agricultural and grazing leases revenues from agricultural outleasing are available for the following:

1. Administrative expenses of agricultural lease (salaries of professional and technical support of the grazing and cropland programs in direct support of agricultural outlease that meet INRMP goals and objectives, training, scientific meetings, parts and supplies).

2. Initiation, improvement, and perpetuation of agricultural outleases (increased productivity, reduced soil erosion, and fencing).

3. Implementation of INRMP Stewardship Projects (compliance measures should be budgeted from O&MN Conservation POM process).

4. The NAVFAC field office sends a request for project proposals for agricultural outleasing funds to the regions and installations in November of each year. Proposals are submitted to the field office and reviewed. Recommended projects are forwarded

to NAVFAC HQ for final review and project selection. While the available funding varies from year to year, this is one of the more consistent funding sources for implementing INRMP projects that are not Level 1 requirements. The installation should contact the field office for additional information on funding availability and timeline.

e. **Fish and Wildlife Fees.** User fees collected for the privilege of hunting, fishing, or trapping will be collected, deposited, and used in accordance with the Sikes Act and the DOD financial management regulations. The Sikes Act specifies that user fees collected for hunting, fishing or trapping shall be used only on the installation where collected. Further, collections will be used exclusively for fish and wildlife conservation and management on the installation where collected.

   The same fee schedule will be used for all participants with the exception of senior citizens, children, and the handicapped. Membership in an installation conservation organization will not give members priority in participating in hunting, fishing, and trapping programs. Efforts should be made to utilize the services of the installations MWR function to collect and administer these funds locally in accordance with Sikes Act authorization.

f. **Recycling Funds.** An installation with a Qualified Recycling Program (QRP) may use proceeds for some types of natural resource projects. Proceeds must first be used to cover QRP costs. Up to 50% of net proceeds may then be used for pollution abatement, pollution prevention, composting, alternative fueled vehicle infrastructure support, vehicle conversion, energy conversion, or occupational safety and health projects, with first consideration given to projects included in the installation's pollution-prevention plans. Remaining funds may be transferred to the non-appropriated MWR account for approved programs or retained to cover anticipated future program costs. Natural resource projects can be funded as pollution prevention/abatement (e.g., wetlands or riparian forest restoration) or MWR projects (e.g., trail construction and maintenance).

g. **Strategic Environmental Research and Development Program (SERDP) Funds:** SERDP is DOD's corporate environmental research and development program, planned and executed in full partnership with the Department of Energy (DOE) and USEPA, with participation by numerous other federal and non-federal organizations. SERDP funds for environmental and conservation is allocated through a competitive process. Within its broad areas of interest the SERDP focuses on Cleanup, Compliance, Conservation, and Pollution Preventions technologies. The purpose of the conservation technology program is to use research and development to provide improved inventory and monitoring capabilities; develop more effective impact and risk assessment techniques; and provide improved mitigation and rehabilitation capabilities. Recently, the program solicited Statements of Need for conservation technology proposals to research indicators of stress

on threatened and endangered species and to develop techniques to inventory and monitor threatened and endangered species in accessible areas.

h. **Non-DOD Funds.** Many grant programs are available for natural resources management projects, such as watershed management and restoration, habitat restoration, and wetland and riparian area restoration. When federally funded, these programs typically require non-federal matching funds. However, installations may partner with other groups to propose eligible projects. Below is one example of a grant program:

   The Five-Star Restoration Challenge Grants Program is sponsored by the National Association of Counties, National Association of Service and Conservation Corps, National Fish and Wildlife Foundation, and Wildlife Habitat Council in cooperation with USEPA, NMFS, and other sponsors. This program provides modest financial assistance ($5,000 - $20,000) on a competitive basis to support community-based wetland and riparian restoration projects that build diverse partnerships and foster local natural resource stewardship. Installations would need to partner with other groups to be eligible for this type of program. Applications are due in March. Information is available on the Web at http://www.epa.gov/owow/wetlands/restore/5star/. INRMPs should include valid Class 2 and 3 projects and actions that would enhance an installation's natural resources. Nontraditional sources of funding for natural resources programs include non-appropriated reimbursable funds (i.e., agricultural outleasing, forestry, hunting and fishing fees) and appropriated reimbursable funds (e.g., DOD Legacy Program, USDA Pest Management Program). These accounts are sources of funds for Class 3 projects. Installations, however, should not depend on reimbursable programs to fund their natural resources management programs.

As discussed in Section 8.3 an additional funding source for natural resource projects is mitigation money set aside as needed from Navy construction projects. At NAVBASE Kitsap, construction projects that typically require mitigation include pier construction and repair, shoreline construction, and upland construction impacting forest resources, streams, or wetlands. As a general practice, NAVBASE Kitsap planners and NR staff will attempt to minimize construction impacts and the need for mitigation early in the design stage of projects; however, it will not be possible to avoid in all cases. This discussion is included here to explain that unfunded projects listed in Appendix D may be executed as mitigation for a construction projects if they adequately compensate for the construction impacts and is found acceptable to the permitting agencies. Execution of Appendix D projects as mitigation will be reflected in the next annual update of the INRMP.

9.4.2 Beneficial Partnerships and Collaborative Resources Planning

The following list contains partnerships and collaborative agreements that DOD has entered to assist with natural resources management.

- NAVBASE Kitsap, as part of DOD, benefits from the January 2006 Memorandum of Understanding (MOU) between DOD, USFWS, and the International Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resources Management Program on Military Installations.
- NAVBASE Kitsap, as part of DOD, benefits from the July 2006 MOU between the USFWS and DOD to Promote the Conservation of Migratory Birds.
- NAVBASE Kitsap, as part of DOD, benefits from the November 2006 MOU between DOD and USDA-NRCS for coordinating activities to preserve land and improve water quality on lands surrounding government-owned military bases.
- NAVBASE Kitsap, as part of DOD, benefits from the 1996 MOU between the USEPA and DOD for coordinating of Integrated Pest Management activities.
- NAVBASE Kitsap, as part of DOD, benefits from the 1996 cooperative agreement between DOD and The Nature Conservancy for conducting natural resources inventories at installations.

9.5 Effectiveness of INRMP Providing No-Net-Loss to Military Mission

Implementation of this INRMP by NAVBASE Kitsap will ensure that the natural resources on NAVBASE Kitsap will continue to support the NAVBASE Kitsap mission. This INRMP strives to integrate natural resources management with other base plans and activities. It also establishes goals that represent a long-term vision for the health and quality of NAVBASE Kitsap's natural resources. The INRMP goals may be revised over time to reflect changing missions and environmental conditions. Any future changes in mission, training activity, or technology should be analyzed to assess its impact on natural resources. As new plans and DON guidance and regulations are developed, they will be integrated with the goals and management actions of this INRMP. The INRMP will be reviewed, assessed, and modified as needed on a regular basis to ensure continued integration with other management plans or changes in military mission.

9.6 Annual Update and Review

Navy guidance directs installations to coordinate their annual Metrics program evaluation with the appropriate field-level offices of the USFWS and the state fish and wildlife agency (for NAVBASE Kitsap, WDFW) to enable partners to measure both the successes and issues resulting from INRMP implementation (USN 2006b). NAVBASE Kitsap has invited NOAA Fisheries to review this INRMP since species and habitats regulated by NMFS are found within NAVBASE Kitsap boundaries. Additionally, tribes with "usual and accustomed" harvest areas adjacent to individual NAVBASE Kitsap properties have been invited to review this plan. Results of the evaluation and feedback will be used by NAVBASE Kitsap natural resources

managers to determine the effectiveness of the installation natural resources management program and to provide data for the Navy portion of the DOD annual report to Congress (USN 2006b).

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APPENDIX A: ACRONYMS AND ABBREVIATIONS

AE	Ammunition Ship
AOE	Fast Combat Support Ship
APHIS	Animal and Plant Health Inspection Service
ATFP	Anti-Terrorism/Force Protection
BASH	Bird Aircraft Strike Hazard
BCC	Birds of Conservation Concern
BMP	Best Management Practice
BOSC	Base Operational Support Contractors
BUMED	Navy Bureau of Medicine and Surgery
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGN	Guided Missile Cruiser, Nuclear Powered
CH	Critical Habitat
CIA	Controlled Industrial Area
cm/sec	cm per second
CNIC	Commander, Naval Installation Command
CNO	Chief of Naval Operations
CNRNW	Commander, Navy Region Northwest
CSL	Cleanup Screening Level
CVN	Aircraft Carrier, Nuclear Powered
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DBH	Diameter Breast Height
DO	Dissolved Oxygen
DOD	Department of Defense
DODINST	Department of Defense Instructions
DOE	Department of Energy
DON	Department of the Navy
DON-SBB	Department of the Navy Submarine Base at Bangor
DPS	Distinct Population Segment
DUSD (ES)	Deputy Under Secretary of Defense (Environmental Security)
DUSD (I&E)	Deputy Under Secretary of Defense (Installations and Environment)
EA	Environmental Assessment
EFH	Essential Fish Habitat
EHW	Explosive Handling Wharf
EIS	Environmental Impact Statement

EISA	Energy Independence and Security Act
ENVVEST	Environment Investment
EO	Executive Order
EPA	Environmental Protection Agency
EPRWeb	Navy Environmental Program Requirements Web Database
EQR	Environmental Quality Report
ERL	Environmental Readiness Level
ESA	Endangered Species Act
ESU	Evolutionarily Significant Units
EU	Ecological Unit
°F	Fahrenheit
FISC	Fleet and Industrial Support Center
FR	Federal Register
ft	Feet
FY	Fiscal Year
FYDP	Future Year Defense Plan
GAO	Government Accountability Office
GIS	Geographic Information System
GPS	Global Positioning System
GRX	Geographic Readiness Exchange
HQ	Headquarters
ICO	Installation Commanding Officer
IEPD	Installation Environmental Program Director
IHA	Incidental Harassment Authorization
iNFADS	Internet Naval Facilities Assets Data Store
INRMP	Integration Natural Resources Management Plan
IPM	Integrated Pest Management
IPMC	Integrated Pest Management Coordinators
JAG	Judge Advocate General
km	kilometer
LID	low impact development
LOA	Letter of Authorization
m	meter
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
MHHW	Mean higher high water
mi	mile
MILCON	Military construction
MLLW	mean lower low water
MMP	Marine Mammal Program

MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
mph	miles per hour
MWR	Morale, Welfare, and Recreation
NAD	Naval Ammunition Depot
NAVBASE	Naval Base
NAVFAC	Naval Facilities Engineering Command
NAVFAC HQ	Naval Facilities Engineering Command Headquarters
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRM	Natural Resources Manager
NTU	Nephelometric turbidity units
NUWCDIV	Naval Undersea Warfare Center Division
NUWES	Naval Undersea Warfare Engineering Station
O&MN	Operations and Maintenance, Navy
OGC	Office of the General Counsel
OPNAV	Chief of Naval Operations
OPNAVINST	Chief of Naval Operational Instructions
OSD	Office of the Secretary of Defense
PAH	Polycyclic Aromatic Hydrocarbons
PAO	Public Affairs Office
PARC	Partners in Amphibian and Reptile Conservation
PCB	Polychlorinated Biphenyls
PIF	Partners in Flight
PL	Public Law
PMP	Pest Management Plan
PNW	Pacific Northwest
POM	Program Objectives Memoranda
PPBES	Planning, Programming, Budget, and Execution System
PPV	Public-Private Venture
PSAMP	Puget Sound Ambient Monitoring Program
PSB	Port Security Barrier
PSNS & IMF	Puget Sound Naval Shipyard and Intermediate Maintenance Facility
PWO	Public Works Officer
QRP	Qualified Recycling Program
RCW	Revised Code of Washington
RSIMS	Regional Shore Installation Management System

SAIA	Sikes Act Improvement Act
SBB	Submarine Base at Bangor
SCA	Sanitary Control Area
SEAFAC	Southeast Alaska Acoustic Measurement Facility
SEA Program	Shorelands & Environmental Assistance Program
SECNAV	Secretary of the Navy
SECNAVINST	Secretary of the Navy Instruction
SERDP	Strategic Environmental Research and Development Program
SISS	Swimmer Interdiction Security System
SPCC	Spill Prevention, Control, and Countermeasures
SQS	Sediment Quality Standards
SRKW	Southern Resident Killer Whales
SVOC	Semi Volatile Organic Compound
SWFPAC	Strategic Weapons Facility, Pacific
T&E	Threatened and Endangered
TES	Threatened and Endangered Species
TMDL	Total Maximum Daily Load
TOT	Time of Travel
U.S.	United States
USC	United States Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDA-NRCS	U.S. Department of Agriculture – Natural Resources Conservation Service
USDA-SCS	U.S. Department of Agriculture – Soil Conservation Service
USDA APHIS-WS	U.S. Department of Agriculture – Animal and Plant Health Inspection Service - Wildlife Services
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USN	U.S. Navy
USNS	U.S. Naval Ship
USS	U.S. Ship
VOC	Volatile Organic Compound
WAC	Washington Administrative Code
WBD	Watershed Boundary Dataset
WCWCS	Washington Comprehensive Wildlife Conservation Strategy
WDFW	Washington State Department of Fish and Wildlife
WDOE	Washington State Department of Ecology
WHPA	Well Head Protection Areas
WHPP	Well Head Protection Plan

WRIA	Water Resource Inventory Area
WS	Wildlife Services

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APPENDIX B: TERMS AND DEFINITIONS

Action. A program, activity, project, official policy (such as a rule or regulation), or formal plan directly carried out by a Federal agency (EO 13186.)

Agricultural outleasing. Agricultural outleasing is the use of non-excess DoD lands under a lease to an agency, organization, or person generally for growing crops or grazing domestic animals. The term "agriculture" includes activities related to producing, harvesting, processing, or marketing an agricultural, aquaculture, maricultural, or horticultural commodity, including the breeding, raising, shearing, feeding, caring for, training, and management of livestock, bees, poultry, fish, shellfish, and fur-bearing animals and wildlife, and the planting, cultivating for harvest, or processing short rotation (less than 15 years) forest products (OPNAV M-5090.1, Chapter 12).

Alien species (see also Exotic species). With respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (EO 13112). According to USDA, an alien species is "a species introduced and occurring in locations beyond its known historical range. Synonyms for alien species include exotic, non-native, non-indigenous, and introduced species. Of the thousands of plants that have been introduced to the United States intentionally for cultivation or by accident, approximately 4,000 of these alien plant species now occur outside of cultivation 400 of these are considered problematic with respect to adverse effects on agricultural or our native biota." (*Example:* Saltmarsh Cordgrass, native to eastern North American estuaries, has been introduced to western North American shoreline habitats and is considered an alien in these western habitats, where it adversely impacts native habitats and displaces native plant species.)

Annual increment. An INRMP addendum addressed annually, to facilitate implementation of the INRMP. Each installation must establish and maintain regular communications with the appropriate U.S. Fish and Wildlife Service (USFWS) and state fish and wildlife agency offices to address issues concerning natural resources management that are not addressed in the INRMP. At a minimum, this includes annual coordination with all cooperating offices. In addition, each installation will invite annual feedback from the appropriate USFWS and state fish and wildlife agency offices on the effectiveness of the INRMP (Per Deputy Under Secretary of Defense (I&E) Memorandum, 10 October 2002, Implementation of Sikes Act Improvement Act: Updated Guidance).

Best management practices (BMPs). BMPs are resources management decisions based on the latest professional and technical standards for the protection, enhancement, and rehabilitation of natural resources. BMPs include schedules of activities, prohibitions of practices, maintenance procedures, treatment requirements, operating procedures, control practices, and other management practices to prevent or reduce pollution (OPNAV M-5090.1, Chapter 12).

Biodiversity. Biodiversity is the variety of life forms and the ecological processes that sustain it, including living organisms; the genetic differences among them; the communities and ecosystems in which they

occur; and the ecological and evolutionary processes which keep them functioning, yet ever changing and adapting, for a given geographic area (OPNAV M-5090.1, Chapter 12).

Biological Assessment (BA). The information prepared by or under the direction of a Federal agency concerning proposed or listed species, as well as proposed or designated critical habitat that may present in the action area and the evaluation potential effects of the action on such species and habitat during consultation under the ESA (16 U. S. C. 1531 *et seq.*). The purpose of the BA is to determine whether or not the proposed action is likely to (1) adversely affect listed species or designated critical habitat; (2) jeopardize the continued existence of species proposed for listing; or (3) adversely modify proposed critical habitat (Per 50 CFR Part 02).

Bird/Animal Aircraft Strike Hazard (BASH) Prevention Program. An integrated program, based on a BASH Plan, to support the Navy's flying mission. This program promotes land management practices to minimize bird and other animal attractants, and safety procedures to recognize, control, and avoid hazardous bird concentrations. Due to the potential impact on natural resources by a command's BASH Program, natural resources managers shall provide biological expertise to assist naval air installations, air operations, and aviation safety officers in preparing and implementing BASH plans where necessary. BASH plans should be reviewed to ensure consistency and compliance with installation INRMPs and applicable natural resources laws and regulations (OPNAV M-5090.1, Chapter 12).

Candidate species. Plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA (16 U. S. C. 1531 *et seq.*), but for which development of a listing regulation is precluded by other higher-priority listing activities. The most current list of candidate species can be found at http://endangered.fws.gov/candidates/index.html (Section 4 of the ESA (16 U. S. C. 1531 *et seq*)).

Coastal zone. The coastal zone is the coastal waters (including lands lying in coastal waters and submerged there under and adjacent shore lands) within the meaning of section 304(1) of reference (a) and as more fully defined and described in each coastal state's federally approved CMP. Excluded from the coastal zone is any Navy facility or real estate owned, held in trust, or used by Navy in performance of its mission (OPNAV M-5090.1, Chapter 14).

Conservation. Conservation is the planned management, use, and protection of natural resources that best reflect sustainable use and continued benefit for present and future generations, and the prevention of exploitation, destruction, waste, and neglect (OPNAV M-5090.1, Chapter 12).

Consistent to the Maximum Extent Practicable. The Navy is required by the CZMA to ensure its activities affecting any coastal use or resource to the "maximum extent practicable," which is defined in Section 930.32(a)(1) of 15 CFR Part 930.58(a) (2006), as amended, (71 Fed. Reg. 787-831, 828 (January 5, 2006)), "Coastal Zone Management Act Federal Consistency Regulations" as "fully consistent" with the enforceable policies of the CMP unless Navy compliance is prohibited by law.

The Navy action proponent will not use a general claim of lack of funding or insufficient funds or failure to include the cost of being fully consistent in the federal budget and planning process as a basis for not being consistent to the maximum extent practicable with an enforceable policy of a federally approved state CMP. The presidential exemption described in CZMA is the only circumstance in which the Navy action

proponent may rely on a lack of funding as a limitation on full consistency with an enforceable policy (OPNAV M-5090.1, Chapter 14).

Consultation under Section 7 of the Endangered Species Act (16 U. S. C. 1531 *et seq.*).

a) *Formal*. Formal consultation is a process between the USFWS or NMFS and the Federal agency that commences with the Federal agency's written request for consultation under Section 7(a) (2) of the ESA and concludes with the USFWS or NMFS issuance of a Biological Opinion under Section 7(b) (3) of the ESA (50 CFR Part 402).
b) *Informal*. Informal consultation is an optional process that includes all discussions, correspondence, etc., between the USFWS or NMFS and the Federal agency or the designated non-Federal representative prior to formal consultation, if required (Per 50 CFR Part 402).

Control. Eradicating, suppressing, reducing, or managing invasive species populations, preventing the spread of invasive species from areas where they are present, and taking steps, such as restoration of native species and habitats, to reduce the effects of invasive species and to prevent further invasions (EO 13112, as appropriate).

Cooperative agreement. A cooperative agreement is an assistance vehicle used to acquire goods or services or stimulate an activity undertaken for the public good. Cooperative agreements assume substantial involvement between the Federal agency and recipient during performance of the activity. They may be used to accomplish work identified in the INRMP, and may be entered into with states, local governments, non-governmental organizations, and individuals to provide for the maintenance and improvement of natural resources, or to benefit natural resources research on DoD installations (OPNAV M-5090.1, Chapter 12).

Critical habitat (CH). These are the "(i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species. (B) Critical habitat may be established for those species now listed as threatened or endangered species for which no critical habitat has heretofore been established as set forth in subparagraph (A) of this paragraph. (C) Except in those circumstances determined by the Secretary, critical habitat must not include the entire geographical area that can be occupied by the threatened or endangered species." (Per ESA (16 U. S. C. 1531 *et seq.*)

DoD Partners in Flight (PIF). DoD lands represent a critical network of habitats for neotropical migratory birds, offering these birds migratory stopover areas for resting and feeding, and suitable sites for nesting and rearing their young. DoD has, therefore, developed a policy to promote and support a partnership role in the protection and conservation of resident and migratory birds by protecting vital habitats, enhancing biodiversity, and maintaining healthy and productive natural systems on our lands consistent with the military mission. See the DoD PIF Strategic Plan at http://www.dodpif.org/strategic_plan/index.htm .

Ecological risk assessment. Ecological Risk Assessment is an evaluation of whether adverse ecological effects could occur or have occurred from exposure to one or more stressors (OPNAV M-5090.1, Chapter 42).

Ecosystem. An ecosystem is a dynamic and natural complex of living organisms interacting with each other and their associated physical environment (OPNAV M-5090.1, Chapter 12).

Endangered species. Any species in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the Secretary of the Interior to constitute a pest whose protection under ESA provisions would present an overwhelming and overriding risk to man (ESA (16 U. S. C. 1531 *et seq.*)).

Endangered or Threatened species. A species of fauna or flora that has been listed by USFWS or NMFS for special protection and management under the ESA (16 U. S. C. 1531 *et seq.*).

Environmentally and economically beneficial landscaping. Landscaping, construction, and design practices that support EO 13148, Greening the Government through Leadership in Environmental Management.

Essential fish habitat (EFH). The water and substrates necessary to fish for spawning, feeding, or growth to maturity. (Per the Magnuson-Stevens Fishery Conservation and Management Act (16 USC § 1801-1883)

Exotic species (see also Alien species). All species of plants and animals not naturally occurring, either now or historically, in any ecosystem of the United States. (EO 11987) Those species occurring outside their native ranges in a given place as a result of actions by humans. (USDA) "Exotic," "alien," "introduced," "non-indigenous," and "non-native" are all synonyms for species that humans intentionally or unintentionally introduced into an area outside of a species' natural range.

Facility. Any building, installation, structure, land, and other property owned or operated by, or constructed or manufactured and leased to, the Federal Government, where the Federal Government is formally accountable for compliance under environmental regulation (e.g., permits, reports/records and/or planning requirements) with requirements pertaining to discharge, emission, release, spill, or management of any waste, contaminant, hazardous chemical, or pollutant. This includes a group of facilities at a single location managed as an integrated operation, as well as Government-owned contractor-operated facilities (EO 13148).

Federal agency. An executive department or agency that does not include independent establishments, as defined by 5 USC § 104.

Feral: Animals that have escaped from domestication and become wild". Introduced or non-native animals are those that have becomes established outside their natural range.

Fish and wildlife. Any member of the animal kingdom, including without limitation any mammal, fish, bird (including migratory, non-migratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod, or other invertebrate, and any part, product, egg, or offspring, thereof, or the dead body or parts thereof (ESA (16 U. S. C. 1531 *et seq.*).

Floodplain. The lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a 1 - percent or greater chance of flooding in any given year. (EO 11988) (NOTE: This is the 100-year floodplain reference, not the 500-year floodplain.) Adverse impacts on floodplains are avoided when possible. The direct or indirect support of floodplain development must be avoided where there is a practicable alternative (DoD Instruction 4715.03).

Forest products. Forest products are those items produced from a forest such as sawtimber, veneer logs, poles, piles, posts, pulpwood, pine straw, stumpwood, bark and other mulch, cones, seeds, mistletoe, firewood, and wood chips (OPNAV M-5090.1, Chapter 12).

Geographic information system (GIS). GISs are an organized collection of computer hardware, software, and geographic data designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced data (OPNAV M-5090.1, Chapter 12).

Grounds. Grounds are all land areas not occupied by buildings, structures, pavements, and other facilities. Depending on the intensity of management, grounds may be classified as improved (as those near buildings), semi-improved, or unimproved (OPNAV M-5090.1, Chapter 12).

Habitat. Habitat is an area where a plant or animal species lives, grows, and reproduces, and the environment that satisfies its life requirements (OPNAV M-5090.1, Chapter 12).

Introduction. The intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity (EO 13112).

Invasive species. An alien (exotic, non-native, non-indigenous, or introduced) species whose introduction does or is likely to cause economic or environmental harm or harm to human health (EO 13112).

Jeopardize the continued existence (or Jeopardy). To engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR Part 402).

Land management. Land management are programs and techniques to manage lands, wetlands, and water quality, including soil conservation; erosion control and non-point source pollution; surface and subsurface waters; habitat restoration; control of noxious weed and poisonous plants; agricultural outleasing; range management; identification and protection of wetlands, watersheds, floodplains management, landscaping, and grounds maintenance (OPNAV M-5090.1, Chapter 12).

Listed species. Any species of a fish, wildlife, or plant that has been determined to be endangered or threatened under Section 4 of the ESA (16 U. S. C. 1531 *et seq.*) (50 FR Prt 402) Listed species are found in 50 CFR 17.11-17.12.

Marine environment. Areas of coastal and ocean waters, the Great Lakes, and their connecting waters, and submerged lands there under, over which the United States exercises jurisdiction, consistent with international law (EO 13158).

Migratory bird. A bird with a seasonal and somewhat predictable pattern of movement. (A general definition.) Any bird, whatever its origin and whether or not raised in captivity, which belongs to a species

listed in 50 CFR 10.13, or which is a mutation or a hybrid of any such species, including any part, nest, or egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. (The Migratory Bird Treaty Act (16 U. S. C. 703 *et seq.*) Any of the over 800 species listed in 50 CFR 10.13, including many common ones like Canada geese, barn swallows, and two kinds of starling (EO 13186).

Migratory bird resources. Migratory birds and the habitats upon which they depend (EO 13186).

Mitigation. Lessening the adverse effects an undertaking may cause relative to natural or cultural resources. Mitigation can include limiting the magnitude of the action; repairing, rehabilitating, or restoring the affected resource; avoiding the effect altogether; reducing or eliminating the effect over time by preservation and maintenance operations during the life of the action; and/or compensating for the effect by providing substitute resources or environments (DoD Instruction 4715.03).

Mitigation banking, Actions taken to compensate for future adverse effects of undertakings by providing substitute resources or environments in advance of any specific undertaking (DoD Instruction 4715.03).

Native species. All species of plants and animals naturally occurring, either currently or historically, in any U.S. ecosystem (EO 11987). With respect to a particular ecosystem, species that other than as a result of an introduction historically occurred or currently occurs in that ecosystem (EO 13112).

Natural resources. Natural resources are all elements of nature and their environments of soils, sediments, air, and water. They consist of earth resources (nonliving resources such as minerals and soil components) and biological resources (living resources such as plants and animals) (OPNAV M-5090.1, Chapter 12).

Natural Resources Manager/Coordinator. A natural resources manager is an individual assigned the responsibility of managing installation natural resources on a regular basis and who keeps the chain of command informed of natural resources issues (OPNAV M-5090.1, Chapter 12).

Near Shore Areas. Waters and submerged lands adjoining the installation from the mean high water mark (i.e., the line on the shore established by the average of all high tides) to the boundaries of installation waterfront activities where Navy controls access, and that are subject to the immediate authority of the installation Commanding Officer or tenant command. (OPNAVINST M-5090.1)

No net loss of military mission. Each INRMP must, to the extent appropriate and applicable, and consistent with the use of the installation to ensure the preparedness of the Armed Forces, provide for "no net loss in the capability of military installation lands to support the military mission of the installation." (Per Section 101(b)(1)(I) of the SAIA). INRMPs are intended principally to help installation commanders manage natural resources more effectively so as to ensure that installation lands remain available and in good condition to support the installation's military mission, i.e., ensure "no net loss in the capability of military installation lands to support the military mission of the installation." Furthermore, appropriate management objectives to protect mission capabilities of installation lands should be clearly articulated in the planning process and should be high in INRMP resourcing priorities. Mission requirements and priorities identified in the INRMP will, where applicable, be integrated in other environmental programs and policies. It is not the intent that natural resources are to be consumed by mission requirements, but sustained for the use of mission requirements. To achieve this, environmental programs and policies must have the goal of

preserving the environment for the purpose of the mission (Deputy Under Secretary of Defense (I&E) Memorandum, 10 October 2002, Implementation of Sikes Act Improvement Act: Updated Guidance).

Noxious weeds. Noxious weeds are plant species identified by Federal or state agencies as requiring control or eradication (OPNAV M-5090.1, Chapter 12).

Outdoor recreation. Outdoor recreation is a program, activity, or opportunity dependent on the natural environment, including picnicking, bird-watching, hiking, wild and scenic river use, hunting, fishing, and primitive camping that will not impair or degrade natural resources (OPNAV M-5090.1, Chapter 12).

Plant. Any member of the plant kingdom, including seeds, roots, and other parts thereof (ESA (16 U. S. C. 1531 *et seq.*).

Proposed species. Any species of fish, wildlife, or plant proposed in the Federal Register to be listed under Section 4 of the ESA (16 U. S. C. 1531 *et seq.*).

Recovery of a listed species. The improvement in the status of a listed species to the point at which listing is no longer appropriate under the criteria set out in Section 4(a)(1) of the ESA (16 U. S. C. 1531 *et seq.*) (50 CFR Part 402).

Soil. A natural body comprised of solids (minerals and organic matter), liquid, and gases that occurs on the land surface, occupies space, and is characterized by one or both of the following; horizons, or layers, that are distinguishable from the initial material as a result of additions, losses, transfers, and transformations of energy and matter or the ability to support rooted plants in the natural environment (As defined in *Soil Taxonomy, A Basic System of Soil Classification for Making and Interpreting Soil Surveys* (USDA, Natural Resources Conservation Service, 1999

Species. A group of organisms, all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms (EO 13112).

Species of concern. Species listed in the periodic report, "Migratory Nongame Birds of Management Concern in the United States," priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 C.F.R. 17.11 (EO 13186). Technically is an informal term, not defined in the federal Endangered Species Act. Commonly refers to species that are declining or appear to be in need of concentrated conservation actions.

State or Territory Listed Species. A state or territory listed species is any species of fish, wildlife, or plant protected by an appropriate state agency as issued in a state's or U.S. territory's endangered species law and other pertinent regulations (OPNAV M-5090.1, Chapter 12).

Stewardship. Stewardship is the responsibility to inventory, manage, conserve, protect, and enhance the natural resources entrusted to one's care in a way that enhances the resources and their benefits for present and future generations (OPNAV M-5090.1, Chapter 12).

Submerged Aquatic Vegetation Areas. "Rooted, vascular, flowering plants that, except for some flowering structures, which live and grow below the water surface. Because of their requirements for

sufficient sunlight, seagrasses are found in coastal areas of all Atlantic coast states, with the exception of Georgia and South Carolina, where freshwater inflow, high turbidity, and tidal amplitude combine to inhibit their growth." (The Atlantic States Marine Fisheries Commission, *Submerged Aquatic Vegetation Policy,* June 1997).

Sustainable yield. Sustainable yield is managing renewable natural resources to provide an annual or periodic yield of goods, services, and direct and indirect benefits into perpetuity. This may include, but is not limited to, maintaining economic benefits, ecological processes and functions, and biodiversity. (OPNAV M-5090.1, Chapter 12).

Synoptic. The synoptic scale (also known as large scale or cyclonic scale) in meteorology is a horizontal length scale on the order of 1000 kilometers (620 miles) or more.

Take of listed species. To harass, hunt, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct, per the ESA (16 U. S. C. 1531 *et seq.*), of which Section 9 prohibits "take."

a) *Harass,* in the definition of "take," means an intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering.
b) *Harm,* in the definition of "take," means an act that actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering.

Taking, killing, or possessing migratory birds. It is unlawful to pursue, hunt, take, capture, kill; attempt to take, capture, or kill; possess, offer for sale, sell offer to barter, barter offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported; deliver for transportation, transport, or cause to be transported; carry or cause to be carried; or receive for shipment, transportation, carriage, or export any migratory bird, any part, nest, or egg of any such bird or any part, nest or egg, thereof. To "take" is to pursue, hunt, shoot, wound, kill, trap, capture, or collect; or attempt to pursue, hunt, shoot, wound kill, trap, capture, or collect (Migratory Bird Treaty Act (16 USC § 706 et seq.). Furthermore, both "intentional" and "unintentional" take are defined in 50 CFR 10.12:

Intentional take. Take that is the purpose of the activity in question. (As defined in EO 13186.)

Unintentional take. Take that results from, but is not the purpose of, the activity in question (As defined in EO 13186). The list of migratory birds protected under the Migratory Bird Treaty Act can be found in 50 CFR Section 10.13. Violations can result in a misdemeanor conviction and a fine up to $15,000.

Threatened species. Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (Per the ESA (16 U. S. C. 1531 *et seq*).

Watershed. A watershed is a geographic area of land, water, and biota within the confines of a drainage divide (OPNAV M-5090.1, Chapter 12).

Wetlands. Wetlands are those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions, such as swamps, marshes, and bogs. Jurisdictional wetlands are those that meet criteria established by the U.S. Environmental Protection Agency regulations and U.S. EPA and Department of the Army guidance (OPNAV M-5090.1, Chapter 12).

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APPENDIX C: RELEVANT LAWS, REGULATIONS, POLICIES, GUIDANCE, INSTRUCTIONS, AND ORDERS

Federal Laws, Regulations, and Executive Orders

American Indian Religious Freedom Act of 1978 (42 USC 1996)
Anadromous Fish Conservation Act (16 USC 757)
Animal Damage Control Act (7 USC 426 et seq.)
Anti-Deficiency Act (31 USC 1341 et seq.)
Antiquities Act of 1906 (16 USC 431 et seq.)
Archaeological Resource Protection Act Regulations (18 CFR 1312)
Archeological and Historical Preservation Act of 1974 (16 USC 469 et seq.)
Archeological Resources Protection Act of 1979 (16 USC 470 et seq.)
Bald and Golden Eagle Protection Act (16 USC 668 et seq.)
Base Closure and Realignment Act (Part A of title XXIX of Public Law 101-510; 10 USC 2687)
Clean Air Act, as amended (42 USC 7401 et seq.)
Clean Water Act (33 USC 1251 et seq.)
Coastal Barrier Resources (16 CFR 3501)
Coastal Barriers Resources Act (16 USC 1451 et seq.)
Coastal Zone Act Reauthorization Amendments (16 USC 1451 et seq.)
Coastal Zone Management Act of 1972 (16 USC 1451-1456)
Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 USC 9601 et seq.)
Conservation and Rehabilitation Program on Military and Public Lands (16 USC 670 et seq.)
Conservation and Rehabilitation Programs on Military and Public Lands (Public Law 93-452)

- Cooperative Conservation (Executive Order 13352)
- Council on Environmental Quality Regulations on Implementing NEPA Procedures (40 CFR 1500-1508)

Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79)
Defense Environmental Restoration Program (10 USC 2701)
Department of Defense Appropriation Act of 1991 (PL 102-393)
Determination of Eligibility for Inclusion in the National Register of Historic Places (36 CFR 63)
Dredge and Fill Nationwide Permit Program (33 CFR 330)
Endangered and Threatened Wildlife and Plants (50 CFR 17)
Endangered Species Act of 1973, as amended (16 USC 1531 et seq.)

Entering Military, Naval, or Coast Guard Property (18 USC 1382)
Environmental Effects in the United States of Department of Defense Actions (32 CFR 188)
EPA Guidelines for Resource Recovery Facilities (40 CFR 245)
EPA National Drinking Water Regulations (40 CFR 141-143)
EPA National Pollutant Discharge Elimination System Permit Regulations (40 CFR 122)
EPA Regulations Designating Areas for Air Quality Planning (40 CFR 81)
EPA Regulations for Ambient Air Monitoring Reference and Equivalent Methods (40 CFR 53)
EPA Regulations for Pesticide Programs (40 CFR 150-186)
EPA Regulations Implementing the Resource Conservation and Recovery Act (40 CFR 260-270)
EPA Regulations on Criteria and Standards for the National Pollutant Discharge Elimination System (40 CFR 125)
EPA Regulations on Discharge of Oil (40 CFR 110)
EPA Regulations on Disposal Site Determination under the CWA (40 CFR 231)
EPA Regulations on Implementation of NEPA Procedures (40 CFR 6)
EPA Regulations on Insecticide, Fungicide, and Rodenticide Use (40 CFR 162)
EPA Regulations on Land Disposal Restrictions (40 CFR 268)
EPA Regulations on National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)
EPA Regulations on Regional Consistency under the Clean Air Act (40 CFR 56)
EPA Requirements for Preparation, Adoption, Submittal, Approval, and Promulgation of Implementation Plans (40 CFR 51-52)
EPA Requirements for Water Quality Planning and Management (40 CFR 130)
EPA Special Exemptions from Requirements of the Clean Air Act (40 CFR 69)
Erosion Protection Act (33 USC 426)
Estuary Protection Act (16 USC 1221)
Farmland Protection Act (7 USC 4201 et seq.)
Federal Compliance with Pollution Control Standards (42 USC 4321)
Federal Consistency with Approved Coastal Management Programs (15 CFR 930)
Federal Facilities Compliance Act of 1992 (42 USC 6961)
Federal Insecticide, Fungicide, and Rodenticide Act, as amended (7 USC 136 et seq.)
Federal Land Policy and Management Act (43 USC 1701)
Federal Noxious Weed Act (7 USC 2801 et seq.)
Federal Plant Pest Act (7 USC 150aa et seq.)
Federal Water Pollution Control Act (Clean Water Act) (33 USC 1251 et seq.)
Fish and Wildlife Conservation Act (16 USC 2901 et seq.)
Fish and Wildlife Coordination Act (16 USC 661 et seq.)
Fish and Wildlife Service List of Endangered and Threatened Wildlife (50 CFR 17)

Fishery Conservation and Management Act of 1976 (16 USC 1801 et seq.)
Floodplain Management (Executive Order 11988, as amended by Executive Order 12148 and 13286)
Forest Resources Conservation and Shortage Relief Act (16 USC 620 et seq.)
Historic Sites Act of 1935 (16 USC 461 et seq.)
Hunting and Fishing on Federal Lands (10 USC 2671 et seq.)
Implementation of Section 311 of the Federal Water Pollution Control Act of 18 October, 1972, as amended, and the Oil Pollution Act of 1990 (Executive Order 12777, as amended by Executive Order 13286)
Interagency Cooperation Endangered Species Act of 1973(50 CFR 402)
Invasive Species (Executive Order 13112)
Lacey Act (16 USC 701) and Lacey Act Amendments of 1981 (16 USC 3371–3378)
Land and Water Conservation Act of 1965 (16 USC 4601 et seq.)
Legacy Resource Protection Program Act (PL 101–511)
Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801)
Marine Mammal Protection Act of 1972 (16 USC 1361 et seq.)
Marine Protected Areas (Executive Order 13158)
Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC 1401 et seq.)
Migratory Bird Conservation Act (16 USC 715 et seq.)
Migratory Bird Treaty Act (16 USC 703–711)
Migratory Birds List (50 CFR 10.13)
Military Construction Authorization Act of 1956 - Leases; non-excess property (10 USC 2667)
Military Construction Authorization Act of 1956 - Sale of Certain Interests in Lands; Logs (10 USC 2665)
Military Construction Authorization Act of 1956- Military Reservations and Facilities: Hunting, Fishing, and Trapping (10 USC 2671)
Military Construction Authorization Act of 1975 (10 USC 2665)
Military Reservation and Facilities: Hunting, Fishing and Trapping (10 USC 2671)
Multiple-Use Sustained Yield Act (16 USC 528)
National Defense Authorization Act for Fiscal Year 1999 (PL 105-261)
National Defense Authorization Act for Fiscal Year 2003 (PL 107-314)
National Defense Authorization Act for Fiscal Year 2004 (PL 108-136)
National Environmental Policy Act of 1969, as amended (42 USC 4321 et seq.)
National Heritage Policy Act of 1979 (16 USC 470)
National Historic Landmarks Program (36 CFR 65)
National Historic Preservation Act of 1966 (16 USC 470 et seq.)
National Historic Preservation Act Regulations for the Protection of Historic Properties (36 CFR 800)
National Oceanic and Atmospheric Administration Coastal Zone Management Program Development and Approval Regulation (15 CFR 923)
National Register of Historic Places (36 CFR 60)

National Register of Historic Places, current edition (36 CFR 60 78, 79, 800, and 1228)
National Trails System Act of 1968 (16 USC 1271)
Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001-3013)
Natural Resources Management Program (32 CFR 190)
Neotropical Migratory Bird Conservation Act (16 USC 6101 et seq.)
Nonindigenous Aquatic Nuisance Prevention and Control Act as amended (16 USC 4701et seq.)
North American Wetlands Conservation Act (16 USC 4401 et seq.)
Noxious Plant Control Act (43 USC 1241.
Ocean Dumping Regulations and Criteria (40 CFR 220, 227)
Off-Road Vehicles Use on Public Lands (Executive Order 11989)
Oil Pollution Control Act of 1990 (33 USC 2701 et seq.)
Outdoor Recreation - Federal/State Program Act (16 USC 4601 et seq.)
Outer Continental Shelf Air Regulations (40 CFR 55)
Partners for Fish and Wildlife Act (16 USC 3771 et seq.)
Plant Quarantine Act (7 USC 151-167)
Pollution Prevention Act (42 USC 13101 et seq.)
Protection and Enhancement of Environmental Quality (Executive Order 11514, as amended by Executive Order 11541 and 11991)
Protection and Enhancement of the Cultural Environment (Executive Order 11593)
Protection of Wetlands (Executive Order 11990, amended by Executive Order 12608)
Recreational Fisheries (Executive Order 12962, as amended by Executive Order 13474)
Regulations Concerning Marine Mammals (50 CFR 10)
Regulations Concerning Marine Mammals (50 CFR 18, 216, 228)
Resource Conservation and Recovery Act (42 USC 6901 et seq.)
Responsibilities of Federal Agencies to Protect Migratory Birds (Executive Order 13186)
Rivers and Harbors Act of 1889 (33 USC 403 et seq.)
Safe Drinking Water Act (42 USC 300(f) et seq.)
Sales of Forest Products on Federal Lands (10 USC 2665 et seq.)
Salmon and Steelhead Conservation and Enhancement Act (16 USC 3301-3345)
Sikes Act Improvement Act of 1997 (16 USC 670a et seq.)
Soil and Water Conservation Act (16 USC 2001 et seq.)
Soil Conservation (16 USC 5901)
Strengthening Federal Environmental, Energy, and Transportation Management (Executive Order 13423)
Water Pollution Prevention and Control (33 USC 1251 et seq.)
Wetland Resources (16 USC 3901)
Wild and Scenic River Act (16 USC 1274)
Youth Conservation Corps Act of 1972 (16 USC 1701)

Federal Guidelines and Memorandums

Cooperative Agreement between the Department of Defense and The Nature Conservancy for Assistance in Natural Resources Inventory

Memorandum of Agreement for Federal Neotropical Migratory Bird Conservation Program and Addendum (Partners in Flight-Aves De Las Americas) among the Department of Defense, through Each of the Military Services, and Over 110 Other Federal and State Agencies and Nongovernmental Organizations

Memorandum of Agreement for Professional and Technical Assistance Conducting Biological Surveys, Research and Related Activities between the Department of Defense and the National Biological Service of the Department of the Interior

Memorandum of Understanding between Department of Defense, U.S. Fish and Wildlife Service, and the International Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resources Management Program on Military Installations

Memorandum of Understanding between the Environmental Protection Agency and the Department of Defense with Respect to Integrated Pest Management

Memorandum of Understanding for Watchable Wildlife Programs

USACE *1987 Wetland Delineation Manual*

Department of Defense Policy, Regulations, and Guidance

Department of Navy Procedures for Implementing NEPA (32 CFR 775)
Deputy Under Secretary of Defense Memorandum, *Integrated Natural Resource Management Plan Template*
DOD Directive 3200.15, *Sustainment of Ranges and Operating Areas*
DOD Directive 4001.1, *Installation Management*
DOD Directive 4140.1, *Material Management Policy*
DOD Instruction 4150.7, *DOD Pest Management Program*
DOD Directive 4165.57, *Air Installations Compatible Use Zones*
DOD Directive 4165.59, *DOD Implementation of the Coastal Zone Management Act*
DOD Directive 4165.61, *Intergovernmental Coordination of DOD Federal Development Programs and Activities*
DOD Directive 4700.2, *Secretary of Defense Award for Natural Resources and Environmental Management*
DOD Directive 4700.4, *Natural Resources Management Program*
DOD Directive 4705.1, *Management of Land-Based Water Resources in Support of Joint Contingency Operations*
DOD Directive 4710.1, *Archaeological and Historic Resources Management*
DOD Directive 4715.1, *Environmental Security*
DOD Directive 4715.03, *Natural Resources Conservation Program*
DOD Directive 4715.4, *Pollution Prevention*
DOD Directive 4715.6, *Environmental Compliance*
DOD Directive 4715.7, *Environmental Restoration Program*
DOD Directive 4715.9, *Environmental Planning and Analysis*
DOD Directive 4751.DD-R, *Draft Integrated Natural Resources Management in the Department of Defense*
DOD Directive 5030.41, *Oil and Hazardous Substance Pollution Prevention and Contingency Program*
DOD Directive 6050.1, *Environmental Effects in the U.S. of DOD Actions*
DOD Directive 6050.15, *Prevention of Oil Pollution from Ships Owned or Operated by DOD*
DOD Directive 6050.2 (as amended), *Use of Off-Road Vehicles on DOD Lands*
DOD Directive 6050.4, *Marine Sanitation Devices for Vessels Owned or Operated by DOD*
DOD Directive 6050.5, *DOD Hazard Communication Program*
DOD Directive, 6050.2, *Use of Off-Road Vehicles on DOD Lands*
DOD Directive 4150.7, *DOD Pest Management Program*
DOD INRMP Handbook, *Resources for INRMP Implementation*
DOD Instruction 5000.13, *Natural Resources - The Secretary of Defense Natural Resource Conservation Award*
DOD Instruction 6055.6, *DOD Fire and Emergency Services Program*
DOD Memorandum on Implementation of Ecosystem Management in DOD
DOD Urban Forestry Manual

Emergency Consultations under the Endangered Species Act
NAVFAC P-73, *Real Estate Manual P-73*
NAVFACINST 11010.45, *Regional Shore Infrastructure Planning*
NAVFACINST 11012.111A, *Land Use Conservation Planning*
NAVFACINST 6250.3H, *Applied Biology Program Services, and Training*
OPNAVINST 11000.17, *National Preservation Act Consultations Related to Base Realignment and Closure Actions*
OPNAVINST 11010.20F, *Facilities Projects Manual*
OPNAV M-5090.1, *Environmental Readiness Program Manual*
OPNAVINST 5750.13, *Historical Properties of the Navy*
OPNAVINST 6250.4B, *Pest Management Program*
OPNAVINST 8000.16, *Environmental Security Management*
OPNAVINST 8026.2A, *Navy Munitions Disposition Policy*
SECNAVINST 4000.35, *Department of the Navy Cultural Resources Program*
SECNAVINST 5090.8, *Policy for Environmental Protection, Natural Resources, Cultural Resources Program*
SECNAVINST 6240.6E, *Implementation of DOD Directives under DOD Instruction 4700.4*

Applicable State and Local Regulation

Aquatic lands -- Beds of navigable waters (RCW 79.130)
Aquatic lands -- Easements and rights-of-way (RCW 79.110)
Aquatic lands – Harbor Areas (RCW 79.115)
Aquatic lands -- Oysters, geoducks, shellfish, other aquacultural uses, and marine aquatic plants (RCW 79.135)
Aquatic lands -- Tidelands and shorelands (RCW 79.125)
Ballast Water Management (RCW 77.125)
Community and Urban Forestry (RCW 76.15)
Construction Projects in State Waters (RCW 77.55)
Control of Spartina and Purple Loosestrife (RCW 17.26)
Cooperative Forest Management Services Act (RCW 76.52)
Fish and Wildlife Enforcement Code (RCW 77.15)
Fishways, Flow, and Screening (RCW 77.57)
Forest Insect and Disease Control (RCW 76.06)
Integrated Pest Management (RCW 17.15)
Management of Natural Resources (RCW 77.110.030)
Marine Fin Fish Aquaculture Programs (RCW 77.125)
Natural Resources Code – Aquatic Land Management (WAC 332-30)
Natural Resources Code – Forest Protection (WAC 332-24)
Natural Resources Code – State Environmental Protection Act Policies and Procedures (WCA 332-41)
Noxious Weed Control on Federal and Tribal Lands (RCW 17.10.201)
Obstructions in Navigable Waters (RCW 88.28)
Puget Sound Fish Other than Salmon (WAC 220-48)
Puget Sound Salmon (WAC 220-47)
Puget Sound Water Quality Protection (RCW 90.71)
River and Harbor Improvements (RCW 88.32)
Salmon Recovery (RCW 77.85)
Shellfish (RCW 77.60)
Shellfish (WAC 220-52)
Shoreline Management Act of 1971 (RCW 90.58)
Stewardship of Nonindustrial Forests and Woodlands (RCW 73.13)
Vessel Oil Spill Prevention and Response (RCW 88.46)
Washington Environmental Policy Act (WAC 220-100)
Washington Fish and Wildlife Regulations – Aquatic Nuisance Species (WAC 232-12-01701)
Washington Fish and Wildlife Regulations – Bald Eagle Protection Rules (WAC 232-12-292)
Washington Fish and Wildlife Regulations – Endangered, Threatened, and Sensitive Wildlife Species (WAC 232-12-297)
Washington Fish and Wildlife Regulations – Nonnative Aquatic Species (WAC 232-12-016)
Washington Hydraulic Code – Aquatic Plant Dredging (WCA 220-110-337)
Washington Hydraulic Code – Dredging in Saltwater Areas (WCA 220-110-320)

Washington Hydraulic Code – Prohibited Work Times in Saltwater Areas (WCA 220-110-271)
Washington Hydraulic Code – Saltwater Habitats of Special Concern (WCA 220-110-250)
Washington Natural Resources Conservation Areas (RCW 79.71)
Washington Pesticide Application Act (RCW 17.21)
Washington Wild Salmonid Policy (RCW 77.65.420)
Water Resource Management (RCW 90.42)
Water Resources Act of 1971 (RCW 90.54)
Water Rights of United States (RCW 90.40)

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APPENDIX D: INRMP PROJECTS, SCHEDULES, AND IMPLEMENTATION TABLE

The following table contains natural resources projects proposed for NAVBASE Kitsap, and includes a natural resources management area (program management, education and outreach, terrestrial habitat, water resources, or fish and wildlife management), a corresponding law or regulation, project driver, and proposed fiscal year for implementing each recommendation.

The projects presented strive to enhance natural resources on NAVBASE Kitsap, without impacting other installation plans and activities. Achieving these recommendations will require development to be conducted in an environmentally sensitive way and requires cooperation between, installation environmental offices, facilities, tenants, and operations. Any future changes in mission, training activity, or technology should be analyzed to assess their impact on natural resources. As new installation plans and DON guidance and regulations are developed, they should be integrated with the goals and management actions in this INRMP.

Table D-1: NAVBASE Kitsap INRMP Projects and Implementation Table

All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under Federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 USC 1341 et seq.).

Table D-1: NAVBASE Kitsap INRMP Projects and Implementation Table

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bangor	6843612001	Threatened, Endangered, and Forage Fish Surveys	Conduct surveys of fish use and presence at NAVBASE Kitsap at Bangor to include ESA listed species.	1 5	1.7 5.2	ESA, SAIA, OPNAV M-5090.1	DOD Class 2.b ERL 4	Non-Recurring	2012-2017	Nearshore	**Cancelled** – Crosslinked to EPR 68436NR003
Bangor	68436NR001	1 CP NW NBK – Chico Creek Trestle Habitat Improvement	Remove remnants of a former railroad trestle crossing at Chico Creek and add large woody debris or other enhancements to improve habitat for salmonids	1 3	1.2 3.1	ESA, CWA, SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 4	Recurring	2016-2018	Riparian	**Not Approved** – Separate project covering Chico Creek Trestle.
Bangor	68436NR002	1 CP NW – NBK Bangor Fish Access Restoration	Fish access restoration at Devil's Hole Creek at NAVBASE Kitsap at Bangor. Project includes removal of six culverts that block fish access and habitat enhancement in other areas.	1 3	1.2 3.1	ESA, CWA, SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 4	Non-Recurring	2016-2016	Shoreline	In Process
Bangor	68436NR003	1 S NW – NBK Bangor T&E Fish Surveys	Conduct surveys of threatened or endangered fish species (to include newly listed Rockfish species) along all NAVBASE Kitsap shorelines. Cross-linked to 68742CN002	1 5	1.7 5.2	ESA, SAIA, OPNAV M-5090.1	DOD Class 2.b ERL 3	Recurring	2015-2016	Shoreline	**Cancelled** – Crosslinked to EPR 68742CN002
Bangor	68436NR004	SIKES NW NBK – Bangor Shellfish Abundance Surveys	Partner with State and tribal representatives that have harvesting agreements to conduct a shellfish and habitat survey. Survey will help develop a complete baseline data set that will aid natural resources personnel in conservation and management decisions on Navy lands.	1 4	1.2 3.1	SAIA, OPNAV M-5090.1	DOD Class 2 ERL 3	Recurring		Shoreline	**Cancelled** – Funds not needed as Tribes manage their shellfish and conduct their own surveys.
Bangor	68436NR005	NW – NBK Rail-Line Wetlands Survey	Conduct survey of wetlands and floodplains along the Navy owned railway from Shelton to Bangor and Bremerton.	1 5	1.7 1.8 1.10 5.2	CWA, OPNAV M-5090.1	DOD Class 2.c ERL 3	Non-Recurring	2018	Wetlands	Approved

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bangor	68436NR007	NW – NBK Rail-line Alder and Maple Removal	Remove alders and maples along the Navy owned railway from Shelton to Bremerton/Bangor and replace with conifers that are more stable and present less risk to the rail line.	1 5	1.7 1.8 1.10 5.2	SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 4	Recurring	2014-2018	Forest	**Cancelled** – Removal of aldner and maple is not for the benefit of the habitat.
Bangor	68436NR008	SIKES NW – NBK BANGOR Christmas Bird Count	Participate in the annual Audubon Christmas Bird Count at NAVBASE Kitsap at Bangor/Keyport with sites to expand in out years. Data will be used to develop migratory bird datasets and management prescriptions.	1 3	1.7 3.1	MBTA, SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 3	Recurring	2012, and yearly	Riparian	**Cancelled** – Surveys are not planned to take place.
Bangor	68436NR009	NW – NBK Earth Day Projects	Participation in the annual Earth Day event at all NAVBASE Kitsap properties. Provide tools/supplies to volunteers for invasive weed removal, beach cleanups, tree plantings, and other activities.	1 5	1.7 1.8 1.10 5.2	CWA, OPNAV M-5090.1	DOD Class 2.c ERL 2	Recurring	2014-2018	Riparian	**Cancelled** – Incorporated with other Ongoing Projects
Bangor	68436NR010	EO13148 NW NBK – Native Plant Landscaping management Guide/Plan	Develop a comprehensive Grounds Maintenance Management Plan for all NAVBASE Kitsap properties. Plan will reduce amount of landscaped areas and replace with native habitat conditions.	1	1.1 - 1.6 1.8	SAIA, ESA, MBTA, CWA, OPNAV M-5090.1	DOD Class 1.b ERL 3	Non-Annual Recurring	2016-2018	Riparian	2016 Funding
Bangor	68436NR011	ARCHIVED NW NBK – Interpretive Signs	Design and install interpretive signs about natural resources conservation and fish and wildlife habitat protection along hiking and jogging trails	2 4	4.1	SAIA, OPNAVINST 5090.1C	DOD Class ERL 1	Non-Recurring	2014 & 2015	Forest	**Cancelled** – Volunteers were used to Implement.
Bangor	68436NR012	NW NBK – Bangor Loop Trail Construction	NAVBASE Kitsap at Bangor loop trail construction between existing trails.	2 4	2.3 4.1	SAIA, OPNAVINST 5090.1C	DOD Class 2.c ERL 2	Non-Recurring	2015	Forest	**Cancelled** – Duplicated in EPR 68436NR015

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bangor	68436NR013	SIKES NW NBK – Hazard Tree Management Plan	Plan for all of NAVBASE Kitsap to assess hazard trees for both safety and habitat values. Plan will incorporate hazard tree abatement with need for achieving habitat objectives.	1	1.1 1.4 1.9 1.11	SAIA, OPNAV M-5090.1	DOD Class 2.b ERL 3	Non-Recurring	2015-2016	Forest	**Cancelled** – This would be evaluated on a project by project basis and overall planning is not feasible.
Bangor	68436NR014	CWA NW NBK – Wetland Invasive Species Control	Invasive species control (Japanese knotweed and reed canary grass) at all NAVBASE Kitsap properties.	1	1.4 1.5	OPNAV M-5090.1	DOD Class 2.b ERL 4	Recurring	2016	Forest	Funding for 2016
Bangor	68436NR015	SIKES NW NBK Nature Trail Construction	Construction of a ¼-mile trail through a forested stand at NAVBASE Kitsap at Bangor.	2 4	2.3 4.1	SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 1	Non-Recurring	2015-2016	Forest	**Cancelled** – Primary trail is closed due to extensive root rot hazard and not in use.
Bangor	68436NR016	CHS EO13112 NW NBK – Reduce Invasive Species and Establish Native Species	Reforestation on disturbed areas to rehabilitate natural habitat. Project will address approximately 5 acres a year at NAVBASE Kitsap at Bangor.	1 5.2	1.1 1.7 1.10 5.2	SAIA, ESA, SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 4	Recurring	2.15-2020	Forest	**Cancelled and Cross-linked** to Region EPRs 6874212345 & 68742NWTJ1
Bangor	68436NR017	SIKES NW NBK – Forest Management /Stand Improvement	Forest stand improvements on all NAVBASE Kitsap properties. Treatments will increase vigor, diameter, resistance to insects/disease, reduce fire hazard, soil nutrition or crown expansion. 5acres planned for each FY.	1 5.2	1.1 1.7 1.10 5.2	SAIA, ESA, SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 4	Recurring	2015-2018	Forest	**Cancelled and Cross-linked** to Region EPR 68742NWTJ1

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bangor	68436NR018	SIKES NW NBK – Tribal Cedar Bark Collection Plan	Tribal Cedar bark collection plan. Plan at NAVBASE Kitsap at Bangor that will include a map identifying areas containing cedars with limited branches and incorporate management techniques to improve the health and quality of bark.	1 3	1.7 3.1	OPNAV M-5090.1	DOD Class 2.c ERL 2	Non-Recurring	2015 & 2017	Forest	**Cancelled**
Bangor	68436NR019	MBTA NW NBK – Non T&E Bird Surveys & Mapping	Bird and habitat surveys at NAVBASE Kitsap properties to develop a baseline data set to assist in conservation.	1 5	1.7 5.2	ESA, MBTA, DODPIF, SAIA	DOD Class 2.b ERL 4	Non-Annual Recurring	2016-2018	Forest	**Approved**, but Low Priority
Bangor	68436NR020	CWA NW NBK Cattail Lake Mitigation	Monitoring and vegetation management incl sediment, oysters, beach elevations, streams, salinity, eel grass, woody debris, hydrology, photopoint, vegetation, invasive species. Treat invasive species and establish palustrine habitat. Required per the Waterfront Security Enclave project (P-977). Permit NWS # 2006-1439	1 5	1.2 1.7 3.1	CWA, Sikes, Invasives, 5090,T&E	DOD Class 2.a ERL 4	Non-Recurring	2016-2023	Nearshore	**Approved**
Bangor	68436NR023	NW – NBK Jackson park Erosion Control	Conduct engineering analysis/feasibility study for shoreline erosion and install solution along Elwood Point Project to focus on soft armoring techniques.	1 3	1.2 1.5 3.1	CWA, NHPA, SAIA, OPNAV M-5090.1, ESA	DOD Class 2.c ERL 3	Recurring	2016-2018	Shoreline	**Not Approved**
Bangor	68436NR024	SIKES NW NBK – Terrestrial Mammal Survey	Conduct comprehensive mammal surveys including important habitat locations at all NAVBASE Kitsap properties.	1 5	1.7 5.2	SAIA, OPNAV M-5090.1 MMPA	DOD Class 2.b ERL -7	Recurring	2015-2018	Forest	**Funding Request for FY 2020**
Bangor	68436NR025	Sikes NW NBK – Amphibian & Reptile Surveys	Reptile/Amphibian survey at NAVBASE Kitsap at Bangor, Keyport, Jackson Park/Navy Hospital; develop GIS maps for inclusion in the INRMP.	1 5	1.7 5.2	SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 3	Recurring	2016-2018	Riparian	**Not Approved**

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bangor	68436NR026	CWA NW NBK Bangor – Shoreline Management	Shoreline surveys for erosion, habitat conditions, species, pollution, and potential enhancement opportunities at NAVBASE Kitsap at Bremerton, Bangor, Keyport, and Jackson Park/Naval Hospital.	1 5	1.2 1.4 1.5 1.8 5.2	SAIA, ESA, CWA, OPNAV M-5090.1	DOD Class 2.b ERL 3	Recurring	2016-2018	Shoreline	**Approved for 2016**
Bangor	68436NR027	NW – NBK Tree Planting	Plant native trees around buildings or structures where trees have been lost to storms or disease. Provides for reforestation to support healthy forests. Will support application to Arbor Day Foundation for NBK to become a "Tree City USA" and to receive saplings for Arbor Day plantings. Plantings will provide energy reduction savings through sustainable, natural shading of facilities.	1 5	1.3 1.4 4.1	SAIA, OPNAV M-5090.1	DOD Class 2 ERL 3	Recurring	2014-2018	Forest	**Cancelled** – Covered within other EPRs
Bangor	68436NR029	CWA NW NBK – Wetland Survey and Delineation	Wetland Survey & Delineations in support of proposed INRMP projects at NAVBASE Kitsap at Bangor.	1 5	1.2 1.7 5.2	CWA, SAIA, OPNAV M-5090.1	DOD Class 2.b ERL 3	Non-Recurring	2016-2018	Wetlands	**SCA Funds**, Project Order for FY15.
Bangor	68436NR033	2 BO NW – NBK Steelhead and Salmonid Entrainment Study	Study of NAVBASE Kitsap at Bangor dry dock effects on steelhead and salmonid entrainment. Required and consistent with NMFS BO # 2009/06414	1	1.10	ESA	DOD Class 2.a.1 ERL 4	Non-Recurring	2016-2018	Nearshore	**In Process**
Bangor	68436NR034	CHS NW – NBK Invasive Species Control - Uplands	Manual/Mechanical Invasive Species control at NAVBASE Kitsap properties.	1	1.4 1.5	OPNAV M-5090.1	DOD Class 2.b ERL 4	Non-Recurring	2014-2018	Forest	**Cancelled and Crosslinked** to Region EPR 68742NWTJ1

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bangor	68436NR035	CHE NW NBK INRMP	INRMP five year update.	1 5	1.7 5.2	OPNAV M-5090.1	DOD Class 2.c ERL 3	Recurring	2016-2020	Shoreline, Nearshore, Forest, Riparian, Wetlands	**Approved**
Bangor	68436NR182	1 CP NW Naval Base Kitsap - Bangor Remove Culvert 14 and Restore Stream	Completely remove the existing culvert and restoration of the stream channel to more natural conditions.	1 3	1.1 1.2 1.5 3.1 3.2	ESA, CWA, Sikes Act, OPNAV M-5090.1	DOD Class ERL 4	Non-Recurring	2018	Riparian	Awaiting Approval by Region
Bangor	68436NR183	1 CP NW Naval Base Kitsap - Bangor Remove Culvert 15 and Restore Stream	Completely remove the existing culvert and restoration of the stream channel to more natural conditions.	1 3	1.1 1.2 1.5 3.1 3.2	ESA, CWA, Sikes Act, OPNAV M-5090.1	DOD Class ERL 4	Non-Recurring	2018	Riparian	Awaiting Approval by Region
Bangor	68436NR184	1 CP NW Naval Base Kitsap - Bangor Remove Culvert 13 and Restore Stream	Completely remove the existing culvert and restoration of the stream channel to more natural conditions.	1 3	1.1 1.2 1.5 3.1 3.2	ESA, CWA, Sikes Act, OPNAV M-5090.1	DOD Class ERL 4	Non-Recurring	2018	Riparian	Awaiting Approval by Region
Bangor	68436NR185	1 CP NW Naval Base Kitsap - Bangor Remove Culvert 12 and Restore Stream	Completely remove the existing culvert and restoration of the stream channel to more natural conditions.	1 3	1.1 1.2 1.5 3.1 3.2	ESA, CWA, Sikes Act, OPNAV M-5090.1	DOD Class ERL 4	Non-Recurring	2018	Riparian	Awaiting Approval by Region

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bangor	68436NR036	1 S NW – NBK Marbled Murrelet Density Surveys	Marbled Murrelet Density Surveys at NAVBASE Kitsap at Bangor. Cross-linked to 68742CN001	1 5	1.7 5.2	SAIA, OPNAV M-5090.1	DOD Class 2.c ERL 4	Non-Recurring	2016 & 2018	Nearshore	**Cancelled – Crosslinked** to Region EPR 68742CN001
Bremerton	3241612001	1 S NW – NBK Bremerton-Listed Fish Surveys	Conduct surveys of fish use and presence at NAVBASE Kitsap at Bremerton to include ESA listed species.	1 5	1.7 5.2	ESA, SAIA, OPNAV M-5090.1	DOD Class 2.b ERL 4	Non-Recurring	2016-2019	Nearshore	**Approved**
Bremerton	32416CHA16	2 BO NW NBK Bremerton Charleston Beach Restoration Monitoring	NAVBASE Kitsap at Bremerton Charleston Beach Restoration Monitoring	1 5	1.1 1.2 1.5 1.7	ESA, OPNAV M-5090.1	DOD Class 2.a, 5.a ERL 4	Non-Annual Recurring	2016-2020	Shoreline	**Funded 2016**
Bremerton	32416FF016	1 CP NW NBK Bremerton Forage Fish Surveys	NAVBASE Kitsap at Bremerton will conduct surveys at beaches for forage fish and associated ESA species of fish.	1 5	1.1 1.7 2.2	ESA, OPNAV M-5090.1	DOD Class 2.a ERL 4	Non-Annual Recurring	2016 & 2019-2020	Shoreline	Crosslinked to EPR# 68742CN002
Bremerton	32416NOX16	CHS EO13112 NW NBK Bremerton – Invasive Species/Noxious Weed Control	Control invasive and noxious weeds at NAVBASE Kitsap at Bremerton with herbicide application	1 5	1.2 1.4 2.2	EO 13112, ESA, OPNAV M-5090.1	DOD Class 2.a, 3 ERL 4	Recurring	2016-2020	Riparian	**Cross Linked** to EPR# 6874212345

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bremerton	32416OSP16	MBTA NW NBK Bremerton Osprey Nesting Platforms	Construct multiple Osprey platforms to encourage Osprey to move nests off of inactive Navy vessels at NAVBASE Kitsap at Bremerton	1 5	1.1 1.7 1.9 1.10	MBTA, SIKES, OPNAV M-5090.1	DOD Class 2.a ERL 4	Non-Recurring	2016	Riparian	On Hold
Bremerton	68436JAR16	1 RP NW NBK – Salmon Culvert Replacement at Jarstad Creek	Replacement of Jarstad Creek culvert to provide fish passage based on culvert survey guidelines	1 5	1.1 1.2 1.5	SIKES, OPNAV M-5090.1	DOD Class 2.a ERL 4	Non-Recurring	2017	Riparian	Replaced with EPR# 32416JAR10, which was not approved
Bremerton	68436NR021	1 CP NW – NBK Charleston Beach Habitat Replenishment	NAVBASE Kitsap at Bremerton Charleston Beach Habitat Replenishment. Install fish mix where erosion is occurring.	1 3	1.2 1.5 3.1 3.2	CWA, ESA, SAIA, OPNAV M-5090.1, NEPA, CERCLA	DOD Class 2.b ERL 4	Non-Annual Recurring	2017-2020	Shoreline	**Cancelled** – Discussions with IR groups found that duplicate efforts were being conducted.
Bremerton	32416JAR10	SIKES NW NBK – Salmon Culvert Replacement at Jarstad Creek (MP BS 1.04)	Replacement of Jarstad Creek culvert to provide fish passage based on culvert survey guidelines	1 5	1.1 1.2 1.5	SIKES, OPNAV M-5090.1	DOD Class 2.a ERL 4	Non-Recurring	2019	Riparian	POM Request

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bremerton	32416JARDS	SIKES NBK - Salmon Culvert Replacement Design at Jarstad Creek	Culverts preventing fish migration were identified in the NBK INRMP, and the final Navy Railroad Culvert Assessment for Fish Passage Report dated June 14, 2015. This assessment was conducted to locate, assess and document stream crossing along the approximate 50 miles of Navy owned railroad (RR) track between NBK Bangor, NBK Bremerton and Shelton WA and rate for fish barrier status. Select culverts classified as fish barriers were carried forward for preliminary design and costing for replacement.	1 5	1.1 1.2 1.5	Sikes act, OPNAV M-5090.1, DOD 4715.03	DOD Class ERL 4	Non-Recurring	2018	Riparian	POM Request
Bremerton	32416DCRDS	CHS NW NBK - Salmon Culvert Replacement Design at Dickerson Creek (MP 36.09)	Culverts preventing fish migration were identified in the NBK INRMP, and the final Navy Railroad Culvert Assessment for Fish Passage Report dated June 14, 2015. This assessment was conducted to locate, assess and document stream crossing along the approximate 50 miles of Navy owned railroad (RR) track between NBK Bangor, NBK Bremerton and Shelton WA and rate for fish barrier status. Select culverts classified as fish barriers were carried forward for preliminary design and costing for replacement.	1 5	1.1 1.2 1.5	ESA, Sikes Act, OPNAV M-5090.1	DOD Class 1 ERL 4	Non-Recurring	2018	Riparian	POM Request
Bremerton	32416DCR15	CHS NW NBK - Salmon Culvert Replacement at Dickerson Creek (MP 36.09)	This project will replace a fish blocking culvert beneath the Navy owned railroad on a Tributary to Dickerson Creek in Kitsap County Washington.	1 5	1.1 1.2 1.5	ESA, Sikes Act, OPNAV M-5090.1	DOD Class 1 ERL 4	Non-Recurring	2019	Riparian	POM Request

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Bremerton	32416MNT10	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Deer Creek (MP 10.5)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Deer Creek in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2018	Riparian	POM Request
Bremerton	32416MNT12	SIKES NW NBK - Salmon Culvert Maintenance at the Tributary to Deer Creek Culvert (MP 12.01)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary of Deer Creek in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2018	Riparian	POM Request
Bremerton	32416MNT14	SIKES NW NBK - Salmon Culvert Maintenance at Deer Creek Headwaters (MP 14.89)	This project will replace a fish blocking culvert beneath the Navy owned railroad on the Deer Creek Headwaters in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2018	Riparian	POM Request
Bremerton	32416MNT15	SIKES NW NBK - Salmon Culvert Maintenance at the Tributary to Gorst Creek (MP BS 1.58)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Gorst Creek Kitsap County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2019	Riparian	POM Request

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Bremerton	32416MNT16	1 RP NW NBK - Salmon Culvert Maintenance at Tributary to Sherwood Creek (MP 16.88)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Sherwood Creek in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	ESA, MSFCM SIKES, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2022	Riparian	POM Request
Bremerton	32416MNT21	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Oakland Bay (MP 2.19)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Oakland Bay in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2022	Riparian	POM Request
Bremerton	32416MNT3X	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Dyes Inlet (MP 38.36)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Dyes Inlet in Kitsap County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2020	Riparian	POM Request
Bremerton	32416MNT31	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Gorst Creek (MP 31.55)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Gorst Creek in Kitsap County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2019	Riparian	POM Request

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bremerton	32416MNT38	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Dyes Inlet (MP 38.11)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Dyes Inlet in Kitsap County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2020	Riparian	POM Request
Bremerton	32416MNT41	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Strawberry Creek (MP 41.35)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Strawberry Creek in Kitsap County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2020	Riparian	POM Request
Bremerton	32416MNT5X	SIKES NW NBK - Salmon Culvert Maintenance at E Mason Lake Road (MP 5.2 & 5.36)	This project will provide maintenance to fish blocking culverts beneath the Navy owned railroad on E Mason Lake Road in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2022	Riparian	POM Request
Bremerton	32416MNT69	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Cranberry Creek (MP 6.91)	This project will provide maintenance to the fish blocking culvert beneath the Navy owned railroad on a tributary to Cranberry Creek in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2021	Riparian	POM Request

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bremerton	32416MNT71	CHS NW NBK - Salmon Culvert Maintenance at Heins Creek (MP 0.71)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on Heins Creek in Kitsap County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	ESA, MSFCM, Sikes Act	ERL 4	Non-Annual Recurring	2018, 2022	Riparian	POM Request
Bremerton	32416MNT82	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Cranberry Creek (MP 8.2)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary to Cranberry Creek in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Annual Recurring	2021	Riparian	POM Request
Bremerton	32416MNT89	SIKES NW NBK - Salmon Culvert Maintenance at Tributary to Deer Creek (MP 8.9)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary of Deer Creek in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2018	Riparian	POM Request
Bremerton	32416MNT92	SIKES NW NBK - Salmon Culvert Maintenance at the Tributary to Deer Creek Culvert (MP 9.28)	This project will provide maintenance to a fish blocking culvert beneath the Navy owned railroad on a tributary of Deer Creek in Mason County Washington.	1 3	1.1 1.2 1.5 3.1 3.2	Sikes act, OPNAV M-5090.1, DOD 4715.03	ERL 4	Non-Recurring	2018	Riparian	POM Request

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Bremerton	68436NR028	CHS NW – NBK Vegetated Buffer	Assess and vegetate buffer strips along Sinclair Inlet at NAVBASE Kitsap at Bremerton with native vegetation. Project includes yearly maintenance for invasive removal.	1	1.2 1.3 1.4 1.5 1.8	SAIA, OPNAV M-5090.1	DOD Class 2.b ERL 3	Non-Recurring	2016-2018	Riparian	**Cancelled** – Project with Bangor UIC caused confusion, and funds were used at Bangor.
Region	6874212345	EO13112 NRNW NBK invasive Species Control	Project is to control invasive and noxious weeds at all Naval Base Kitsap Properties and associated rights of way. Control is accomplished through an integrated pest management process with herbicide application being the primary action and mechanical removal as necessary for scotch broom (Class B). Weed control will be conducted based on a rotational priority basis which is based on habitat benefits and habitat and species support.	2 3 5	1.2 1.4 3.2	EO13112, ESA, Sikes Act	DOD Class 2.c ERL 4	Recurring	2018-2022	All	Funded FY16
Region	68742CN001	1 CR NRNW Marbled Murrelet Density Surveys	The objectives of the annual marbled murrelet winter density survey are to estimate (1) population trends and (2) population size during the winter season. The surveys will occur in the marine environment adjacent to Navy installations within Puget Sound and the Washington coast.	2 3	1.10 3.2	ESA, Migratory Bird Treaty Act, Sikes Act	DOD Class ERL 4	Non-Annual Recurring	2016-2021	Nearshore	Funded FY2016
Region	68742CN002	1 S NRNW Threatened and Endangered Fish and Forage Fish Surveys	During the Puget Sound Chinook salmon ESA Critical Habitat review, the Navy committed to conducting annual monitoring for salmon and their prey species along Navy owned intertidal areas to support Critical Habitat exemption.	2 3	1.10 3.2	ESA, Migratory Bird Treaty Act, Sikes Act	DOD Class 2.c ERL 4	Recurring	2016-2022	Nearshore	Funded FY2016

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Region	68742NWTJ1	SIKES NRNW Establishing, Sustaining & Improving Vegetated Habitats	These projects contribute toward establishing, sustaining and improving habitats that support a variety of species. · Density and competition management (maintains habitat vigor, develops larger tree crowns for nests and cover, increases vertical diversity (e.g. can reduce nest predation), increases landscape habitat diversity, increases species diversity and provides for introduction of some late successional habitat characteristics earlier than would naturally occur, etc.) Establish native species (restores habitat, reduces fragmentation, increases habitat diversity, maintains wildlife travel corridors etc.) · Decrease or mitigate habitat damaging agents to reduce habitat degradation (e.g. reduce the spread of disease, mitigate susceptibility to wind-throw, etc.) These projects would be implemented in areas where the investment is predicted to benefit habitat over the long-term. As a part of the project, some treatments may require a vegetation based habitat inventory, evaluation of existing conditions and a prioritized plan to enable focused implementation in areas that would effectively facilitate habitat recovery and contribute toward long-term habitat quality.	3 4	1.10 1.11 4.1	Sikes Act, DOD Inst 4715.03, OPNAV M-5090.1	DOD Class ERL 4	Recurring	2018-2022	Forest	Awaiting CNO Approval

Installation	Project Number	Project Title	Project Description	INRMP Goals	INRMP Objective	Law, Policy, or Guidance	DOD Class and DON ERL Level	Progress Code	Fiscal Year	Ecosystem	Status
Region	68742MMS01	5 S NRNW Marine mammal Monitoring and Orca Network	Marine mammal monitoring will occur weekly at Navy Region Northwest (NRNW) installations to support Marine Mammal Protection Act (MMPA) permits (IHA applications) for mission activities and construction.	2	1.10	ESA, EFH, MMPA, Sikes Act	DOD Class 2.c ERL 4	Recurring	2018-2022	Nearshore	POM 18

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APPENDIX E: SPECIES THAT MAY OCCUR AT NAVBASE KITSAP

Appendix E. Species That May Occur at NAVBASE Kitsap

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Reptiles and Amphibians										
American bullfrog	X	X	X	X	X	X	X	X	X	X
Common gartersnake	X	X	X	X	X	X	X	X	X	X
Terrestrial gartersnake	X	X	X	X	X	X	X	X	X	X
Northwestern gartersnake	X	X	X	X	X	X	X	X	X	X
Long-toed salamander	X	X	X	X	X	X	X	X	X	X
Northwestern salamander	X	X	X	X	X	X	X	X	X	X
Northern Pacific chorus frog	X	X	X	X	X	X	X	X	X	X
Pacific treefrog	X	X	X	X	X	X	X	X	X	X
Western Toad	X	X	X	X	X	X	X	X	X	X
Rubber Boa		X		X	X		X	X	X	X
Northern Alligator Lizard	X	X	X	X	X	X	X	X	X	X
Ensatina	X	X	X	X	X	X	X	X	X	X
Western Redback Salamander	X	X	X	X	X	X	X	X	X	X
Northern Red- legged Frog		X	X	X	X		X	X	X	X
Western pond turtle	X	X			X					
Rough-Skinned Newt		X	X	X	X		X	X	X	X
Mammals										
Beaver		X			X		X		X	X
Black bear		X	X	X	X		X	X	X	X
Black-tailed deer	X	X	X	X	X		X	X	X	X
Bobcat		X			X		X	X	X	X
Brush rabbit	X	X	X	X	X	X	X	X	X	X
Bushytail woodrat	X	X	X	X	X	X	X	X	X	X
Coyote	X	X	X	X	X	X	X	X	X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Cougar	X	X			X			X	X	X
Deer mouse	X	X	X	X	X	X	X	X	X	X
Douglas squirrel	X	X	X	X	X	X	X	X	X	X
Long-tailed vole	X	X	X	X	X	X	X	X	X	X
Muskrat	X	X	X		X		X	X	X	X
Opossum	X	X	X	X	X	X	X	X	X	X
Raccoon	X	X	X	X	X	X	X	X	X	X
Red fox	X	X	X	X	X		X	X	X	X
River otter	X	X	X	X	X	X	X	X	X	X
Short-tailed weasel	X	X	X	X	X		X	X	X	X
Shrew	X	X	X	X	X	X	X	X	X	X
Townsend's chipmunk	X	X	X	X	X		X	X	X	X
Spotted skunk		X			X	X	X	X	X	X
Douglas squirrel	X	X	X	X	X	X	X	X	X	X
Mountain beaver		X	X	X	X		X	X	X	X
Long-tailed weasel		X			X		X	X	X	X
Mink		X			X		X	X	X	X
Townsend's Big-eared Bat	X	X	X	X	X	X	X	X	X	X
Pacific mole	X	X	X	X	X	X	X	X	X	X
Townsend mole	X	X	X	X	X	X	X	X	X	X
Striped skunk		X			X	X	X	X	X	X
Oregon vole	X	X	X	X	X	X	X	X	X	X
Marine Mammals										
Minke whale			X	X	X	X	X		X	X
Killer whale (transient)			X	X	X	X	X		X	X
Harbor porpoise			X	X	X	X	X		X	X
Gray whale			X	X		X	X			
Steller sea lion			X	X	X	X	X		X	X
North pacific Humpback whale			X	X	X	X	X		X	X
Northern elephant seal						X	X			
Harbor seal			X	X	X	X	X		X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
California sea lion			X	X	X	X	X		X	X
Birds										
American coot			X	X	X	X	X	X	X	X
American robin	X	X	X	X	X	X	X	X	X	X
Bald eagle	X	X	X	X	X	X	X	X	X	X
Barrow's goldeneye			X	X	X	X	X		X	X
Bufflehead			X	X	X	X	X		X	X
Bushtit	X	X	X	X	X		X	X	X	X
Caspian tern					X	X	X		X	X
Common crow	X	X	X	X	X	X	X	X	X	X
Common goldeneye			X	X	X	X	X		X	X
Common loon			X	X	X	X	X		X	X
Common raven	X	X	X	X	X		X	X	X	X
Downy woodpecker	X	X	X	X	X		X	X	X	X
Dunlin			X	X	X		X		X	X
Great blue heron		X	X	X	X		X	X	X	X
Hairy woodpecker	X	X	X	X	X		X	X	X	X
Harlequin duck					X		X		X	X
Hutton's vireo	X	X	X	X	X	X	X	X	X	X
Mallard	X	X	X	X	X	X	X		X	X
Merlin (pigeon hawk)	X	X	X	X	X		X	X	X	X
Mew gull	X	X	X	X	X	X	X	X	X	X
Northern pintail		X			X		X			
Northern pygmy owl	X	X	X	X	X		X	X	X	X
Northwestern crow	X	X	X	X	X	X	X	X	X	X
Osprey	X	X	X	X	X	X	X	X	X	X
Peregrine falcon					X					
Pigeon guillemot			X	X	X	X	X		X	X
Pileated woodpecker	X	X	X	X	X		X	X	X	X
Rhinoceros auklet					X		X		X	X
Sharp-shinned hawk	X	X	X	X	X		X	X	X	X
Sparrow hawk	X	X	X	X	X		X	X	X	X
Steller's Jay	X	X	X	X	X	X	X	X	X	X
Surf scoter			X	X	X	X	X		X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Townsend's Warbler	X	X	X	X	X		X	X	X	X
Swallow	X	X	X	X	X	X	X	X	X	X
Varied thrush	X	X	X	X	X	X	X	X	X	X
Western grebe			X	X	X	X	X		X	X
Western sandpiper			X	X	X	X	X		X	X
Wood duck		X			X		X		X	X
Yellow-billed loon			X	X	X	X	X		X	X
Pine siskin	X	X	X	X	X	X	X	X	X	X
American goldfinch	X	X	X	X	X	X	X	X	X	X
European starling	X	X	X	X	X	X	X	X	X	X
Bewick's wren	X	X	X	X	X	X	X	X	X	X
Greater yellowlegs			X	X	X	X	X		X	X
Winter wren	X	X	X	X	X	X	X	X	X	X
Robin	X	X	X	X	X	X	X	X	X	X
Barn owl	X	X			X	X	X	X	X	X
Barred owl	X	X			X	X	X	X	X	X
Mourning dove	X	X	X	X	X	X	X	X	X	X
White-crowned sparrow	X	X	X	X	X	X	X	X	X	X
Coopers' hawk		X	X	X	X		X	X	X	X
Spotted sandpiper			X	X	X	X	X		X	X
Red-winged blackbird		X			X		X	X	X	X
American widgeon		X	X	X	X	X	X		X	X
Green-winged teal		X	X	X	X	X	X		X	X
Northern shoveler		X	X	X	X	X	X		X	X
Greater scaup			X	X	X	X	X	X	X	X
Canvasback		X			X		X			
Lesser scaup			X	X	X	X	X	X	X	X
Ring-necked duck		X			X		X			
Ruffed grouse		X			X				X	X
Canada goose	X	X	X	X	X	X	X	X	X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Great horned owl		X			X		X	X	X	X
Red-tailed hawk		X	X	X	X		X	X	X	X
House finch	X	X	X	X	X	X	X	X	X	X
Purple finch	X	X	X	X	X	X	X	X	X	X
Brown creeper		X	X	X	X		X	X	X	X
Killdeer	X	X	X	X	X	X	X	X	X	X
Night hawk	X	X	X	X	X		X	X	X	X
Dipper		X			X		X		X	
Northern harrier		X	X	X	X		X		X	X
Evening grosbeak	X	X	X	X	X	X	X	X	X	X
Common flicker	X	X	X	X	X	X	X	X	X	X
Band-tailed pigeon	X	X	X	X	X	X	X	X	X	X
Rock dove	X	X	X	X	X	X	X	X	X	X
Common loon		X	X	X	X	X	X		X	X
Barn swallow	X	X	X	X	X	X	X	X	X	X
Dark-eyed (Oregon) junco	X	X	X	X	X	X	X	X	X	X
Herring gull			X	X	X	X	X	X	X	X
Ring-billed gull			X	X	X	X	X	X	X	X
Glaucous-winged gull			X	X	X	X	X	X	X	X
Bonaparte's gull			X	X	X	X	X	X	X	X
Long-billed dowitcher			X	X	X	X	X		X	X
Hooded merganser			X	X	X	X	X		X	X
California quail		X	X	X	X		X	X	X	X
Red crossbill	X	X	X	X	X	X	X	X	X	X
American widgeon		X	X	X	X	X	X		X	X
European widgeon		X	X	X	X	X	X		X	X
Belted kingfisher		X	X	X	X	X	X	X	X	X
White-winged scoter		X	X	X	X	X	X		X	X
Song sparrow	X	X	X	X	X	X	X	X	X	X
Common merganser		X	X	X	X	X	X		X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Red-breasted merganser		X	X	X	X	X	X		X	X
Black (Common) scoter			X	X	X	X	X		X	X
Screech owl		X	X	X	X		X	X	X	X
Black-capped chickadee	X	X	X	X	X	X	X	X	X	X
House sparrow	X	X	X	X	X	X	X	X	X	X
Fox sparrow	X	X	X	X	X	X	X	X	X	X
Rufous-sided towhee	X	X	X	X	X	X	X	X	X	X
Double-crested cormorant			X	X	X	X	X		X	X
Pelagic cormorant			X	X	X	X	X		X	X
Horned grebe			X	X	X	X	X		X	X
Red-necked grebe			X	X	X	X	X		X	X
Eared grebe			X	X	X	X	X		X	X
Pied-billed grebe			X	X	X	X	X		X	X
Purple martin	X	X	X	X	X	X	X	X	X	X
Ruby-crowned kinglet	X	X	X	X	X	X	X	X	X	X
Golden-crowned kinglet	X	X	X	X	X	X	X	X	X	X
Red-breasted nuthatch	X	X	X	X	X	X	X	X	X	X
Red-breasted sapsucker		X	X	X	X		X	X	X	X
Fish										
Arrowtooth flounder			X	X	X	X	X		X	X
Blackeye goby					X	X	X		X	X
Bluegill sunfish	X	X	X	X						
Buffalo sculpin			X	X	X	X	X	X	X	X
Chum salmon			X	X	X	X	X	X	X	X
Cutthroat trout			X	X	X	X	X		X	X
Dwarf wrymouth					X	X	X		X	X
High cockscomb			X	X	X	X	X	X	X	X
Kelp greenling			X	X	X	X	X	X	X	X
Pacific cod					X	X	X		X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Pacific herring			X	X	X	X	X	X	X	X
Pacific lamprey			X	X	X	X	X	X	X	X
Pacific sand lance			X	X	X	X	X	X	X	X
Pacific sanddab					X	X	X		X	X
Padded sculpin			X	X	X	X	X	X	X	X
Penpoint gunnel					X	X	X		X	X
Pink salmon			X	X	X	X	X		X	X
rex sole			X	X	X	X	X		X	X
Rock sole			X	X	X	X	X		X	X
Roughback sculpin			X	X	X	X	X	X	X	
Sablefish			X	X	X	X	X		X	X
Scalyhead sculpin			X	X	X	X	X	X	X	X
Sharpnose sculpin			X	X	X	X	X	X	X	X
Shiner perch			X	X	X	X	X		X	X
Smoothhead sculpin			X	X	X	X	X	X	X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Soft sculpin			X	X	X	X	X	X	X	X
Speckled sanddab			X	X	X	X	X		X	X
Spinycheek starsnout					X	X	X		X	X
Spinyhead sculpin			X	X	X	X	X	X	X	X
Sturgeon poacher					X	X	X		X	X
Surf smelt			X	X	X	X	X	X	X	X
Threespine stickleback	x	x	X	X	X	X	X	X	X	X
Tube-snout			X	X	X	X	X		X	X
Walleye pollock			X	X	X	X	X		X	X
Roughspine sculpin			X	X	X	X	X		X	X
Blacktip poacher					X	X	X			X
Greenstriped rockfish			X	X	X	X	X			X
Yellowtail rockfish			X	X	X	X	X			X
Quillback rockfish			X	X	X	X	X			X
Black rockfish			X	X	X	X	X			X
Redstriped rockfish			X	X	X	X	X			X
Spiny dogfish			X	X	X	X	X			X
Bay pipefish			X	X	X	X	X		X	X
Manacled sculpin			X	X	X	X	X		X	X
Sand sole			X	X	X	X	X		X	X
Tadpole sculpin			X	X	X	X	X		X	X
Slim sculpin			X	X	X	X	X		X	X
Big skate			X	X	X	X	X		X	X
Longnose skate			X	X	X	X	X		X	X
Pile perch			X	X	X	X	X		X	X
Northern ronquil			X	X	X	X	X		X	X
Rainbow trout	X		X	X	X	X	X		X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Cabezon, giant marbled sculpin			X	X	X	X	X		X	X
Brown rockfish			X	X	X	X	X		X	X
Copper rockfish			X	X	X	X	X		X	X
Brown bullhead	X		X	X	X	X	X		X	X
Arrow goby			X	X	X	X	X		X	X
Striped seaperch			X	X	X	X	X		X	X
Northern anchovy			X	X	X	X	X		X	X
Red irish lord			X	X	X	X	X		X	X
Flathead sole			X	X	X	X	X		X	X
Whitespotted greenling			X	X	X	X	X		X	X
Ratfish			X	X	X	X	X		X	X
Pacific staghorn sculpin			X	X	X	X	X		X	X
Ribbon snailfish			X	X	X	X	X		X	X
Showy snailfish			X	X	X	X	X		X	X
Pacific snake prickleback			X	X	X	X	X		X	X
Wattled eelpout			X	X	X	X	X		X	X
Blackbelly eelpout			X	X	X	X	X		X	X
Slender sole			X	X	X	X	X		X	X
Blackfin sculpin			X	X	X	X	X		X	X
Pacific hake			X	X	X	X	X		X	X
Pacific tomcod			X	X	X	X	X		X	X
Largemouth bass	X	X			X					
Dover sole			X	X	X	X	X		X	X
Sailfish sculpin			X	X	X	X	X		X	X
Pygmy poacher			X	X	X	X	X		X	X
Tidepool sculpin			X	X	X	X	X		X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Coho salmon	X		X	X	X	X	X	X	X	X
Sockeye salmon			X	X	X	X	X	X	X	X
Painted greenling			X	X	X	X	X		X	X
English sole			X	X	X	X	X		X	X
Lingcod			X	X	X	X	X		X	X
Crescent gunnel			X	X	X	X	X		X	X
Saddleback gunnel			X	X	X	X	X		X	X
Starry flounder			X	X	X	X	X		X	X
Bluebarred prickleback			X	X	X	X	X		X	X
Silverspotted sculpin			X	X	X	X	X		X	X
C-O Sole			X	X	X	X	X		X	X
Plainfin midshipman			X	X	X	X	X		X	X
Benthic & Shellfish Species										
Blue mussels			X	X	X	X	X		X	X
Butter clam			X	X	X	X	X		X	X
Dungeness crab			X	X	X	X	X		X	X
Littleneck clams					X	X	X		X	X
Olympia oyster			X	X	X	X	X		X	X
Pacific oyster			X	X	X	X	X		X	X
Pandalid shrimp			X	X	X	X	X		X	X
Red urchin			X	X	X	X	X		X	X
Brittle Stars			X	X	X	X	X		X	X
Tubeworm			X	X	X	X	X		X	X
Sea anemones			X	X	X	X	X		X	X
Barnacles			X	X	X	X	X		X	X
Graceful crab			X	X	X	X	X		X	X
Red rock crab			X	X	X	X	X		X	X
Decorator crab			X	X	X	X	X		X	X
Sea cucumbers			X	X	X	X	X		X	X
Starfish			X	X	X	X	X		X	X
Burrowing anemone			X	X	X	X	X		X	X

Species	Installation									
	Camp McKean	Camp Wesley Harris	Jackson Park Housing Complex	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Rock scallop			X	X	X	X	X		X	X
Limpet			X	X	X	X	X		X	X
Bent-nosed clam			X	X	X	X	X		X	X
Decorator crab			X	X	X	X	X		X	X
Horse mussel			X	X	X	X	X		X	X
Eastern soft shell clam			X	X	X	X	X		X	X
Bay mussel, Pacific blue mussel			X	X	X	X	X		X	X
Mediterranean mussels			X	X	X	X	X		X	X
Nudibranchs			X	X	X	X	X		X	X
Sea cucumber			X	X	X	X	X		X	X
Native littleneck clam			X	X	X	X	X		X	X
Kelp crab			X	X	X	X	X		X	X
Tubeworm			X	X	X	X	X		X	X
Jackknife clam			X	X	X	X	X		X	X
Manila clam; Japanese littleneck clam			X	X	X	X	X		X	X
Helmet crab			X	X	X	X	X		X	X
Horse clam, Gaper clam			X	X	X	X	X		X	X
Pacific geoduck			X	X	X	X	X		X	X

Potentially Occurring Threatened, Endangered, and Sensitive Species at NAVBASE Kitsap

Species	Status		Installation									
	Federal (critical habitat)	Washington	Camp McKean	Camp Wesley Harris	Jackson Park Housing	Naval Hospital Bremerton	NAVBASE Kitsap, Bangor	NAVBASE Kitsap, Bremerton	NAVBASE Kitsap, Keyport	Navy Railroad	Toandos Buffer Zone	Zelatched Point
Fauna												
Marbled murrelet	T	T			X	X	X	X	X		X	X
Bald eagle	SoC	S	X	X	X	X	X	X	X	X	X	X
Puget Sound chinook salmon	T	C			X	X	X	X	X	X	X	X
Hood Canal summer-run chum salmon	T	C					X				X	X
Puget Sound steelhead	T	T			X	X	X	X	X	X	X	X
Bull trout	T	C			X	X	X	X	X		X	X
Bocaccio	E	C			X	X	X	X	X		X	X
Canary rockfish	T	C			X	X	X	X	X		X	X
Yelloweye rockfish	T	C			X	X	X	X	X		X	X
Steller sea lion		T			X	X	X	X	X		X	X
Humpback whale	E	E			X	X	X	X	X		X	X
Southern resident killer whale	E	E			X	X		X	X			
Fisher		E									X	X
Yellow-billed cuckoo (riparian)	T	C		X	X	X	X		X	X	X	X
Burrington jumping-slug	C						X					
Evening fieldslug	C				X	X	X	X	X			
Cascades Frog	C	SM									X	X
Flora												
Marsh sandwort	E	PE		X		X	X		X	X	X	X
Howellia	T	T		X		X	X		X	X	X	X
Tall bugbane	SoC	T					X					
Torrey's peavine	SoC	T		X								
Yellow cedar	C			X	X	X	X		X	X	X	X
Pink sand-verbena	SoC	PE									X	

C=Candidate, E=Endangered, S=Sensitive, SoC=Species of Concern, T=Threatened, PE=Possibly Extirpated, P=Proposed, SM=State Monitored

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APPENDIX F: INSTALLATION RESTORATION SITES

NAVBASE Kitsap at Bangor
Installation Restoration Sites

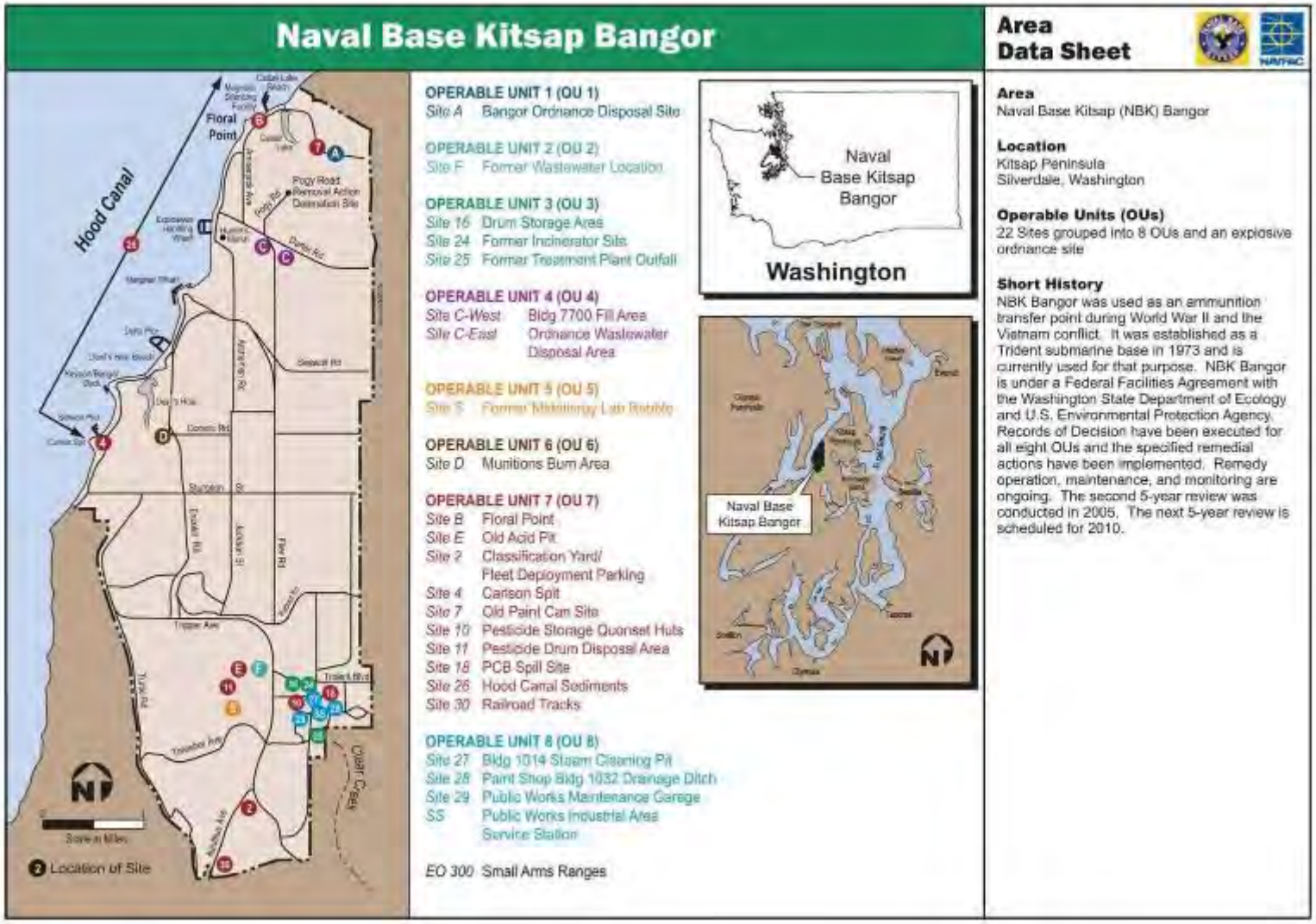
Naval Base Kitsap Bangor

Naval Base Description

Naval Base Kitsap (NBK) Bangor consists of approximately 7,000 acres of semirural land located on Hood Canal, 10 miles north of the city of Bremerton, Kitsap County, Washington. NBK Bangor was used as an ammunition transfer point from 1944 to the early 1970s. Ordnance arrived by train and ship to support U.S. military efforts in the Pacific theater. It was established as a Trident submarine base in 1973 and is currently used for that purpose. In February 1977, Naval Base Kitsap Bangor was commissioned as Naval Submarine Base (SUBASE), Bangor, the west coast homeport for the Trident Submarine Launched Ballistic Missile System. There are eight operable units (OUs) at NBK Bangor consisting of 23 individual sites. NBK Bangor is administered under a Federal Facilities Agreement between the Navy, Washington State Department of Ecology, and U.S. Environmental Protection Agency (EPA).

The following is a list of historical events at NBK Bangor from 1944 to the present:

- In 1944, naval activities began at the facility on 4 June.
- In 1944, the Pacific shipment point for ammunition and explosives was established.
- In 1945, Bangor Naval Magazine began operations on 25 January.
- In 1973, Trident System was approved by Congress; Bangor Naval Complex was selected as the location.
- Prior to 1977, ordnance and other wastes were burned, detonated, or disposed of at SUBASE, Bangor.
- In 1977, SUBASE, Bangor was commissioned.
- In 1982, the first submarine arrived.
- In 1987, Site A, located at the northern end of the base, was listed on the National Priorities List (NPL).
- In 1990, the remainder of SUBASE, Bangor was listed on the NPL.
- In 1991, the OU 1 Site A Record of Decision (ROD) was executed and the interim ROD for OU 2 was executed.
- In 1993, the OU 5 ROD was executed.
- In 1994, the OU 2 Site F ROD was executed.
- In 1994, RODs for OUs 3, 4, 5, and 6 were executed.
- In 1994, the Explanation of Significant Differences (ESD) No. 1 was prepared for OU 1, Site A.
- In 1994, an ESD was prepared for OU 2, Site F.
- In 1996, the OU 7 ROD was executed.
- In 1998, the ESD No. 2 was prepared for OU 1, Site A.
- In 2000, the ESD No. 3 was prepared for OU 1, Site A.
- In 2000, the OU 8 ROD was executed and the first 5-year review for NBK Bangor was completed.
- In 2001, the Institutional Controls Management Plan (ICMP) for NBK Bangor was completed and implemented.
- In 2005, the second 5-year review for NBK Bangor was completed.
- From 2005 to present, operation, maintenance, and monitoring are being conducted as specified in the RODs for OUs 1, 2, 3, 7, and 8.


Naval Base Kitsap Bangor
Area Data Sheet
Hood Canal
Floral Point
Location of Site
OPERABLE UNIT 1 (OU 1)
Site A Bangor Ordnance Disposal Site
OPERABLE UNIT 2 (OU 2)
Site F Former Wastewater Location
OPERABLE UNIT 3 (OU 3)
Site 16 Drum Storage Area
Site 24 Former Incinerator Site
Site 25 Former Treatment Plant Outfall
OPERABLE UNIT 4 (OU 4)
Site C-West Bldg 7700 Fill Area
Site C-East Ordnance Wastewater Disposal Area
OPERABLE UNIT 5 (OU 5)
Site 5 Former Metallurgy Lab Rubble
OPERABLE UNIT 6 (OU 6)
Site D Munitions Burn Area
OPERABLE UNIT 7 (OU 7)
Site B Floral Point
Site E Old Acid Pit
Site 2 Classification Yard/ Fleet Deployment Parking
Site 4 Carlson Spit
Site 7 Old Paint Can Site
Site 10 Pesticide Storage Quonset Huts
Site 11 Pesticide Drum Disposal Area
Site 18 PCB Spill Site
Site 26 Hood Canal Sediments
Site 30 Railroad Tracks
OPERABLE UNIT 8 (OU 8)
Site 27 Bldg 1014 Steam Cleaning Pit
Site 28 Paint Shop Bldg 1032 Drainage Ditch
Site 29 Public Works Maintenance Garage
SS Public Works Industrial Area Service Station
EO 300 Small Arms Ranges
Naval Base Kitsap Bangor
Washington
Naval Base Kitsap Bangor
Area
Naval Base Kitsap (NBK) Bangor
Location
Kitsap Peninsula
Silverdale, Washington
Operable Units (OUs)
22 Sites grouped into 8 OUs and an explosive ordnance site
Short History
NBK Bangor was used as an ammunition transfer point during World War II and the Vietnam conflict. It was established as a Trident submarine base in 1973 and is currently used for that purpose. NBK Bangor is under a Federal Facilities Agreement with the Washington State Department of Ecology and U.S. Environmental Protection Agency. Records of Decision have been executed for all eight OUs and the specified remedial actions have been implemented. Remedy operation, maintenance, and monitoring are ongoing. The second 5-year review was conducted in 2005. The next 5-year review is scheduled for 2010.


Naval Base Kitsap
Bangor
Site A
Site
Data Sheet
Site
Vinland
Cattail
Lake
Pintado Road
Site A
Tinosa Road
0
800
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site A, Bangor Ordnance Disposal Site
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 1
Identified Contaminants
Dinitrotoluene (DNT), picric acid, picramic acid, tetryl, trinitrotoluene (TNT), royal demolition explosive (RDX), and Otto fuel in soil, surface water, and groundwater
Short History
Site A was used to detonate and incinerate various ordnance materials from 1962 to 1975 and is composed of a burn area, two debris areas, and a storm water discharge area. Soil, surface water, and shallow groundwater were impacted because of its historical use. Municipal water supplies for nearby Vinland to the north are obtained from the deeper sea level aquifer, which has not been impacted by activities at Site A.
Investigations for this site were conducted from 1984 to 1991. The OU 1 Record of Decision (ROD) was executed in December 1991. The remedy for OU 1 consisted of excavating and treating 7,000 cubic yards of surface soil from the Burn Area and 100 cubic yards of soil from Debris Area 2, treating impacted groundwater using an ultraviolet oxidation process and reinfiltrating treated water in the shallow aquifer, and monitoring groundwater throughout the restoration action.
In 1993, soil contaminated with residue from burning explosives was excavated and cleaned using a wash-leach process and placed within a lined soil washing basin within the Burn Area. Debris Area 2 soils with elevated lead concentrations were isolated in a special cell within the wash basin. Groundwater restoration at OU 1 began in May 1997. Regular operation, maintenance, and monitoring of the system and groundwater have been conducted since 2000.
The second 5-year review (2005) concluded that the groundwater extraction and treatment system is not functioning as intended. The second 5-year review recommended that the Navy finalize optimization recommendations for the groundwater treatment system at Site A. The other components of the remedy for Site A are functioning as intended. The base-wide land use controls inspection process is functioning as intended.
Current Actions
The Navy conducts regular operation, maintenance, and monitoring of the groundwater treatment system. The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site F
Site
Data Sheet
Trigger Ave
Rabaul Rd
Railroad Sidings
Site F
Trident Blvd
Trigger Ave
Railroad
Railroad Sidings
Thresher Ave
Site
N
0
1,000
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site F, Former Wastewater Lagoon
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit
OU 2
Identified Contaminants
Trinitrotoluene (TNT) and royal demolition explosive (RDX) in soil and groundwater
Short History
Site F is a former wastewater lagoon and ditch that received rinse water from a steam-cleaning operation between 1957 and 1972. The wastewater was produced during the demilitarization (demil) of ordnance items in the adjacent building. Much of the wastewater infiltrated through the lagoon bottom. Periodically, the wastewater lagoon was allowed to drain and waste materials at the surface of the lagoon were "burned off" in place. The lagoon was taken out of service in 1972-1973.
Investigations for this site were conducted from 1988 to 1993. An interim Record of Decision (ROD) for OU 2 was executed in September 1991, specifying the interim remedial action of limiting further migration of ordnance-related chemicals in groundwater. The final OU 2 ROD was executed in September 1994. The remedy for OU 2 consisted of soil excavation and treatment, installation an infiltration barrier, periodic inspections of infiltration barrier to ensure long-term integrity, groundwater extraction and treatment, treated ground reinfiltration, and groundwater monitoring.
Impacted soil was excavated and treated in 1972. The former lagoon was backfilled and paved in 1980. On-site buildings were decontaminated and converted to storage. A groundwater extraction and treatment system specified by the interim ROD was constructed in 1994 and upgraded in 1996. This system is currently operational. Additional soil was excavated and treated in 1996. The site was capped in December 1997.
The second 5-year review (2005) concluded that the groundwater extraction and treatment portion of the remedy for Site F is not functioning as intended. An optimization review performed in 2004 concluded that the system is still effective at removing contaminant mass but will not fully clean up groundwater. Five specific recommendations for system optimization and future monitoring were made. The second 5-year review recommended that the Navy implement these optimization recommendations. The other components of the remedy for Site F are functioning as intended.
Current Actions
The Navy conducts regular operation, maintenance, and monitoring of the groundwater treatment system. The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site 16
Site
Data Sheet
NAVFAC
Trident Blvd
Seadevil Road
Sculpin Circle
Site 16
Site
1461
1028
1201
Parking
1014
1203
1016
1200
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 16, Drum Storage Area
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 3
Identified Contaminants
Semivolatile organic compounds (SVOCs), metals, ordnance compounds, and polychlorinated biphenyls (PCBs) in soil
Short History
Site 16 is located in the southeastern portion of NBK Bangor south of Trident Boulevard, and bounded by Seadevil Road to the east and Sculpin Circle to the Southwest. Site 16 is the location of a former drum storage area associated with former solid- and liquid-waste incinerators (Site 24). From 1970 to 1983, drums containing Otto fuel, trinitrotoluene (TNT), royal demolition explosive (RDX), and waste solvents were stored at Site 16. The area was used to store materials to be burned in the incinerators. Small spills reportedly occurred at the site, especially during heavy rainfall.
Investigations for this site were conducted from 1988 to 1993. The OU 3 Record of Decision (ROD) was executed in April 1994. The OU 3 ROD declared that risks at Site 16 are within the acceptable risk range and no remedial action was necessary. However, Site 16 surface soils had concentrations of some metals above Model Toxics Control Act residential soil clean up levels. Institutional controls restricting residential use of Site 16 were in place at the time the ROD was signed.
The second 5-year review (2005) concluded that the remedy has functioned as intended by the ROD. Land use restrictions for Site 16 are included in the Institutional Controls Management Plan (ICMP) as part of the base-wide restrictions established under OU 6 and are being monitored and enforced.
Current Actions
The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site 24
Site
Data Sheet
Trident Blvd
Seadevil Road
Sculpin Circle
Site
24
Site
0
200
Scale in Feet
1461
1026
1201
Parking
1014
1203
1016
1200
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 24, Former Incinerator Site
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 3
Identified Contaminants
Semivolatile organic compounds (SVOCs), metals, ordnance compounds, and polychlorinated biphenyls (PCBs) in soil
Short History
Site 24 is located in the southeastern portion of NBK Bangor south of Trident Boulevard and bounded by Seadevil Road to the east and Sculpin Circle to the southwest. Site 24 is the location of former solid- and liquid-waste incinerators. Between 1973 and 1983, the liquid-waste incinerator reportedly burned demilitarization wastewater from Site F, Otto fuel wastewater, and waste solvents. The solid-waste incinerator burned solid waste, including rags, sawdust, protective clothing, and carbon filters. Both incinerators were deactivated and removed in 1983.
Investigations were conducted from 1988 to 1993. The OU 3 Record of Decision (ROD) was executed in April 1994. The OU 3 ROD declared that risks at Site 24 are within the acceptable risk range and no remedial action was necessary. However, Site 24 surface soils had concentrations of some metals above Model Toxics Control Act residential soil clean up levels. Land use controls restricting residential use of Site 24 were in place at the time the ROD was signed.
The second 5-year review (2005) concluded that the remedy has functioned as intended by the ROD. Land use restrictions for Site 24 are included in the Institutional Controls Management Plan (ICMP) as part of the base-wide restrictions established under OU 8 and are being monitored and enforced.
Current Actions
The next 5-year review is scheduled for 2010.


Naval Base Kitsap
Bangor
Site 25
Site
Data Sheet
Name
Site 25, Former Treatment Plant Outfall
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 3
Identified Contaminants
Trinitrotoluene (TNT), royal demolition explosive (RDX), and metals in groundwater
Short History
Site 25 is located at the southeastern boundary of NBK Bangor between Sculpin Circle and Southern Boundary Road. Site 25 is the location of a former outfall from a sewage treatment plant that served the base's industrial area. The outfall discharged into two small ponds that directly discharged into Clear Creek. Records from 1971 indicate that RDX- and TNT-contaminated wastewater was treated at the plant. Site 25 has since been regraded and currently consists of two stormwater detention ponds that discharge into an oil-water separator prior to discharge into Clear Creek. Site 25, located downgradient of Sites 16/24, was included in OU 3 because of its proximity to Site 16/24 and because of the potential for contaminant migration from Sites 16/24 to Site 25 either by surface water or groundwater.
Investigations were conducted from 1988 to 1993. The OU 3 Record of Decision (ROD) was executed in April 1994. The OU 3 ROD declared that risks at Site 25 are within the acceptable risk range and no remedial action was necessary. However, Site 25 groundwater had concentrations of some chemicals of concern above groundwater cleanup levels. The ROD required 5 years of groundwater monitoring at Site 25. Following eight rounds of groundwater monitoring, the Navy and Washington State Department of Ecology agreed that the groundwater monitoring completed for Site 25 met the requirements of the OU 3 ROD and that no additional monitoring was required.
The second 5-year review (2005) concluded that the remedy for Site 25 has functioned as intended by the OU 3 ROD.
Current Actions
The next 5-year review is scheduled to be conducted in 2010.
Site
1016
1038
1021
1202
Parking
Parking
Parking
Public Works
1025
2011
Sculpin Circle
Oil/Water
Separator
Sorgion Ave
Site 25
Southern Boundary Road
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Bangor
Site C-East
Site
Data Sheet
NAVFAC
Site
Site C-West
Pogy Rd
Flier Rd
East
Carbon
Filter
West
Carbon
Filter
7701
Darter Road
Fill Material
Return Area
Probable
Leachate Pits
Site C-East
Flier Rd
N
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site C-East, Ordnance Wastewater Disposal Area
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 4
Identified Contaminants
Ammonium picrate, trinitrotoluene (TNT), royal demolition explosive (RDX), and Otto fuel in soil
Short History
Site C-East is a former wastewater and sludge disposal area located at the intersection of Flier Road, Darter Road, and Pogy Road. Site C-East was a gravel pit used for periodic ordnance wastewater and sludge disposal resulting from demilitarization operations. Documented disposal activities occurred from 1957 to 1973. Between 1957 and 1964, an estimated 1 million gallons of picric acid from Jackson Park demilitarization operations were disposed of in the unlined leachate pits at Site C-East. From 1964 to 1971, Site C-East was inactive. In 1971, an oil/water separator was installed on Site C-East to treat wastewater. In 1977, a portion of one of the disposal pits was excavated during construction of Flier Road and used as fill material in what is now Site C-West. It was later discovered that the material was contaminated, and it was returned to Site C-East. In 1978, a curtain drain, a road underdrain, and two carbon filter units were installed to treat surface water that had been contaminated. The carbon filter system was deactivated in 1982 due to low influent concentrations, but the road underdrain is still present.
Investigations for this site were conducted from 1988 to 1993. The OU 4 Record of Decision (ROD) was executed in July 1994. The evaluation indicated that no action was required to be protective of human health and the environment. Washington State Department of Ecology and U.S. Environmental Protection Agency concurred with these findings. Therefore, remedial action, land use controls, and monitoring were not required for this site.
Current Actions
None


Naval Base Kitsap
Bangor
Site C-West
Site
Data Sheet
Site
7062
Suspected
Fill Area
7700
Site C-West
Pogy Rd
Flier Rd
Darter Road
Site C-East
Flier Rd
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site C-West, Building 7700 Fill Area
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 4
Identified Contaminants
Ammonium picrate, trinitrotoluene (TNT), royal demolition explosive (RDX), and Otto fuel in soil
Short History
Site C-West is west of Site C-East, along Flier Road. Most of Site C-West is paved. Site C-West is an area where fill from Site C-East was taken to level a site for construction of Building of 7700. Prior to construction, this fill was determined to be contaminated and returned to Site C-East.
Investigations for this site were conducted from 1988 to 1993. The OU 4 Record of Decision (ROD) was executed in July 1994. The evaluation indicated that no action was required to be protective of human health and the environment. Washington State Department of Ecology and U.S. Environmental Protection Agency concurred with these findings. Therefore, remedial action, land use controls, and monitoring were not required for this site.
Current Actions
None


Naval Base Kitsap
Bangor
Site 5
Site
Data Sheet
NAVFAC
Trigger Ave
Site 5
Railroad Sidings
Railroad Sidings
Railroad
Trigger Ave
Thresher Ave
Site
N
0
1,000
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 5, Former Metallurgy Lab Rubble
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 5
Identified Contaminants
Mercury in soil
Short History
Site 5 consists of the construction rubble disposal area containing demolition rubble from the former metallurgy laboratory (FML). The disposal area is believed to be in the northern portion of the western barricaded railroad siding area, located in the south-central portion of NBK Bangor. This area consists of 20 barricaded railroad sidings located between Thresher Avenue and Trigger Avenue. From approximately 1958 to 1973, the FML was used for testing brass projectile shell casings. Approximately 100 pounds of mercurous nitrate was used to coat the casings. The volatilized mercury condensed on the walls of the FML building and was believed to be present in the rubble of the FML building. According to Navy personnel, the FML was demolished in the early 1970s.
Investigations for this site were conducted from 1988 to 1993. These evaluations resulted in a Record of Decision for OU 5 that was executed in September 1993. The evaluation indicated that no action was required to be protective of human health and the environment. The Washington State Department of Ecology and the U.S. Environmental Protection Agency concurred with these findings. Therefore, remedial action, land use controls, and monitoring were not required.
Current Actions
None


Naval Base Kitsap
Bangor
Site D
Site
Data Sheet
Site
Site D
Escolar Rd
Abandoned Railroad Grade
Burn Mounds or
Residual Soil
Seasonally
Wet Area
Stained
Area
Small Arms
Incinerator
Disturbed Area
Burn Trench
0
300
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site D, Munitions Burn Area
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 6
Identified Contaminants
Ammonium picrate, trinitrotoluene (TNT), royal demolition explosive (RDX), metals, picric acid, and picramic acid in soil, surface water and groundwater
Short History
Site D is a former munitions burn area located south of Dorado Road between Escolar Road and an abandoned railroad spur. It served as the principal ordnance burning and detonation area at NBK Bangor from 1944 to 1963 when these activities were transferred to Site A. Between 1944 and 1957, explosive D (ammonium picrate) sludge from the steam cleaning of projectiles at other areas was transferred to Site D for disposal. Site D was used sporadically for ordnance disposal until approximately 1985. Waste disposal areas at Site D included a small arms incinerator, a burn trench, and smaller burn areas or mounds.
Investigations for this site were conducted from 1988 to 1993. The OU 6 Record of Decision (ROD) was executed in September 1994. The remedy consisted of soil excavation and soil treatment, confirmation sampling of on-site surface water, and groundwater monitoring.
Impacted soil was excavated and treated in 1996 and 1997. The treated soil was then returned to the excavation area and planted with native vegetation.
The first 5-year review (2000) concluded that the remedy components for soil removal and treatment, surface water monitoring, and groundwater monitoring at OU 6 functioned as intended by the ROD. No additional monitoring was required following the first 5-year review. The second 5-year review concluded that there was no apparent change in the functionality of the remedy. Land use controls are not required for OU 6.
Current Actions
The next 5-year review is scheduled to be conducted in 2010.

OU 7

OPERABLE UNIT 7 (OU 7)

Site B	Floral Point
Site E	Old Acid Pit
Site 2	Classification Yard/ Fleet Deployment Parking
Site 4	Carlson Spit
Site 7	Old Paint Can Site
Site 10	Pesticide Storage Quonset Huts
Site 11	Pesticide Drum Disposal Area
Site 18	PCB Spill Site
Site 26	Hood Canal Sediments
Site 30	Railroad Tracks

Area Data Sheet

Area
Operable Unit (OU) 7

Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington

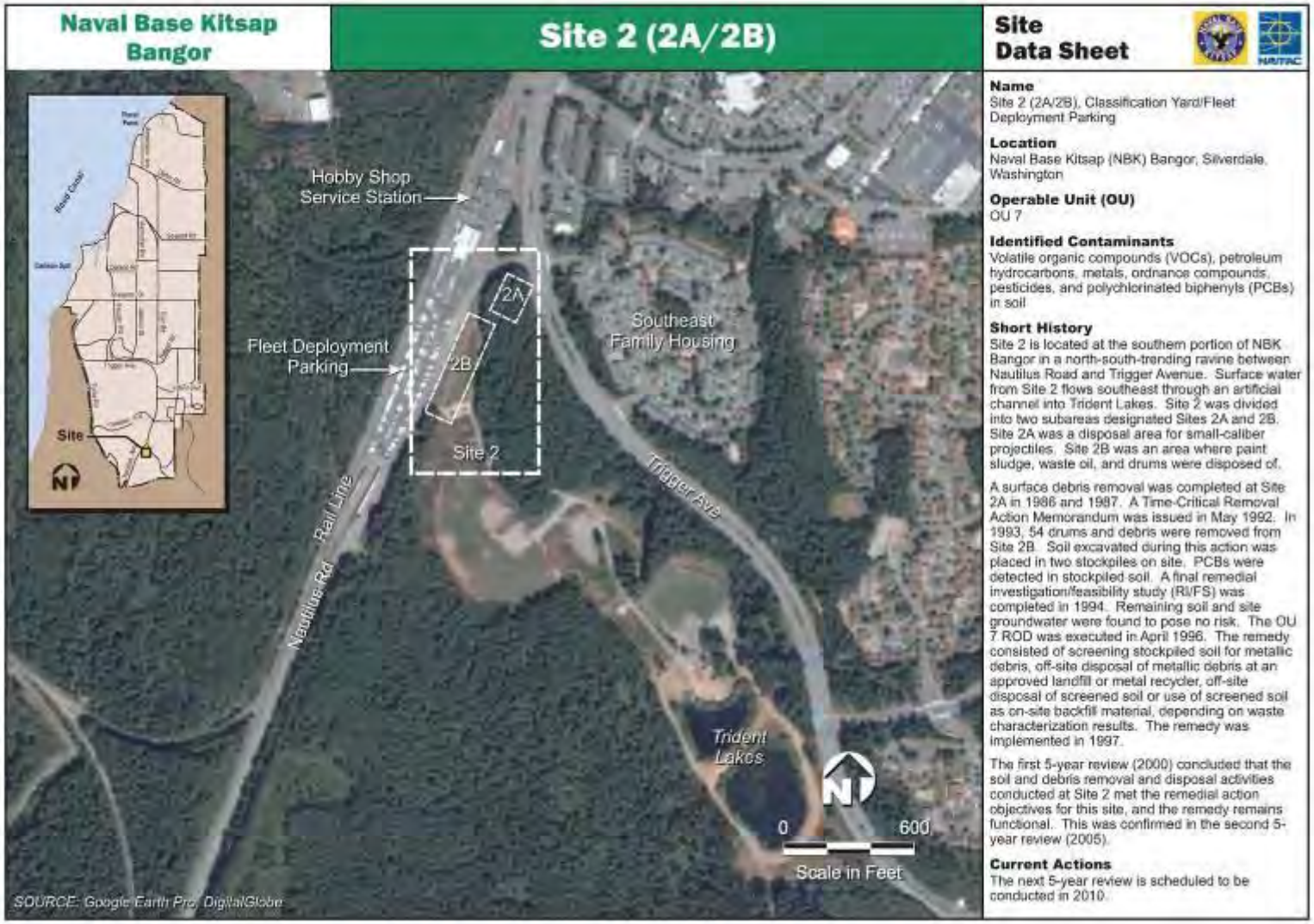
Operable Units
10 sites grouped into OU 7

Short History
OU 7 comprises 10 known or suspected waste sites (Sites B, E, 2, 4, 7, 10, 11, 18, 26, and 30) at locations across NBK Bangor. Sites 27, 28, and 29 were originally part of OU 7, but were included within OU 8 in 1994 following investigation of surrounding areas. Although not part of OU 7 as defined in the Federal Facilities Agreement (FFA), three lake or wetland areas (Cattail Lake, Hunter's Marsh, and Devil's Hole, collectively termed the Ecological Areas) were included for study with the 10 sites.

The remedial investigation/feasibility study for OU 7 was completed in 1994, and the Record of Decision was completed in 1996. More details on each of the 10 OU 7 sites are provided in the following site data sheets.


Naval Base Kitsap
Bangor
Site B
Site
Data Sheet
Site
Hood Canal
Site B
Concrete
Pad
Amberjack Rd
0
150
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site B, Floral Point
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Volatile organic compounds (VOCs), petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), metals, ordnance compounds, pesticides, and polychlorinated biphenyls (PCBs) in soil
Short History
Site B is located in the northwest portion of NBK Bangor at Floral Point. It consists of approximately 5 acres of natural shoreline between Amberjack Road and Hood Canal. The only structures on the site are a small observation hut facing Hood Canal and an L-shaped concrete foundation located in the approximate center of the point. The interior of the point is vegetative with some trees and underbrush. Pyrotechnic testing and black powder burning were conducted at Floral Point in the 1950s and 1960s. Floral Point was also used for station dumping, including pit disposal, landfilling and trash burning, from approximately 1950 to 1968. From 1966 to 1967, the site was reportedly used for open burning of explosive residuals from Site F. Floral Point contains no surface water drainages, and groundwater beneath the shoreline site is not suitable for consumption due to mixing with salt water.
Investigations for this site were completed from 1988 to 1994. The OU 7 Record of Decision (ROD) was executed in April 1996. The remedy for Site B at OU 7 consisted of removing metal debris from the wetland area, decommissioning nine monitoring wells, covering contaminated soil areas with 1 foot of clean soil overlain by a mulch layer and revegetation, construction of a shoreline protection system, installation of a stormwater drainage system, and construction of a concrete turnaround at the top of the boat ramp to prevent erosion from vehicles using the ramp.
Remedial actions at Site B were completed in November 1997. Remedy components have been inspected and maintained since then. Land use controls are in place, are enforced, and are inspected annually. Sediment and clam tissue monitoring was conducted in the area of Floral Point for 14 years (1991 through 2004). Trends in this analytical data show that groundwater discharge from Floral Point into Hood Canal is not adversely affecting sediments or clam tissue. The second 5-year review (2005) concluded that the monitoring component of the Site B remedy has functioned as intended by the ROD and is complete.
Current Actions
The Navy conducts remedy inspections and sediment and clam tissue monitoring annually. The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site E
Site
Data Sheet
Trigger Ave
Site E
Drum Staging Area
Equipment
Decontamination
Area
Decontamination
Trailer
Site 11
Clean Soil Stockpile
Areas Where Drums Detected
Excavation Pit
Contaminant Cell (Contaminated Soil)
Trailer
Railroad Sidings
Railroad Sidings
Trigger Ave
Railroad
Thresher Ave
0
800
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site E, Old Acid Pit
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Pesticides and metals in soil and Otto fuel in groundwater
Short History
Site E is located in a forested area in the south-central portion of NBK Bangor between Trigger Avenue and Thresher Avenue. Site E was combined with Site 11 into one investigation program because the two sites are contiguous and there was concern that drums at Site 11 were also disposed of at Site E. Site E was reportedly used as an acid disposal site for electroplating wastes and Otto fuel (torpedo fuel) from 1960 to 1973. The materials were disposed of in a pit lined with gravel, and there is no record that an impermeable barrier or liner was placed beneath the gravel.
Investigations for this site were conducted from 1988 to 1994. The OU 7 Record of Decision (ROD) was executed in April 1996. The remedy for OU 7, Site E, consisted of the removal and disposal of the stockpiled soil at a permitted landfill, removal and disposal of metal debris at an off-site facility, and implementation of groundwater use restrictions. Groundwater monitoring is regularly conducted as specified in the remedy for Site F under the ROD for OU 2.
The first 5-year review (2000) concluded that the remedy component for soil removal and disposal at Site E functioned as intended by the ROD. The groundwater use restriction in place as part of the base-wide Institutional Controls Management Plan (ICMP) is functioning as intended. The second 5-year review (2005) concluded that the groundwater remedy is functioning to contain, but not substantially remove, Otto fuel from beneath the site. Containment of groundwater with Otto fuel, in combination with the groundwater use restriction, functions to meet the remedial action objective
Current Actions
The Navy conducts regular operation, maintenance, and monitoring of the groundwater treatment system. The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site 2 (2A/2B)
Site
Data Sheet
Hobby Shop
Service Station
Fleet Deployment
Parking
2A
2B
Site 2
Southeast
Family Housing
Trigger Ave
Nautilus Rd
Rail Line
Trident
Lakes
Site
0
600
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 2 (2A/2B), Classification Yard/Fleet Deployment Parking
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Volatile organic compounds (VOCs), petroleum hydrocarbons, metals, ordnance compounds, pesticides, and polychlorinated biphenyls (PCBs) in soil
Short History
Site 2 is located at the southern portion of NBK Bangor in a north-south-trending ravine between Nautilus Road and Trigger Avenue. Surface water from Site 2 flows southeast through an artificial channel into Trident Lakes. Site 2 was divided into two subareas designated Sites 2A and 2B. Site 2A was a disposal area for small-caliber projectiles. Site 2B was an area where paint sludge, waste oil, and drums were disposed of.
A surface debris removal was completed at Site 2A in 1986 and 1987. A Time-Critical Removal Action Memorandum was issued in May 1992. In 1993, 54 drums and debris were removed from Site 2B. Soil excavated during this action was placed in two stockpiles on site. PCBs were detected in stockpiled soil. A final remedial investigation/feasibility study (RI/FS) was completed in 1994. Remaining soil and site groundwater were found to pose no risk. The OU 7 ROD was executed in April 1996. The remedy consisted of screening stockpiled soil for metallic debris, off-site disposal of metallic debris at an approved landfill or metal recycler, off-site disposal of screened soil or use of screened soil as on-site backfill material, depending on waste characterization results. The remedy was implemented in 1997.
The first 5-year review (2000) concluded that the soil and debris removal and disposal activities conducted at Site 2 met the remedial action objectives for this site, and the remedy remains functional. This was confirmed in the second 5-year review (2005).
Current Actions
The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site 4
Site
Data Sheet
Hood Canal
Service Pier
Site
7041
7101
Site 4
Wahoo Rd
Parking
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 4, Carlson Spit
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
None identified
Short History
Site 4 is a gravelly beach and upland area located at Carlson Spit between Wahoo Road and Hood Canal just south of Service Pier. The site reportedly contained ordnance detonation test pits. No contamination was identified during Phase I sampling activities.
The OU 7 risk assessment concluded that conditions at Site 4 do not pose risks to human health or the environment. The OU 7 Record of Decision (ROD) declared that remedial action, land use controls, monitoring, and 5-year reviews were not required.
Current Actions
None


Naval Base Kitsap
Bangor
Site 7
Site
Data Sheet
Hood
Canal
Site
Tinosa Rd
Cattail
Lake
Marsh
Site
7
N
0
300
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 7, Old Paint Can Site
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Metals and solvents in soil and groundwater
Short History
Site 7 is located in a wooded area on the hillside above the south end of Cattail Lake in the northern portion of NBK Bangor. It was used for disposal of containers from an old paint shop during the mid-1970s. Some of the containers were partially filled with paint, thinner, and solvents. The containers were removed in 1981. The OU 7 risk assessment concluded that conditions at Site 7 do not pose risks to human health or the environment. The OU 7 Record of Decision (ROD) declared that remedial action, land use controls, monitoring, and 5-year reviews were not required.
Current Actions
None

Name
Site 10, Pesticide Storage Quonset Huts

Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington

Operable Unit (OU)
OU 7

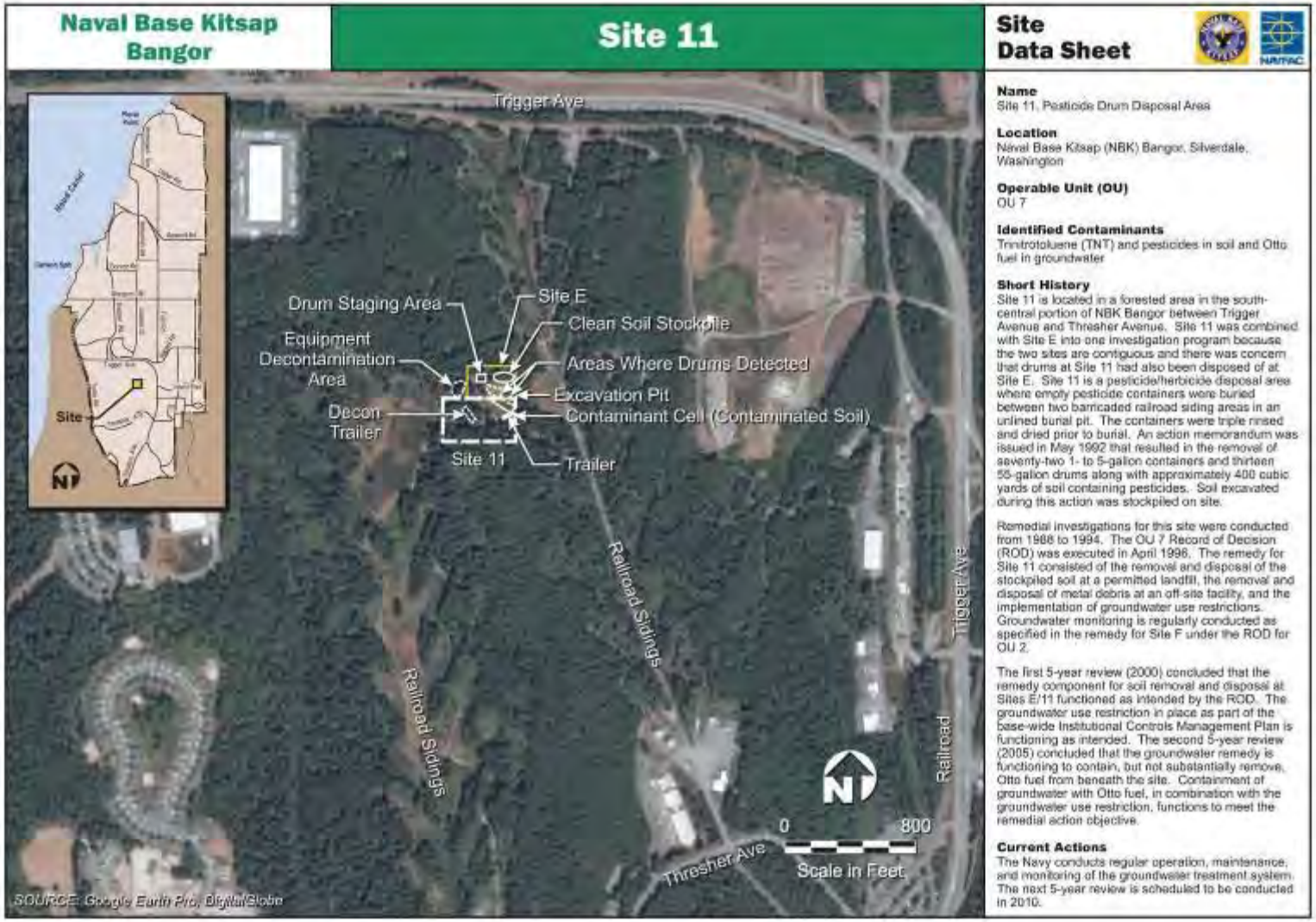
Identified Contaminants
Pesticides and herbicides in soil

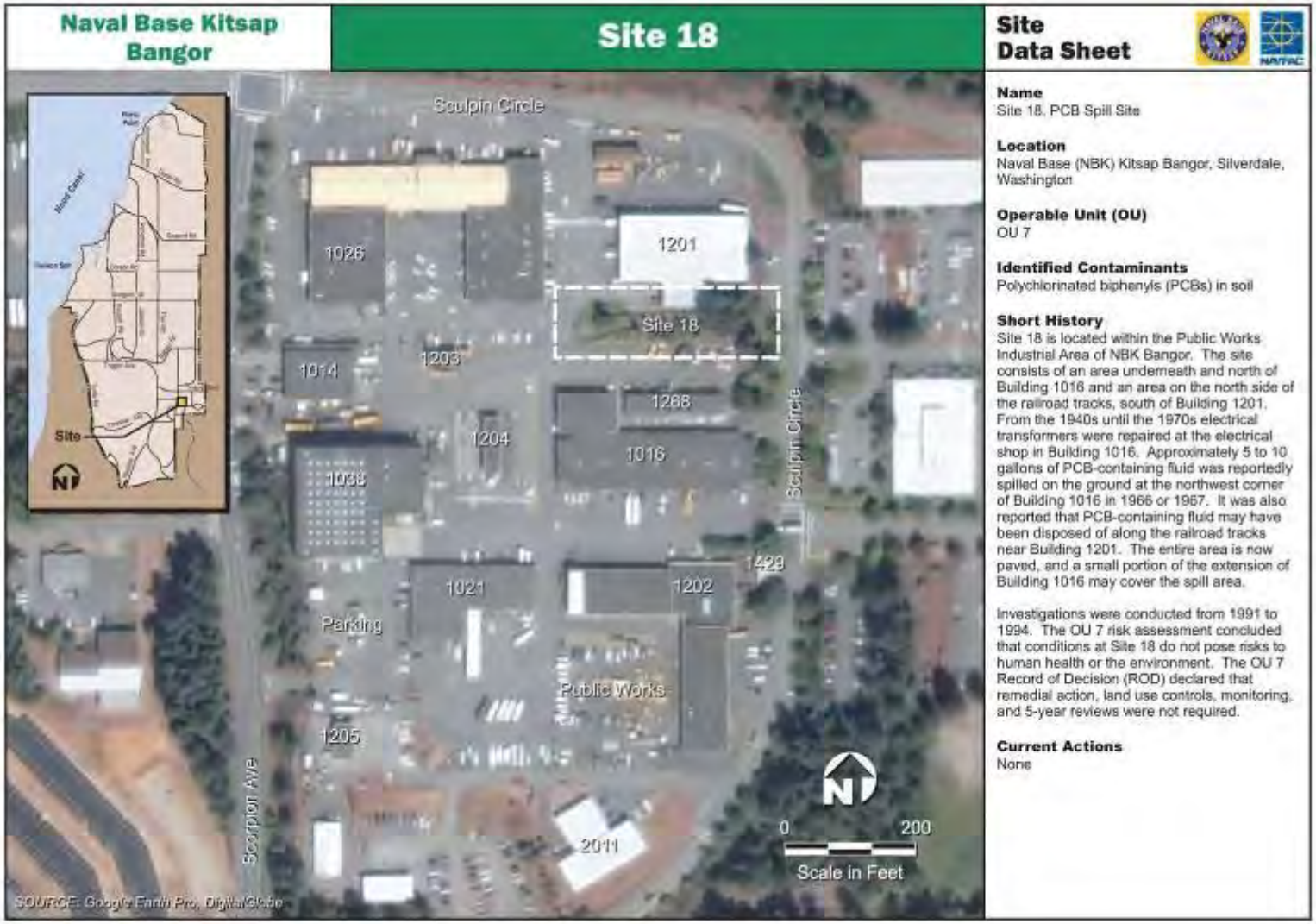
Short History
Site 10 is located just west of the Public Works Industrial Area proper across Scorpion Avenue on the south side of Guardfish Street. The site is the former location of two wooden floor Quonset huts (demolished in 1983) that stored pesticides and herbicides prior to 1979. The area has been extensively and repeatedly excavated, leveled, and developed. The site is currently the paved parking area for Buildings 2011 and 2012.

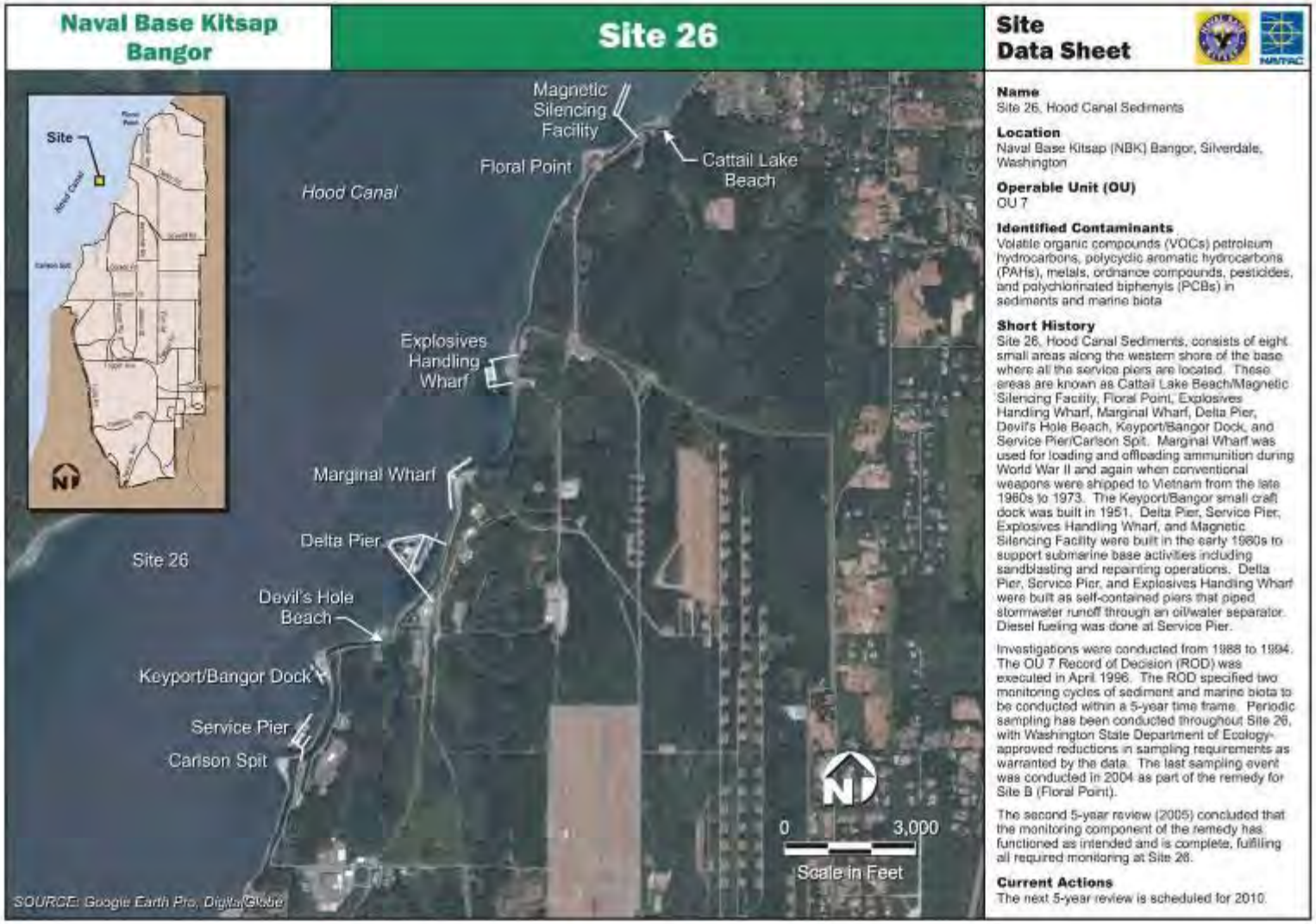
Investigations for this site were conducted from 1988 to 1994. The OU 7 Record of Decision (ROD) was executed in April 1996. The Navy, U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology determined that the most appropriate remedies for Site 10 were long-term maintenance of the existing asphalt pavement to prevent exposure to chemicals in the soil, conducting confirmatory groundwater sampling for the presence (or absence) of petroleum hydrocarbons, and establishing land use controls to prevent groundwater use.

The second 5-year review (2005) concluded that the remedy for Site 10 was functioning as intended. Confirmation groundwater sampling results showed that no further sampling was necessary. Groundwater use restrictions for Site 10 were included in the Institutional Controls Management Plan (ICMP) as part of the restrictions established under OU 8 and are being monitored and enforced.

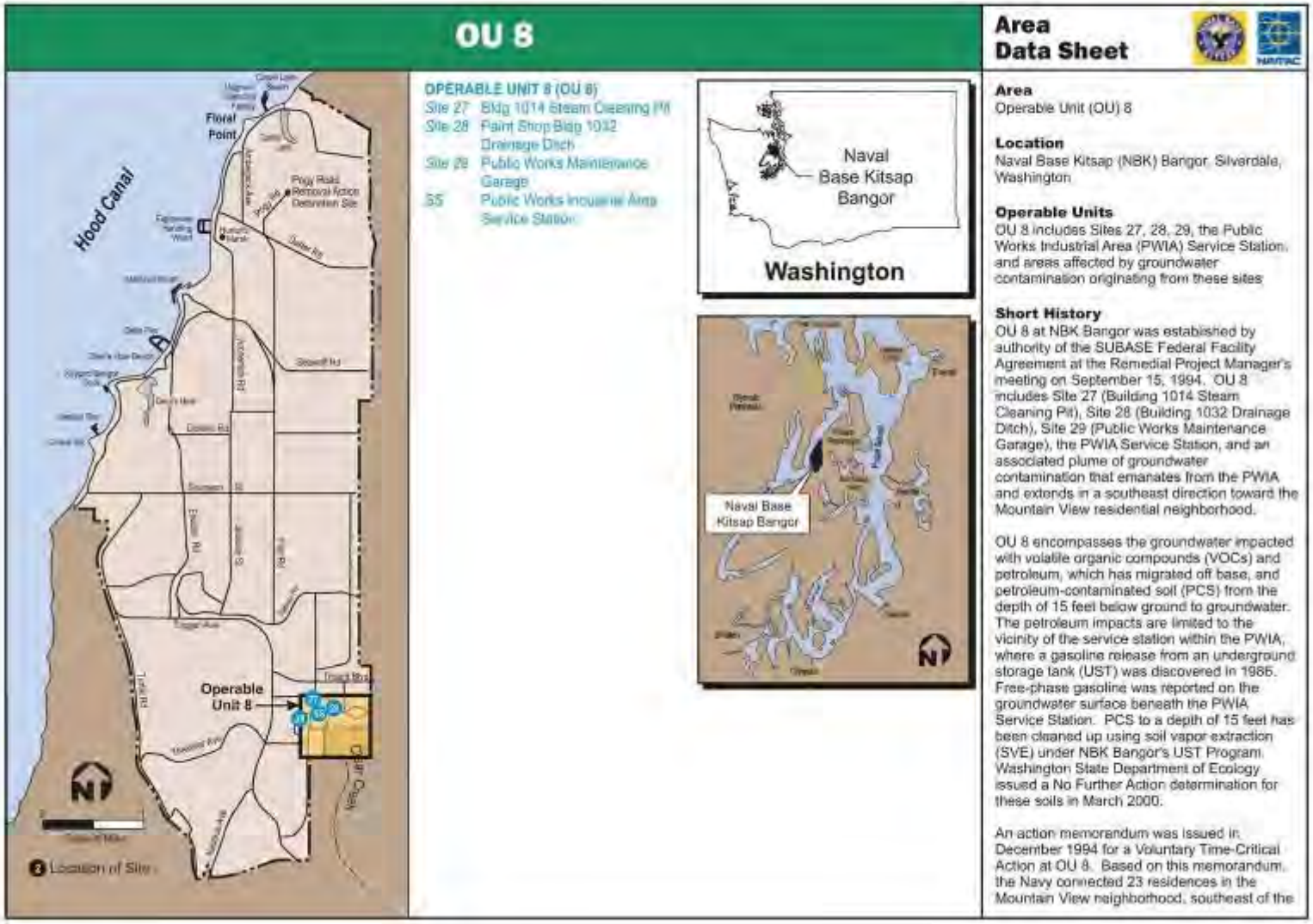
Current Actions
The Navy conducts institutional control maintenance and inspections annually. The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site 11
Site
Data Sheet
Trigger Ave
Drum Staging Area
Site E
Clean Soil Stockpile
Equipment
Decontamination
Area
Areas Where Drums Detected
Excavation Pit
Decon
Trailer
Contaminant Cell (Contaminated Soil)
Site 11
Trailer
Railroad Sidings
Railroad Sidings
Trigger Ave
Railroad
Thresher Ave
0
800
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 11, Pesticide Drum Disposal Area
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Trinitrotoluene (TNT) and pesticides in soil and Otto fuel in groundwater
Short History
Site 11 is located in a forested area in the south-central portion of NBK Bangor between Trigger Avenue and Thresher Avenue. Site 11 was combined with Site E into one investigation program because the two sites are contiguous and there was concern that drums at Site 11 had also been disposed of at Site E. Site 11 is a pesticide/herbicide disposal area where empty pesticide containers were buried between two barricaded railroad siding areas in an unlined burial pit. The containers were triple rinsed and dried prior to burial. An action memorandum was issued in May 1992 that resulted in the removal of seventy-two 1- to 5-gallon containers and thirteen 55-gallon drums along with approximately 400 cubic yards of soil containing pesticides. Soil excavated during this action was stockpiled on site.
Remedial investigations for this site were conducted from 1988 to 1994. The OU 7 Record of Decision (ROD) was executed in April 1996. The remedy for Site 11 consisted of the removal and disposal of the stockpiled soil at a permitted landfill, the removal and disposal of metal debris at an off-site facility, and the implementation of groundwater use restrictions. Groundwater monitoring is regularly conducted as specified in the remedy for Site F under the ROD for OU 2.
The first 5-year review (2000) concluded that the remedy component for soil removal and disposal at Sites E/11 functioned as intended by the ROD. The groundwater use restriction in place as part of the base-wide Institutional Controls Management Plan is functioning as intended. The second 5-year review (2005) concluded that the groundwater remedy is functioning to contain, but not substantially remove, Otto fuel from beneath the site. Containment of groundwater with Otto fuel, in combination with the groundwater use restriction, functions to meet the remedial action objective.
Current Actions
The Navy conducts regular operation, maintenance, and monitoring of the groundwater treatment system. The next 5-year review is scheduled to be conducted in 2010.


Naval Base Kitsap
Bangor
Site 18
Site
Data Sheet
Sculpin Circle
1026
1201
Site 18
1014
1203
1288
1204
1016
1038
1428
1021
1202
Parking
Public Works
1205
2011
Scorpion Ave
Sculpin Circle
Site
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 18, PCB Spill Site
Location
Naval Base (NBK) Kitsap Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Polychlorinated biphenyls (PCBs) in soil
Short History
Site 18 is located within the Public Works Industrial Area of NBK Bangor. The site consists of an area underneath and north of Building 1016 and an area on the north side of the railroad tracks, south of Building 1201. From the 1940s until the 1970s electrical transformers were repaired at the electrical shop in Building 1016. Approximately 5 to 10 gallons of PCB-containing fluid was reportedly spilled on the ground at the northwest corner of Building 1016 in 1966 or 1967. It was also reported that PCB-containing fluid may have been disposed of along the railroad tracks near Building 1201. The entire area is now paved, and a small portion of the extension of Building 1016 may cover the spill area.
Investigations were conducted from 1991 to 1994. The OU 7 risk assessment concluded that conditions at Site 18 do not pose risks to human health or the environment. The OU 7 Record of Decision (ROD) declared that remedial action, land use controls, monitoring, and 5-year reviews were not required.
Current Actions
None


Naval Base Kitsap
Bangor
Site 26
Site
Data Sheet
Site
Hood Canal
Magnetic
Silencing
Facility
Floral Point
Cattail Lake
Beach
Explosives
Handling
Wharf
Marginal Wharf
Delta Pier
Site 26
Devil's Hole
Beach
Keyport/Bangor Dock
Service Pier
Carlson Spit
0
3,000
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 26, Hood Canal Sediments
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Volatile organic compounds (VOCs) petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), metals, ordnance compounds, pesticides, and polychlorinated biphenyls (PCBs) in sediments and marine biota
Short History
Site 26, Hood Canal Sediments, consists of eight small areas along the western shore of the base where all the service piers are located. These areas are known as Cattail Lake Beach/Magnetic Silencing Facility, Floral Point, Explosives Handling Wharf, Marginal Wharf, Delta Pier, Devil's Hole Beach, Keyport/Bangor Dock, and Service Pier/Carlson Spit. Marginal Wharf was used for loading and offloading ammunition during World War II and again when conventional weapons were shipped to Vietnam from the late 1960s to 1973. The Keyport/Bangor small craft dock was built in 1951. Delta Pier, Service Pier, Explosives Handling Wharf, and Magnetic Silencing Facility were built in the early 1960s to support submarine base activities including sandblasting and repainting operations. Delta Pier, Service Pier, and Explosives Handling Wharf were built as self-contained piers that piped stormwater runoff through an oil/water separator. Diesel fueling was done at Service Pier.
Investigations were conducted from 1988 to 1994. The OU 7 Record of Decision (ROD) was executed in April 1996. The ROD specified two monitoring cycles of sediment and marine biota to be conducted within a 5-year time frame. Periodic sampling has been conducted throughout Site 26, with Washington State Department of Ecology-approved reductions in sampling requirements as warranted by the data. The last sampling event was conducted in 2004 as part of the remedy for Site B (Floral Point).
The second 5-year review (2005) concluded that the monitoring component of the remedy has functioned as intended and is complete, fulfilling all required monitoring at Site 26.
Current Actions
The next 5-year review is scheduled for 2010.

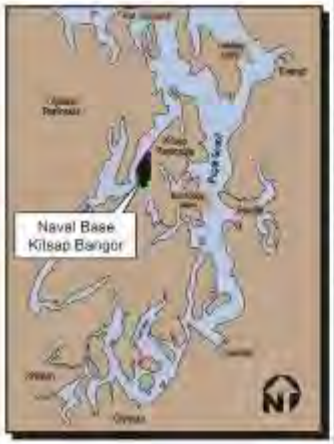

Naval Base Kitsap
Bangor
Site 30
Site
Data Sheet
Name
Site 30, Railroad Tracks
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 7
Identified Contaminants
Herbicides and pesticides in soil
Short History
Site 30 is a portion of the railroad tracks north of Trigger Avenue Gate and on the west side of Naulilus Avenue. The site includes the railroad tracks and a steep drainage ditch adjacent to the tracks. Site 30 was reportedly used from 1977 to 1985 for the disposal of rinsewater from a triple-rinsing process that used Nutra-sol to clean large tank sprayers and holding tanks of pesticides and herbicides. The quantity of materials disposed of at this site is unknown. The OU 7 risk assessment concluded that conditions at Site 30 do not pose risks to human health or the environment. The OU 7 Record of Decision (ROD) declared that remedial action, land use controls, monitoring, and 5-year reviews were not required.
Current Actions
None
Base Boundary
Site 30
Rail Line
Naulilus Ave
Southern Boundary Rd
Gate 4
0
600
Scale in Feet
Site
SOURCE: Google Earth Pro, DigitalGlobe


OU 8
Area
Data Sheet
NAVFAC
OPERABLE UNIT 8 (OU 8)
Site 27 Bldg 1014 Steam Cleaning Pit
Site 28 Paint Shop Bldg 1032 Drainage Ditch
Site 29 Public Works Maintenance Garage
SS Public Works Industrial Area Service Station
Naval Base Kitsap Bangor
Washington
Naval Base Kitsap Bangor
Hood Canal
Floral Point
Piggy Road Removal Action Destination Site
Operable Unit 8
Location of Site
Area
Operable Unit (OU) 8
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Units
OU 8 includes Sites 27, 28, 29, the Public Works Industrial Area (PWIA) Service Station, and areas affected by groundwater contamination originating from these sites
Short History
OU 8 at NBK Bangor was established by authority of the SUBASE Federal Facility Agreement at the Remedial Project Manager's meeting on September 15, 1994. OU 8 includes Site 27 (Building 1014 Steam Cleaning Pit), Site 28 (Building 1032 Drainage Ditch), Site 29 (Public Works Maintenance Garage), the PWIA Service Station, and an associated plume of groundwater contamination that emanates from the PWIA and extends in a southeast direction toward the Mountain View residential neighborhood.
OU 8 encompasses the groundwater impacted with volatile organic compounds (VOCs) and petroleum, which has migrated off base, and petroleum-contaminated soil (PCS) from the depth of 15 feet below ground to groundwater. The petroleum impacts are limited to the vicinity of the service station within the PWIA, where a gasoline release from an underground storage tank (UST) was discovered in 1986. Free-phase gasoline was reported on the groundwater surface beneath the PWIA Service Station. PCS to a depth of 15 feet has been cleaned up using soil vapor extraction (SVE) under NBK Bangor's UST Program. Washington State Department of Ecology issued a No Further Action determination for these soils in March 2000.
An action memorandum was issued in December 1994 for a Voluntary Time-Critical Action at OU 8. Based on this memorandum, the Navy connected 23 residences in the Mountain View neighborhood, southeast of the

OU 8 (continued)

OPERABLE UNIT 8 (OU 8)

- Site 27 Bldg 1014 Steam Cleaning Pit
- Site 28 Paint Shop Bldg 1032 Drainage Ditch
- Site 29 Public Works Maintenance Garage
- SS Public Works Industrial Area Service Station

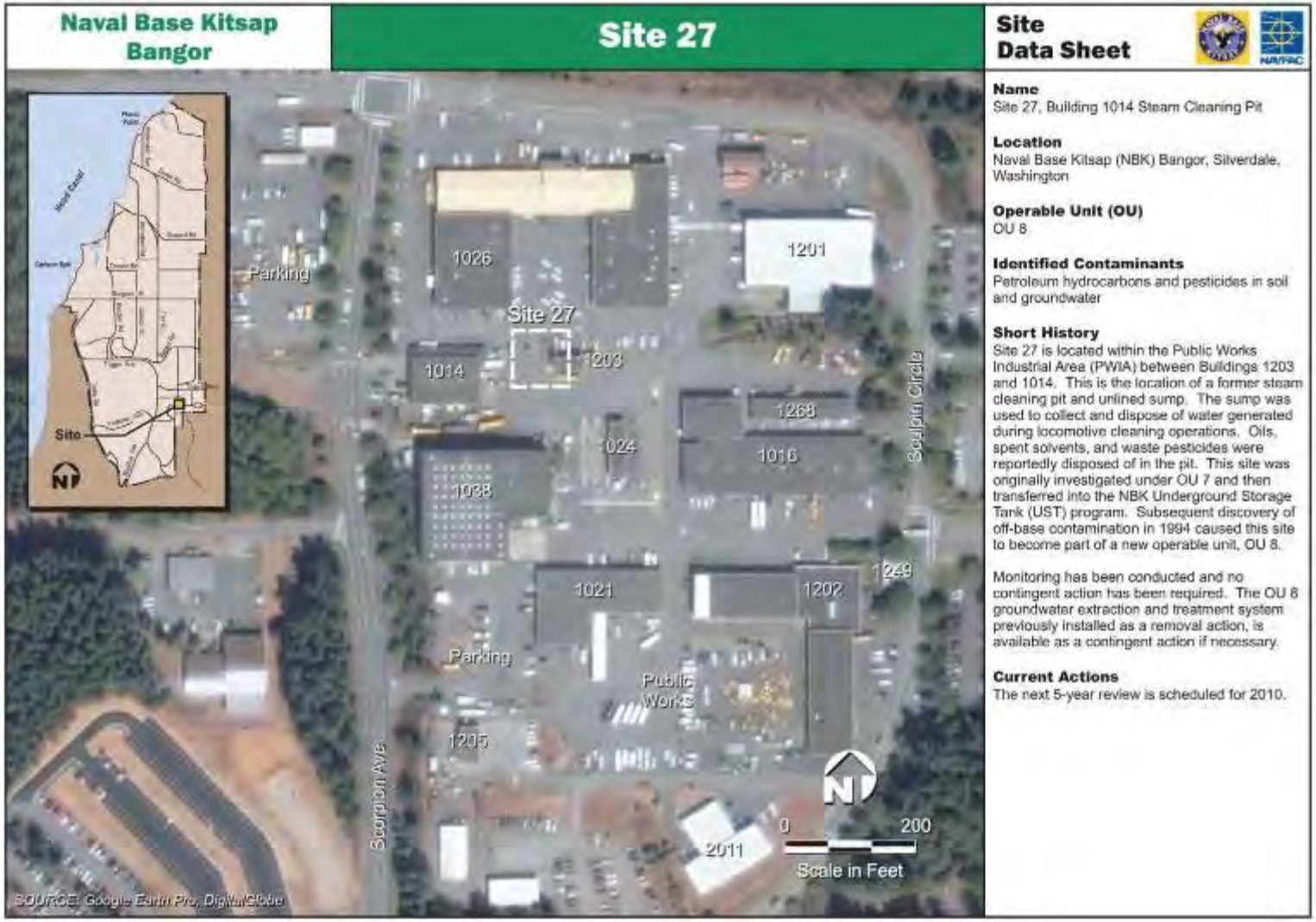


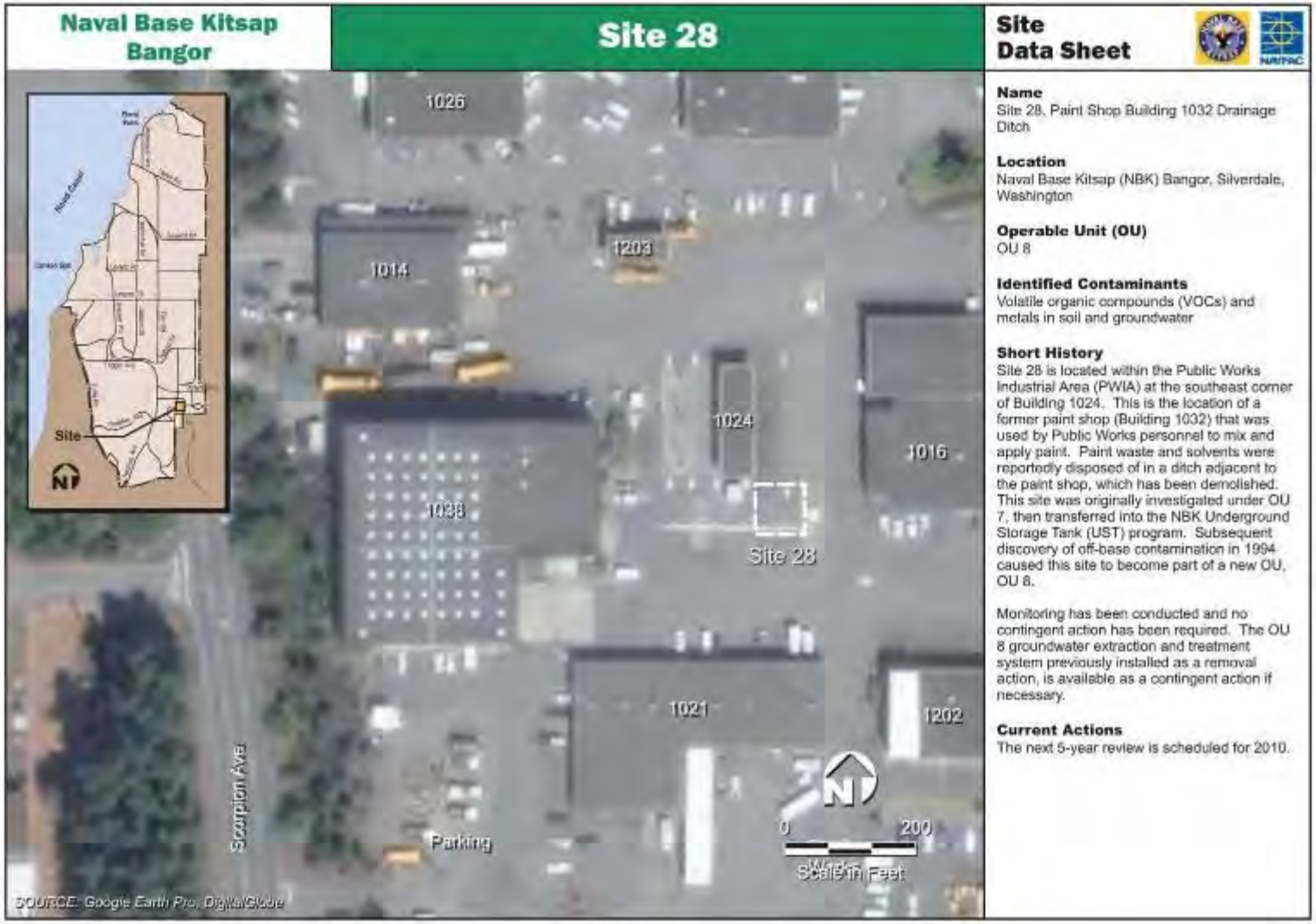
Area Data Sheet

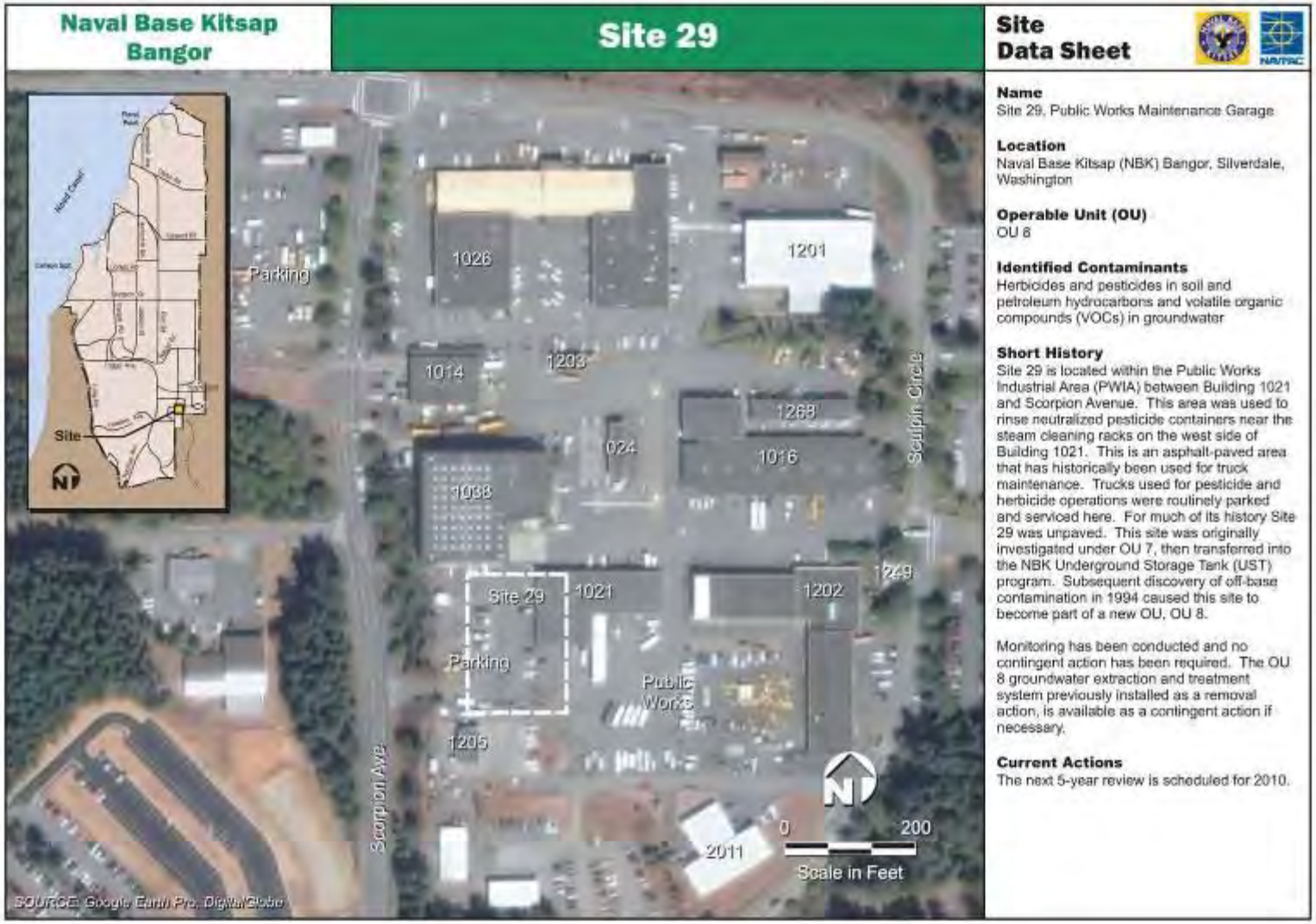
Short History (continued)

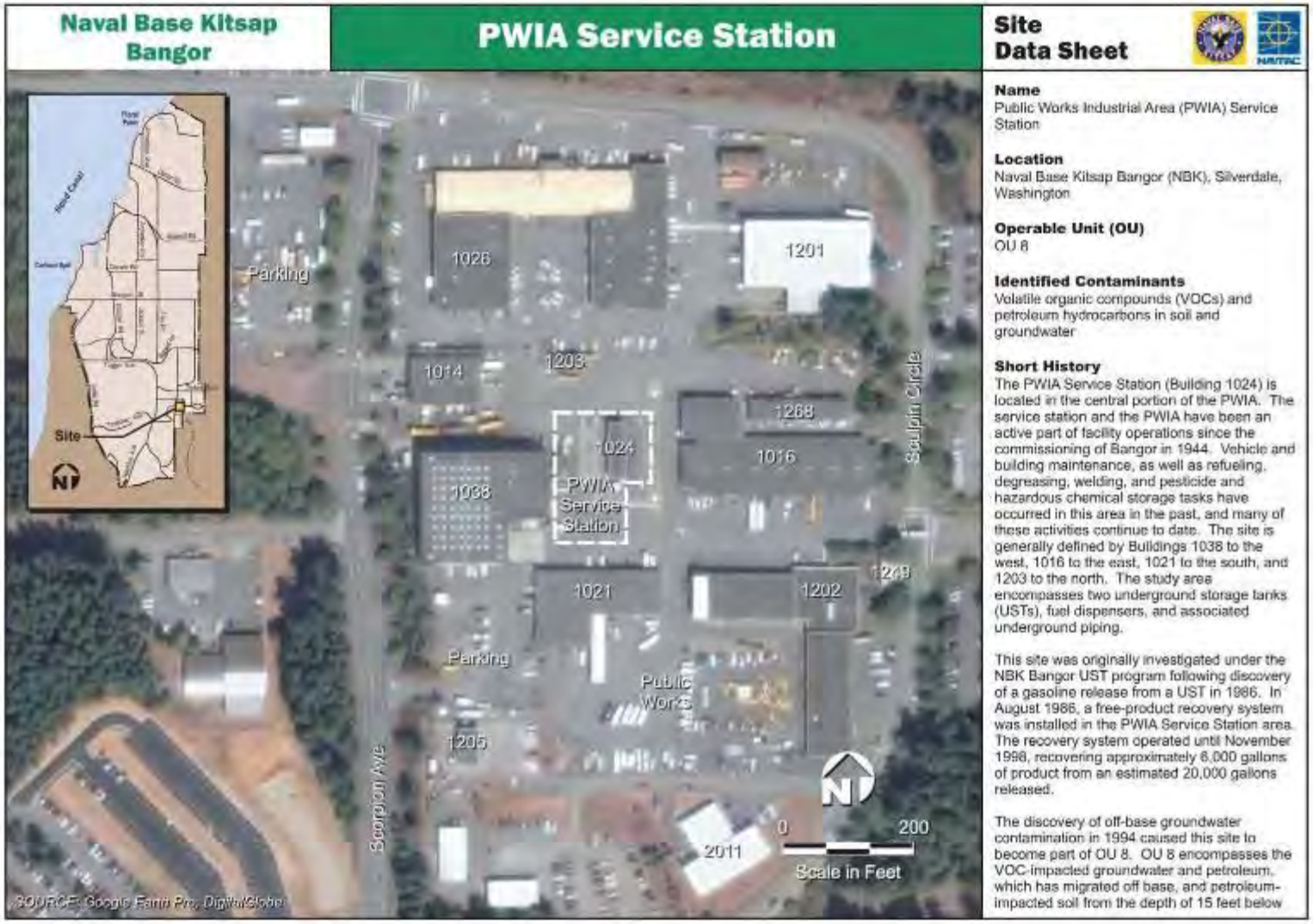
base boundary, to the Silverdale Water District in 1995, a municipal water supply. A second Time-Critical Action Memorandum was issued in February 1996. Based on this memorandum, the Navy installed a groundwater containment system to minimize off-base plume migration in 1996. The Record of Decision (ROD) for OU 8 was executed in September 2000. The preferred cleanup alternative includes a combination of three technologies: monitored natural attenuation (MNA) of contaminants in groundwater, free-product recovery, and land use controls.

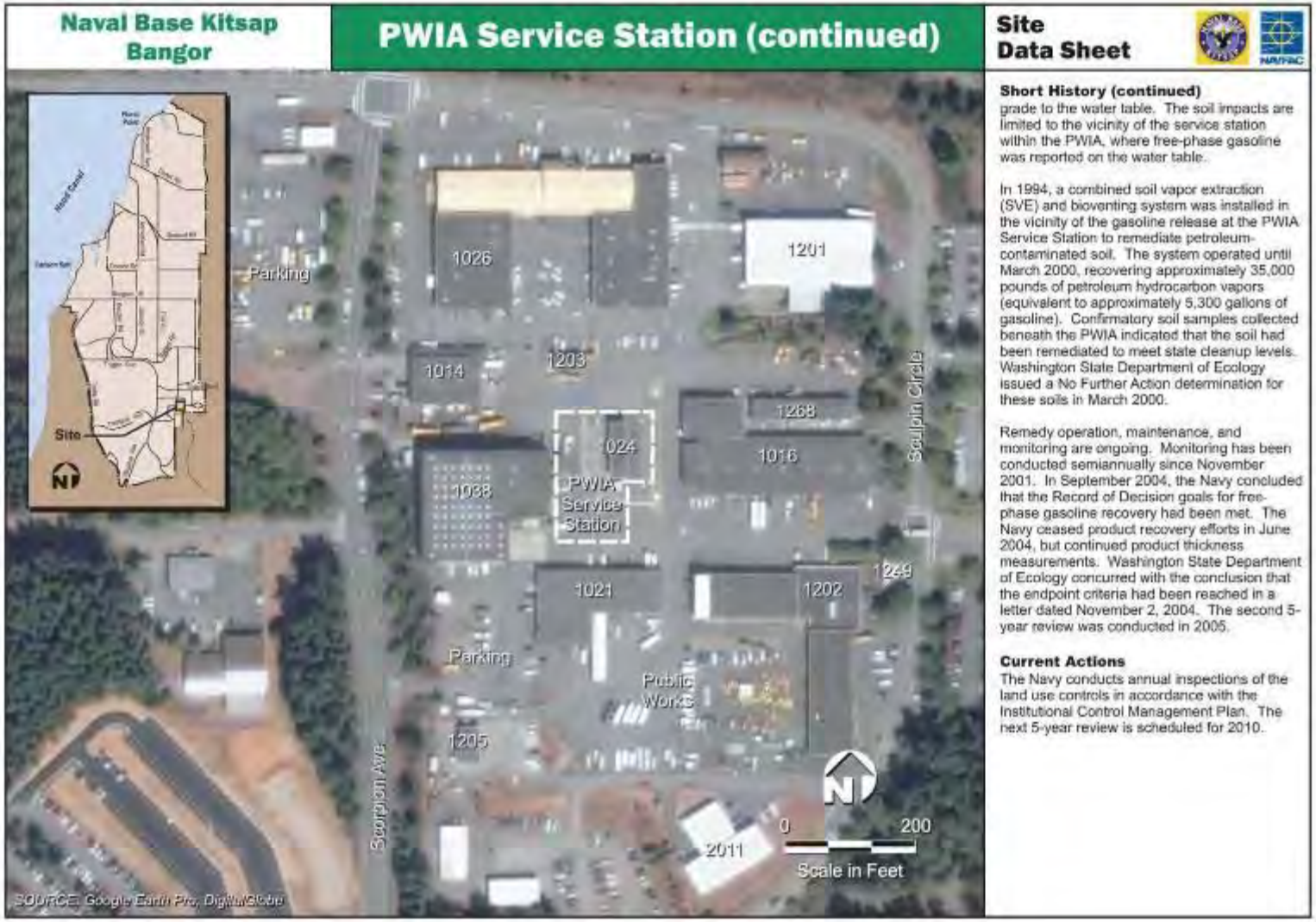
Remedy operation, maintenance, and monitoring are ongoing. MNA monitoring has been conducted semiannually since November 2001. In September 2004, the Navy concluded that the ROD goals for product recovery had been met. The Navy ceased product recovery efforts in June 2004, but continued product thickness measurements. Washington State Department of Ecology concurred with the conclusion that the endpoint criteria had been reached in a letter dated November 2, 2004. The Navy has conducted annual inspections of the land use controls. The second 5-year review was conducted in 2005. The next 5-year review is scheduled for 2010.


Naval Base Kitsap
Bangor
Site 27
Site
Data Sheet
NAVFAC
Name
Site 27, Building 1014 Steam Cleaning Pit
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 8
Identified Contaminants
Petroleum hydrocarbons and pesticides in soil and groundwater
Short History
Site 27 is located within the Public Works Industrial Area (PWIA) between Buildings 1203 and 1014. This is the location of a former steam cleaning pit and unlined sump. The sump was used to collect and dispose of water generated during locomotive cleaning operations. Oils, spent solvents, and waste pesticides were reportedly disposed of in the pit. This site was originally investigated under OU 7 and then transferred into the NBK Underground Storage Tank (UST) program. Subsequent discovery of off-base contamination in 1994 caused this site to become part of a new operable unit, OU 8.
Monitoring has been conducted and no contingent action has been required. The OU 8 groundwater extraction and treatment system previously installed as a removal action, is available as a contingent action if necessary.
Current Actions
The next 5-year review is scheduled for 2010.
Site
NP
Parking
1026
Site 27
1203
1014
1201
1268
1024
1016
1038
Scorpion Circle
1021
1202
1249
Parking
Public Works
1205
Scorpion Ave
2011
N
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Bangor
Site 28
Site
Data Sheet
NAVFAC
Name
Site 28, Paint Shop Building 1032 Drainage Ditch
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 8
Identified Contaminants
Volatile organic compounds (VOCs) and metals in soil and groundwater
Short History
Site 28 is located within the Public Works Industrial Area (PWIA) at the southeast corner of Building 1024. This is the location of a former paint shop (Building 1032) that was used by Public Works personnel to mix and apply paint. Paint waste and solvents were reportedly disposed of in a ditch adjacent to the paint shop, which has been demolished. This site was originally investigated under OU 7, then transferred into the NBK Underground Storage Tank (UST) program. Subsequent discovery of off-base contamination in 1994 caused this site to become part of a new OU, OU 8.
Monitoring has been conducted and no contingent action has been required. The OU 8 groundwater extraction and treatment system previously installed as a removal action, is available as a contingent action if necessary.
Current Actions
The next 5-year review is scheduled for 2010.
1026
1014
1203
1024
1016
1038
Site 28
1021
1202
Scorpion Ave
Parking
Site
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Bangor
Site 29
Site
Data Sheet
Name
Site 29, Public Works Maintenance Garage
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit (OU)
OU 8
Identified Contaminants
Herbicides and pesticides in soil and petroleum hydrocarbons and volatile organic compounds (VOCs) in groundwater
Short History
Site 29 is located within the Public Works Industrial Area (PWIA) between Building 1021 and Scorpion Avenue. This area was used to rinse neutralized pesticide containers near the steam cleaning racks on the west side of Building 1021. This is an asphalt-paved area that has historically been used for truck maintenance. Trucks used for pesticide and herbicide operations were routinely parked and serviced here. For much of its history Site 29 was unpaved. This site was originally investigated under OU 7, then transferred into the NBK Underground Storage Tank (UST) program. Subsequent discovery of off-base contamination in 1994 caused this site to become part of a new OU, OU 8.
Monitoring has been conducted and no contingent action has been required. The OU 8 groundwater extraction and treatment system previously installed as a removal action, is available as a contingent action if necessary.
Current Actions
The next 5-year review is scheduled for 2010.
Site
Parking
1026
1201
1014
1203
1269
024
1016
1038
Sculpin Circle
1249
Site 29
1021
1202
Parking
Public Works
1205
Scorpion Ave
2011
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Bangor
PWIA Service Station
Site
Data Sheet
Name
Public Works Industrial Area (PWIA) Service Station
Location
Naval Base Kitsap Bangor (NBK), Silverdale, Washington
Operable Unit (OU)
OU 8
Identified Contaminants
Volatile organic compounds (VOCs) and petroleum hydrocarbons in soil and groundwater
Short History
The PWIA Service Station (Building 1024) is located in the central portion of the PWIA. The service station and the PWIA have been an active part of facility operations since the commissioning of Bangor in 1944. Vehicle and building maintenance, as well as refueling, degreasing, welding, and pesticide and hazardous chemical storage tasks have occurred in this area in the past, and many of these activities continue to date. The site is generally defined by Buildings 1038 to the west, 1016 to the east, 1021 to the south, and 1203 to the north. The study area encompasses two underground storage tanks (USTs), fuel dispensers, and associated underground piping.
This site was originally investigated under the NBK Bangor UST program following discovery of a gasoline release from a UST in 1986. In August 1986, a free-product recovery system was installed in the PWIA Service Station area. The recovery system operated until November 1998, recovering approximately 6,000 gallons of product from an estimated 20,000 gallons released.
The discovery of off-base groundwater contamination in 1994 caused this site to become part of OU 8. OU 8 encompasses the VOC-impacted groundwater and petroleum, which has migrated off base, and petroleum-impacted soil from the depth of 15 feet below
Site
Parking
1026
1201
1014
1203
1268
1024
1016
PWIA Service Station
1038
Sculpin Circle
1021
1202
1249
Parking
Public Works
1205
Scorpion Ave
2011
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Bangor
PWIA Service Station (continued)
Site
Data Sheet
Short History (continued)
grade to the water table. The soil impacts are limited to the vicinity of the service station within the PWIA, where free-phase gasoline was reported on the water table.
In 1994, a combined soil vapor extraction (SVE) and bioventing system was installed in the vicinity of the gasoline release at the PWIA Service Station to remediate petroleum-contaminated soil. The system operated until March 2000, recovering approximately 35,000 pounds of petroleum hydrocarbon vapors (equivalent to approximately 5,300 gallons of gasoline). Confirmatory soil samples collected beneath the PWIA indicated that the soil had been remediated to meet state cleanup levels. Washington State Department of Ecology issued a No Further Action determination for these soils in March 2000.
Remedy operation, maintenance, and monitoring are ongoing. Monitoring has been conducted semiannually since November 2001. In September 2004, the Navy concluded that the Record of Decision goals for free-phase gasoline recovery had been met. The Navy ceased product recovery efforts in June 2004, but continued product thickness measurements. Washington State Department of Ecology concurred with the conclusion that the endpoint criteria had been reached in a letter dated November 2, 2004. The second 5-year review was conducted in 2005.
Current Actions
The Navy conducts annual inspections of the land use controls in accordance with the Institutional Control Management Plan. The next 5-year review is scheduled for 2010.
Site
Parking
1026
1201
1014
1203
1268
1024
1016
PWIA Service Station
1038
Scuttin Circle
1249
1021
1202
Parking
Public Works
1205
Scorpion Ave
2011
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Bangor
EO 300
Site
Data Sheet
Name
EO 300, Small Arms Ranges
Location
Naval Base Kitsap (NBK) Bangor, Silverdale, Washington
Operable Unit
Not Applicable
Identified Contaminants
Lead in soil
Short History
The Small Arms Ranges consist of two pistol ranges and one trap range that were constructed in the late 1940s. Only small caliber ammunition was used at the ranges. Following the closure of the ranges in the late 1970s, the area was used for an archery range. The ranges are currently unused.
In 1995, lead concentrations in soil were detected in excess of state cleanup levels. In 2006, the Navy completed a preliminary assessment of the Small Arms Ranges. This assessment reported no evidence of munitions and explosives of concern (MEC) during a site visit and concluded that this site is not suspected to contain MEC. The assessment also concluded that complete exposure pathways exist for human and ecological receptors for munitions constituents (MC) in surface soil and potentially complete pathways exist for subsurface soil and groundwater.
Project plans for field sampling were completed in September 2007. Field sampling was conducted in December 2007.
Current Actions
Project plans are being developed for a removal action that is scheduled for 2009.
Nautilus Avenue
Small Arms Ranges
EO 300
Pistol Range 1
Pistol Range 2
Trap Range
South Boundary Road
Site
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe

NAVBASE Kitsap at Keyport
Installation Restoration Sites

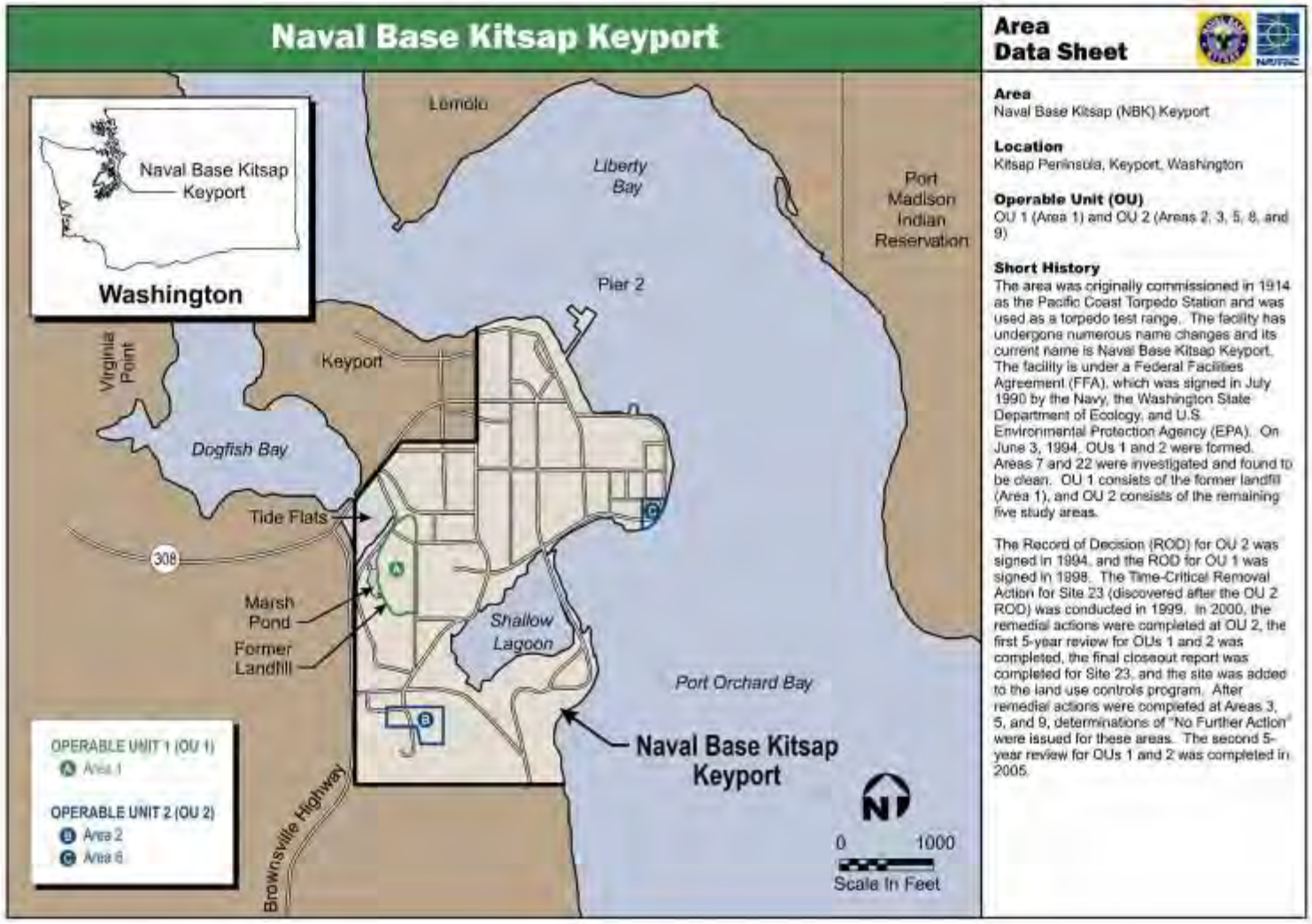
Naval Base Kitsap Keyport

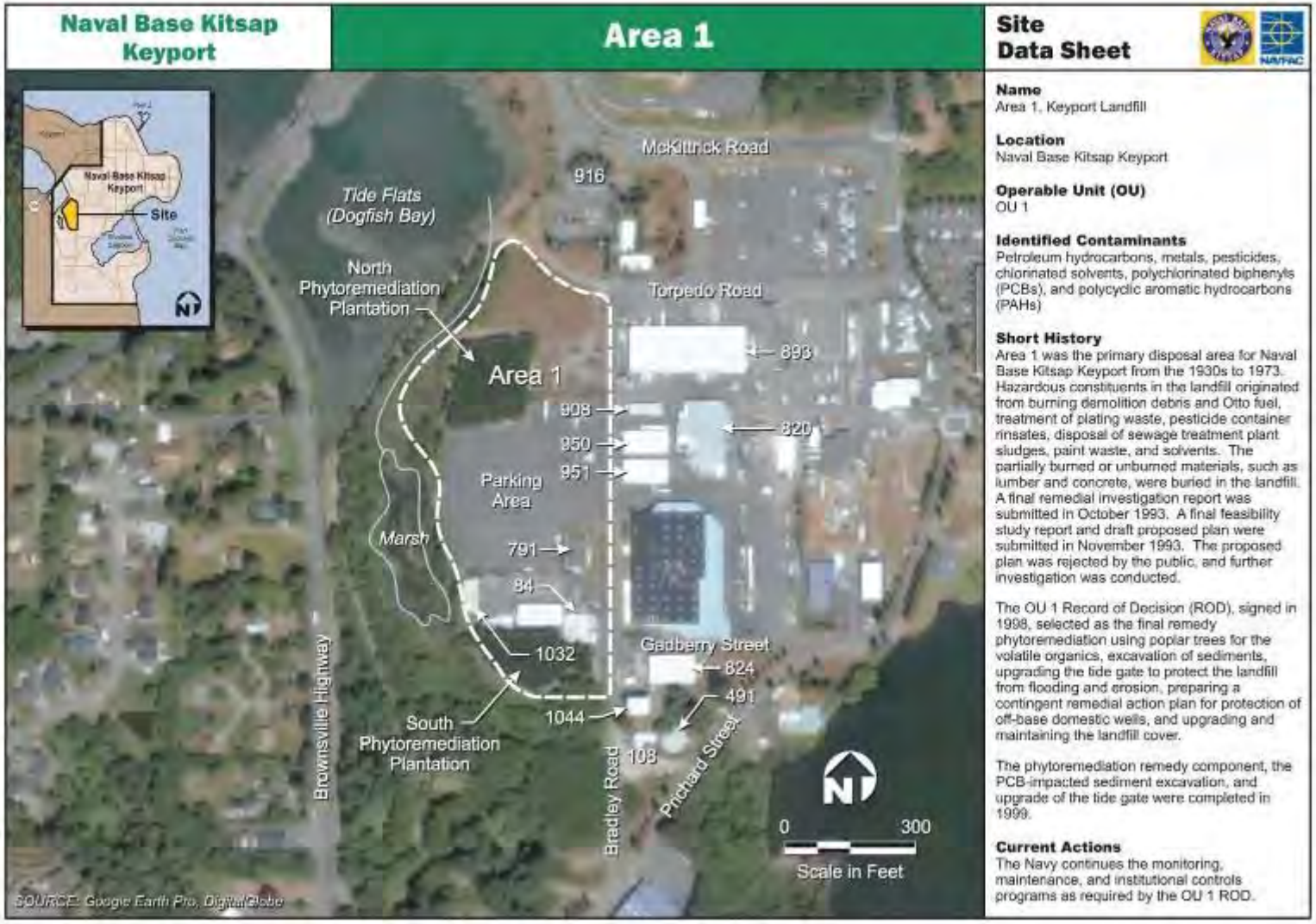
Naval Base Description

Naval Base Kitsap (NBK) Keyport consists of approximately 340 acres on the Kitsap Peninsula in the north-central portion of Puget Sound, approximately 5.5 miles northeast of Silverdale, Washington. The mission of Naval Base Kitsap Keyport is to provide testing and evaluation; in-service engineering, maintenance, and repair; fleet readiness; and industrial-base support for undersea warfare systems, countermeasures, and sonar systems.

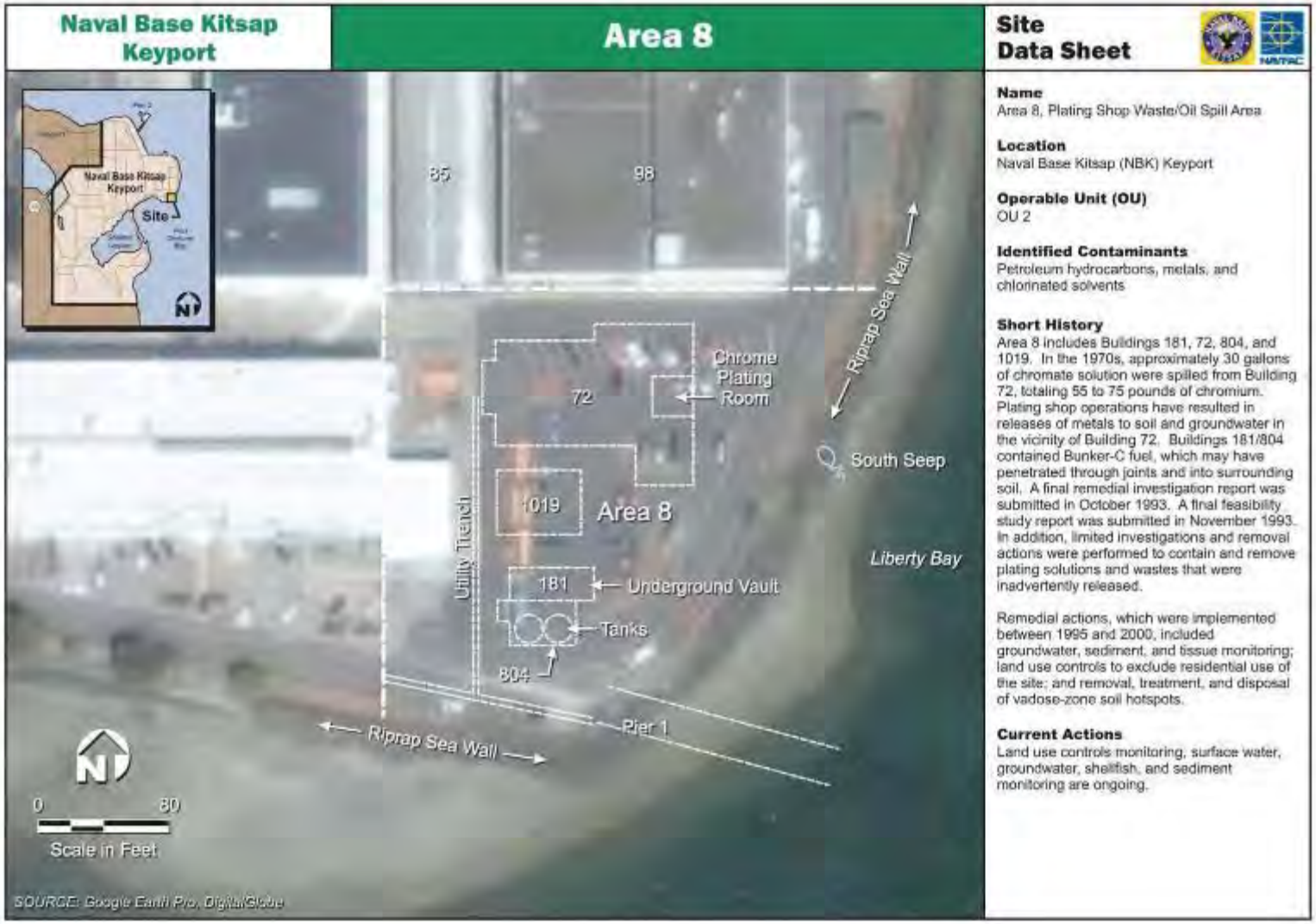
The following is a list of historical events at Naval Base Kitsap Keyport from 1913 to the present:

- The Navy acquired Naval Base Kitsap Keyport property in 1913. The property was commissioned in 1914 as the Pacific Coast Torpedo Station and the first building was constructed in 1915.
- The largest facility expansion occurred during World War II. Activities included torpedo production, proofing, and overhaul.
- In 1963, a new torpedo shop was constructed and the facility name was changed to Naval Torpedo Station Keyport.
- In 1978, the name of the facility was changed from Naval Torpedo Station Keyport to Naval Undersea Warfare Engineering Station (NUWES) Keyport. The name was subsequently changed to Naval Undersea Warfare Center (NUWC) in January 1992.
- In 1984, the initial assessment study (IAS) conducted by SCS Engineers identified past waste disposal and spill sites at NUWC Division, Keyport.
- In 1987, the current situation report completed by SCS Engineers verified contamination at the waste disposal and spill sites.
- In May 1988, the entire Keyport Station was proposed by the U.S. Environmental Protection Agency (EPA) for inclusion on the National Priorities List (NPL), and in October 1989, Keyport was placed on the NPL.
- Initial remedial investigations (RIs) started in 1988. The RI and feasibility study (FS) was started in 1990 and completed in November 1993.
- In July 1990, a Federal Facilities Agreement (FFA) was signed by the Navy, EPA, and Washington State Department of Ecology.
- On June 3, 1994, Operable Units (OUs) 1 and 2 were formed. The final Record of Decision (ROD) for OU 2 was signed in September 1994. OU 1 consists of Area 1 (the former base landfill), and OU 2 consists of the remaining areas of concern (Areas 2, 3, 5, 8, and 9). Areas 7 and 22 were investigated and found to be clean.
- In March 1996, the ROD for OU 2 was modified by an Explanation of Significant Differences (ESD).
- The ROD for OU 1 was signed in September 1998.
- In 1999, the Time-Critical Removal Action was conducted for Site 23, which was discovered post-OU 2 ROD.
- In 2000, the remedial actions were completed at OU 2, and the first 5-year review for OU 1 and OU 2 was completed. The final closeout report was completed for Site 23, and the site was added to the institutional controls (ICs) program.
- After remedial actions were completed at Areas 3, 5, and 9, determinations of "No Further Action" were issued for these areas.
- Phytoremediation and monitoring is ongoing at Area 1. Monitoring is ongoing at Areas 1, 2, and 8.
- In 2005, the second 5-year review for OUs 1 and 2 was completed.


Naval Base Kitsap Keyport
Area
Data Sheet
Area
Naval Base Kitsap (NBK) Keyport
Location
Kitsap Peninsula, Keyport, Washington
Operable Unit (OU)
OU 1 (Area 1) and OU 2 (Areas 2, 3, 5, 8, and 9)
Short History
The area was originally commissioned in 1914 as the Pacific Coast Torpedo Station and was used as a torpedo test range. The facility has undergone numerous name changes and its current name is Naval Base Kitsap Keyport. The facility is under a Federal Facilities Agreement (FFA), which was signed in July 1990 by the Navy, the Washington State Department of Ecology, and U.S. Environmental Protection Agency (EPA). On June 3, 1994, OUs 1 and 2 were formed. Areas 7 and 22 were investigated and found to be clean. OU 1 consists of the former landfill (Area 1), and OU 2 consists of the remaining five study areas.
The Record of Decision (ROD) for OU 2 was signed in 1994, and the ROD for OU 1 was signed in 1998. The Time-Critical Removal Action for Site 23 (discovered after the OU 2 ROD) was conducted in 1999. In 2000, the remedial actions were completed at OU 2, the first 5-year review for OUs 1 and 2 was completed, the final closeout report was completed for Site 23, and the site was added to the land use controls program. After remedial actions were completed at Areas 3, 5, and 9, determinations of "No Further Action" were issued for these areas. The second 5-year review for OUs 1 and 2 was completed in 2005.
Naval Base Kitsap Keyport
Washington
Lemolo
Liberty Bay
Port Madison Indian Reservation
Pier 2
Keyport
Virginia Point
Dogfish Bay
Tide Flats
308
Marsh Pond
Former Landfill
Shallow Lagoon
Port Orchard Bay
Naval Base Kitsap Keyport
Brownsville Highway
OPERABLE UNIT 1 (OU 1)
Area 1
OPERABLE UNIT 2 (OU 2)
Area 2
Area 6
0
1000
Scale In Feet


Naval Base Kitsap
Keyport
Area 1
Site
Data Sheet
NAVFAC
Name
Area 1, Keyport Landfill
Location
Naval Base Kitsap Keyport
Operable Unit (OU)
OU 1
Identified Contaminants
Petroleum hydrocarbons, metals, pesticides, chlorinated solvents, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs)
Short History
Area 1 was the primary disposal area for Naval Base Kitsap Keyport from the 1930s to 1973. Hazardous constituents in the landfill originated from burning demolition debris and Otto fuel, treatment of plating waste, pesticide container rinsates, disposal of sewage treatment plant sludges, paint waste, and solvents. The partially burned or unburned materials, such as lumber and concrete, were buried in the landfill. A final remedial investigation report was submitted in October 1993. A final feasibility study report and draft proposed plan were submitted in November 1993. The proposed plan was rejected by the public, and further investigation was conducted.
The OU 1 Record of Decision (ROD), signed in 1998, selected as the final remedy phytoremediation using poplar trees for the volatile organics, excavation of sediments, upgrading the tide gate to protect the landfill from flooding and erosion, preparing a contingent remedial action plan for protection of off-base domestic wells, and upgrading and maintaining the landfill cover.
The phytoremediation remedy component, the PCB-impacted sediment excavation, and upgrade of the tide gate were completed in 1999.
Current Actions
The Navy continues the monitoring, maintenance, and institutional controls programs as required by the OU 1 ROD.
Naval Base Kitsap Keyport
Site
McKittrick Road
916
Tide Flats
(Dogfish Bay)
North
Phytoremediation
Plantation
Torpedo Road
893
Area 1
908
950
951
820
Parking
Area
Marsh
791
84
1032
Gaudberry Street
824
491
1044
South
Phytoremediation
Plantation
108
Brownsville Highway
Bradley Road
Pritchard Street
0
300
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Keyport
Area 2
Site
Data Sheet
Name
Area 2, Van Meter Road Spill/Drum Storage Area
Location
Naval Base Kitsap (NBK) Keyport
Operable Unit (OU)
OU 2
Identified Contaminants
Petroleum hydrocarbons, metals, and chlorinated solvents
Short History
Area 2 includes the Van Meter Road Spill, former Building 957 drum storage area, and Building 734 drum storage area. From the 1940s to the 1960s, 55-gallon drums of assorted fuels, organic chemicals, and pesticides were stored in areas around Buildings 957 and 734. Drums not completely emptied were allowed to drain into the ground. In 1976, 2,000 to 5,000 gallons of plating waste corroded through an unlined tank truck and spilled on site and into the creek/drainage ditch. A final remedial investigation report was submitted in October 1993. A final feasibility study report was submitted in November 1993. The final Record of Decision (ROD) for OU 2 was signed in September 1994.
Remedial actions include land use controls and groundwater monitoring.
Current Actions
Land use controls and groundwater monitoring are ongoing.
Naval Base Kitsap Keyport
Site
Prichard Street
Shallow Lagoon
Wright Road
Westfall Road
Westfall Road
95
735
734
957
Area 2
Brownsville Highway
Creek
Van Meter Road
Pistol Range
0
300
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe


Naval Base Kitsap
Keyport
Area 8
Site
Data Sheet
Name
Area 8, Plating Shop Waste/Oil Spill Area
Location
Naval Base Kitsap (NBK) Keyport
Operable Unit (OU)
OU 2
Identified Contaminants
Petroleum hydrocarbons, metals, and chlorinated solvents
Short History
Area 8 includes Buildings 181, 72, 804, and 1019. In the 1970s, approximately 30 gallons of chromate solution were spilled from Building 72, totaling 55 to 75 pounds of chromium. Plating shop operations have resulted in releases of metals to soil and groundwater in the vicinity of Building 72. Buildings 181/804 contained Bunker-C fuel, which may have penetrated through joints and into surrounding soil. A final remedial investigation report was submitted in October 1993. A final feasibility study report was submitted in November 1993. In addition, limited investigations and removal actions were performed to contain and remove plating solutions and wastes that were inadvertently released.
Remedial actions, which were implemented between 1995 and 2000, included groundwater, sediment, and tissue monitoring; land use controls to exclude residential use of the site; and removal, treatment, and disposal of vadose-zone soil hotspots.
Current Actions
Land use controls monitoring, surface water, groundwater, shellfish, and sediment monitoring are ongoing.
Naval Base Kitsap Keyport
Site
85
98
72
Chrome Plating Room
Riprap Sea Wall
South Seep
1019
Area 8
Utility Trench
Liberty Bay
181
Underground Vault
Tanks
804
Pier 1
Riprap Sea Wall
N
0
80
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe

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NAVBASE Kitsap Jackson Park
Installation Restoration Sites

Jackson Park Housing Complex/Naval Hospital Bremerton

Naval Base Description

Jackson Park Housing Complex (JPHC)/Naval Hospital Bremerton (NHB) consists of 300 acres and is located in the central portion of the Kitsap Peninsula, approximately 2 miles northwest of Bremerton, Washington. A chronological history of the site is as follows:

- In 1904, JPHC/NHB site is established as the former Naval Magazine Puget Sound.
- From 1908 to 1914, the magazine operated as a naval ammunition storage facility.
- During World War I, operations expanded to include ordnance manufacturing and processing, projectile loading and cleaning, and ordnance demilitarization.
- In 1916, Naval Magazine Puget Sound was commissioned as the U.S. Naval Ammunition Depot (NAD) Puget Sound.
- During World War II, ordnance production was increased for military support.
- In 1948, the command of NAD Puget Sound changed during the development of NAD Bangor and Naval Torpedo Station Keyport. During this time, NAD Puget Sound was reauthorized as Bremerton Annex.
- In 1959, NAD Bangor assumed command of the Bremerton Annex. The annex was decommissioned and placed on caretaker status.
- From 1965 to 1975, a portion of the property was converted to military housing and renamed the Jackson Park Housing Complex.
- In 1981, a gas station was added to the Navy Exchange (NEX) convenience store located within the JPHC.
- In 1983, a preliminary assessment (PA) was conducted.
- In 1992, the Washington State Department of Ecology issued an Enforcement Order.
- In 1993, a site inspection (SI) was conducted.
- In 1994, JPHC/NHB was placed on National Priorities List (NPL).
- In 1995, the site was divided into OU 1 (terrestrial environment) and OU 2 (marine environment).
- In 1996, the OU 1 remedial investigation (RI) was completed.
- In 1998, the OU 1 feasibility study (FS) was completed.
- From 1997 to 1999, OU 1 post-FS investigations were conducted.
- In 2000, the OU 1 Record of Decision (ROD) was issued.
- In 2000, remedial action construction was initiated at OU 1. OU 3 was added to address abandoned ordnance in the terrestrial (OU 3-T) and marine environments (OU 3-M).
- In 2002, remedial action construction was completed and a draft closeout report for OU 1 was issued.
- In 2003, a PA/SI was completed for OU 3 and the Phase I RI for OU 3-T JPHC begins.
- From 2004 to 2005, the Phase I RI for OU 3-T was continued.
- In 2006, Phase II OU 3-T and OU 3-M work was initiated.
- In 2007, Phase II RI field work is completed at OU 3-T at JPHC and the RI work for OU 3-T at NHB was initiated. Work at OU 3-M continued.
- In 2008, RI work at OU 3-T NHB continues and work at OU 3-M continues.


Jackson Park Housing Complex
Area Data Sheet
Jackson Park Housing Complex
Washington
OPERABLE UNIT 1 (OU 1)
A Site 101 – Industrial Area
B Site 101A – Underground Storage Tank Site
C Site 103 – Elwood Point
D Site 110 – Upland Area
E Benzene Release Area
OPERABLE UNIT 2 (OU 2)
F Marine Environment
OPERABLE UNIT 3 (OU 3)
G OU 3-Terrestrial (T)
H OU 3-Marine (M)
Enands Point
Navy Hospital
Fishing Pier
Elwood Point
Elwood Pt Rd
Dowell Rd
Pier 2
Ostrich Bay
Former Oil Pier
Madrona Point
Jackson Park Housing Complex
0
1,500
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Silverdale
Bremerton
Area
Jackson Park Housing Complex (JPHC)
Location
Bremerton, Washington
Operable Units (OUs)
OUs 1, 2, and 3
Short History
JPHC was established in 1904 as Naval Magazine Puget Sound. The magazine operated as a naval ammunition storage facility from 1908 to 1914. It was commissioned as Naval Ammunition Depot (NAD) Puget Sound in 1916. Operations were increased to provide military support during World War II. During this time, the primary role was shifted to ordnance demilitarization. During 1948, the command of NAD changed during development of NAD Bangor (now Naval Base Kitsap Bangor) and Naval Torpedo Station Keyport (now Naval Base Kitsap Keyport). During 1959, the NAD was decommissioned. The site was converted to a military residential complex over time beginning in the 1960s. JPHC includes Naval Hospital Bremerton (NHB). JPHC was placed on the national Priorities List (NPL) in 1994. The site was divided into OU 1 (Terrestrial) and OU 2 (Marine). A benzene release area was identified in 1996. The Record of Decision (ROD) for OU 1 was signed during 2000. Remedial action construction was initiated at OU 1 during 2000. The ordnance work was segregated from the chemical work by designating ordnance work as OU 3 during 2000. Work associated with OUs 1 and 2 was complete in 2002. Work associated with OU 3 (ordnance) and the benzene release area is ongoing.


Jackson Park Housing Complex
Site 101
Site Data Sheet
Jackson Park Housing Complex
Site
Dowell Road
126
38
160
Haven Road
Ostrich Bay
36
95
Pier 2
7
94
9
90
67
55
Former Oil Pier
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 101, Industrial Area
Location
Jackson Park Housing Complex (JPHC), Bremerton, Washington
Operable Unit (OU)
OU 1
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, ordnance compounds, and metals in groundwater and shellfish
Short History
Site 101 includes a strip of shoreline located primarily east of Haven Road along Ostrich Bay up to Elwood Point. Past operations at Site 101 included ordnance production and destruction, storage of ordnance, and recycling and disposal of ordnance wastes. Around 1965, a portion of the property was converted to military housing and renamed the Jackson Park Housing Complex. As housing construction continued in the early 1970s, the Navy demolished most of the remaining depot structures at the site.
Site investigations were conducted from 1992 to 1999. Soil removal was conducted from September 1993 through February 1994. The Record of Decision (ROD) was signed in 2000. The selected remedial action was a vegetated cover, shoreline stabilization, regular inspection of the cover and shoreline structure, land use controls, and groundwater and shellfish sampling programs. Remedy implementation for Site 101 occurred primarily from June 2000 through June 2001.
Current Actions
The Navy conducts remedy and land use controls inspections, groundwater and shellfish monitoring, and erosion controls maintenance.


Jackson Park Housing Complex
Site 101A
Site Data Sheet
Jackson Park Housing Complex
Site
0
250
Scale in Feet
Former Oil Pier
Ostrich Bay
UST-1
UST-2
UST-3
UST-4
100
102
104
Site 101A
Lower Area
Upper Area
Abandoned Gravel Access Road
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 101A, Underground Storage Tank Site
Location
Jackson Park Housing Complex (JPHC), Bremerton, Washington
Operable Unit (OU)
OU 1
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and ordnance compounds in shellfish
Short History
Site 101A lies to the west and includes a strip of shoreline along Ostrich Bay and approximately 7 acres of adjacent uplands located south of Site 101. Past operations at Site 101A included ordnance production and destruction and ordnance sifting and loading. Demilitarization used high temperature water and steam. An incinerator and a boiler house were also present at the site. Around 1965, a portion of the property was converted to military housing and renamed the Jackson Park Housing Complex. As housing construction continued in the early 1970s, the Navy demolished most of the remaining depot structures at the site. The site currently includes a former construction debris landfill and a housing area.
Six underground storage tanks (USTs), associated pipes and fuel distribution lines, and all petroleum-impacted soils were removed from Site 101A in 1993. The landfill containing structural debris from ordnance storage bunkers at Site 110 was identified as an additional source of environmental concern at Site 101A.
Site investigations were conducted from 1992 to 1999. The Record of Decision (ROD) was signed in 2000. The selected remedial action was a vegetated cover, shoreline stabilization, regular inspection of the cover and shoreline structure, land use controls, and a shellfish sampling program. Remedy implementation for Site 101A occurred from June 2000 through June 2002.
Current Actions
The Navy conducts remedy and land use controls inspections, groundwater and shellfish monitoring, and erosion controls maintenance.


Jackson Park Housing Complex
Site 103
Site Data Sheet
Site
Jackson Park Housing Complex
Site 103
Former Trash Burning Area
Ostrich Bay
Former Ordnance Burning Area
Fishing Pier
Railroad Transfer Station
Suspected Fill Area
Baseball Fields
Elwood Point Road
Personnel Barracks
Elwood Point
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 103, Elwood Point
Location
Jackson Park Housing Complex (JPHC), Bremerton, Washington
Operable Unit (OU)
OU 1
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, ordnance compounds, and metals in groundwater and shellfish
Short History
Site 103 consists of a low, flat promontory referred to as Elwood Point and approximately 500 feet of Ostrich Bay shoreline to the east of the hospital. Past operations at Site 103 include maintenance of locomotives, sand blasting, military and civilian housing, barracks, a cafeteria, latrines, paint and oil storage, and a railroad transfer station. Ordnance wastes were burned on a concrete slab on the north side of Elwood Point, and trash was burned in an area farther north along the shoreline. An incinerator was also present at Site 103. Landfilling took place from 1910 to 1959 and included sands, gravels, and man-made materials such as concrete and metal debris. The site currently includes a helicopter pad, recreation fields, playing courts, a picnic area, and remnants of a former pier.
In 1998, significant shoreline erosion was occurring near the helipad that had the potential to release fill material into the marine environment. A removal action was conducted to prevent further erosion along the shoreline.
Site investigations were conducted from 1992 to 1999. The Record of Decision (ROD) was signed in 2000. The selected remedial action was a vegetated cover, shoreline stabilization, regular inspection of the cover and shoreline structure, land use controls, and groundwater and shellfish sampling programs. Remedy implementation for Site 103 occurred from June 2000 through June 2002.
Current Actions
The Navy conducts remedy and land use controls inspections, groundwater and shellfish monitoring, and erosion controls maintenance.


Jackson Park Housing Complex
Site 110
Site
Data Sheet
NAVFAC
Site
Naval Hospital
Elwood Pt Rd
Upland Bunker Area
Olding Rd
Site 110
Wencker Way
Dowell Rd
Haven Rd
Pool Ct
Fishing Pier
Elwood Point
Ostrich Bay
Pier 2
Former Oil Pier
0
1,000
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 110, Upland Areas
Location
Jackson Park Housing Complex, Bremerton (JPHC), Washington
Operable Unit (OU)
OU 1
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, ordnance compounds, and metals in groundwater
Short History
Site 110 includes the majority of JPHC and Naval Hospital Bremerton (NHB). Past operations at Site 110 include ordnance production and storage of ordnance and other materials. Around 1965, the property was converted to military housing and renamed to JPHC. As housing construction continued in the early 1970s, the Navy demolished most of the remaining depot structures at the site. Three of the original bunkers are currently used as warehouses, a fourth is being used as storage for household goods, and the remaining two have been demolished. Currently, the site is predominantly occupied by housing units or housing support activities.
Surface soil containing metals and organic compounds were excavated and properly disposed of between August 1994 and June 1995. Pavement serves as a barrier for a limited amount of soil containing arsenic in front of two of the bunkers. A disposal site was discovered at the northeast corner of Olding Road and Elwood Point Road. Samples confirmed the presence of asbestos in pipe insulation, petroleum products and lime waste in drums, petroleum impacts in soil, and creosote compounds in timber. In March 1995, all waste and impacted soil were removed and disposed of. Four underground storage tanks (USTs) were removed from Site 110 in 1996. The tanks and all associated petroleum-impacted soil were removed and disposed of as required by law.
Soil impacted with organic compounds and arsenic east of two residential buildings along Haven Road were further investigated in June 2001 and March 2002. Excavation and disposal of impacted soil occurred in June 2002. Pipe debris assumed to contain asbestos, lead-wrapped wire, and railroad ties assumed to be creosote treated were discovered, removed, and properly disposed of. After excavation work was completed, the selected remedial action included import of clean material as backfill and planting sod. Land use controls and a groundwater monitoring program were included as components of the remedy.
Current Actions
The Navy conducts remedy and land use controls inspections, groundwater monitoring, and erosion controls maintenance.


Jackson Park Housing Complex
Benzene Release Area
Jackson Park Housing Complex
Site
Benzene Release Area
NEX Gas Station
Dowell Rd
Haven Rd
Ostrich Bay
Pier 2
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Site Data Sheet
Name
Benzene Release Area
Location
Jackson Park Housing Complex (JPHC), Bremerton, Washington
Operable Unit (OU)
OU 1
Identified Contaminants
Volatile organic compounds (VOCs) and petroleum hydrocarbons in groundwater
Short History
The Benzene Release Area is located within Sites 101 and 110. The area is defined by two seeps that discharge through pipes along the shore of Ostrich Bay and an area of known soil or groundwater impact that extends approximately 450 feet uphill from the seeps. The site is currently occupied by housing units or housing support activities.
Seep sampling at Site 101 identified one shoreline outfall that was discharging water containing benzene and petroleum hydrocarbons above state cleanup levels. In 1997 and 1998, a second investigation was conducted by the Navy in an attempt to determine the source and extent of benzene and petroleum impact in soil and groundwater. In November 1999, additional field work identified a source of the benzene and petroleum impacts near the fuel dispenser island at the NEX gas station located at Dowell Road and Sullivan Place in Site 110.
At the time the Record of Decision (ROD) was signed (2000), it was thought that the perched groundwater in the Benzene Release Area was impacted, but the deeper groundwater was not. Therefore, the remedial action specified in the ROD was protection of the marine environment (located in Site 101). Subsequent investigation activities have identified past releases from the NEX gas station that have also impacted the deeper groundwater unit.
Current Actions
A removal action to skim the gasoline is being implemented. A feasibility study is ongoing to determine what further site remediation is required.


Jackson Park Housing Complex
OU 2
Site Data Sheet
Jackson Park Housing Complex
Site
Naval Hospital
Elwood Pt Rd
Oding Rd
Wenicker Way
Dowell Rd
Haven Rd
Root Ct
Fishing Pier
Elwood Point
OU 2
Ostrich Bay
Pier 2
Former Oil Pier
0
1,000
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
OU 2
Location
Jackson Park Housing Complex (JPHC), Bremerton, Washington
Operable Unit (OU)
OU 2
Identified Contaminants
Munitions-related compounds and metals in the marine environment
Short History
OU 2 was separated from OU 1 in 1995 to address potential impacts located in the marine environment offshore of OU 1 sites. OU 2 includes Navy-owned property extending out from the shoreline to a distance in Ostrich Bay to where the water depth is 24 feet below mean lower low water (MLLW). Because many historical operations at the site may have resulted in the discharge of munitions-related compounds, these operations were suspected to have an impact on sediment quality in the bay.
Numerous studies have been implemented by the Navy in Ostrich Bay and adjacent waters. The Navy concluded that while nearshore sediments contained low levels of munitions-related compounds, most sediment contamination in Ostrich Bay was likely associated with the transport of metals-impacted sediments into the bay from Dyes Inlet and other sources. The Navy, Washington State Department of Ecology, and the U.S. Environmental Protection Agency (EPA) are currently in negotiations regarding the best approach to remediation for OU 2. The Draft Final Proposed Plan for Cleanup Action at Operable Unit 2, JPHC/NHB, dated February 9, 2005, was sent to Washington State Department of Ecology and EPA for review and was rejected by the regulators. Since March 2005, the Navy and EPA have engaged in informal dispute resolution. In February 2007, the Navy and EPA agreed that a supplemental remedial investigation was needed and that following the ecological risk assessment process will allow for clear identification of the data gaps at the site and ensure the future evaluations are defensible. As part of that process, a Tier 2 Screening Refinement and Preliminary Data Gaps document was completed in December 2007. It refined the selection of chemicals of potential concern and identified data gaps and stated that data gaps could be filled through additional sediment toxicity testing. A more complete identification of data gaps and the design of data collection efforts will be described in a subsequent document.
Current Actions
The Navy and EPA are currently in discussions regarding the most appropriate manner in which to investigate potential impacts to the marine environment from past operations at JPHC/NHB.


Jackson Park Housing Complex
OU 3
Site
Data Sheet
Site
Jackson Park Housing Complex
Naval Hospital
OU 3-M-Ordnance
Fishing Pier
Elwood Pt Rd
Elwood Point
Olding Rd
Wanker Way
Dowell Rd
Haren Rd
Ostrich Bay
Pier 2
OU 3-T-Ordnance
Former Oil Pier
Pearl Ct
0
1,000
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
OU 3
Location
Jackson Park Housing Complex (JPHC), Bremerton, Washington
Operable Unit (OU)
OU 3
Identified Contaminants
Munitions-related items and chemical constituents in the terrestrial and marine environments
Short History
As part of a November 15, 2004 Interagency Agreement between the Navy and U.S. Environmental Protection Agency (EPA), OU 3 was divided into OU 3-Terrestrial (T) and OU 3-Marine (M). OU 3-T was further divided into OU 3-T JPHC and OU 3-T NHB (Naval Hospital Bremerton). OU 3-T JPHC and OU 3-T NHB include all portions of JPHC/NHB located above the 0 foot mean lower low water (MLLW) line. OU 3-M addresses munitions in Ostrich Bay below 0 foot MLLW, where impacts have also been positively identified.
OU 3-T JPHC - Investigations have progressed over the course of many years in two phases. During Phase I activities (March 2003 through August 2004), a significant amount of munitions debris was recovered and properly disposed of. The Navy has determined that the explosives safety hazard at JPHC is low and that existing land use controls are effectively managing explosive risks presented by any potential discarded military munitions (DMM) at the site. However, the Navy is performing additional subsurface investigations in accordance with the scheduled Phase II activities. The results will be used to assess the explosive safety hazard and determine if additional actions are necessary. At a later date, a Record of Decision (ROD) will also be prepared for OU 3-T JPHC.
OU 3-T NHB - The Navy initially investigated the terrestrial area surrounding NHB in the mid-1990s. The main issue at this site is the potential presence of DMM and the best possible manner of locating and removing such items. Beginning in early 2007, plans were drafted to perform a remedial investigation (RI) at NHB. The RI work plans were approved by EPA in August 2007 and work commenced in the field in early 2008. The field work was scheduled to be completed by August 2008. The Navy expects that a ROD for this site can be completed in 2010.
OU 3-M - OU 3-M is specifically defined as areas with material potentially presenting an explosive hazard.

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NAVBASE Kitsap at Bremerton
Installation Restoration Sites

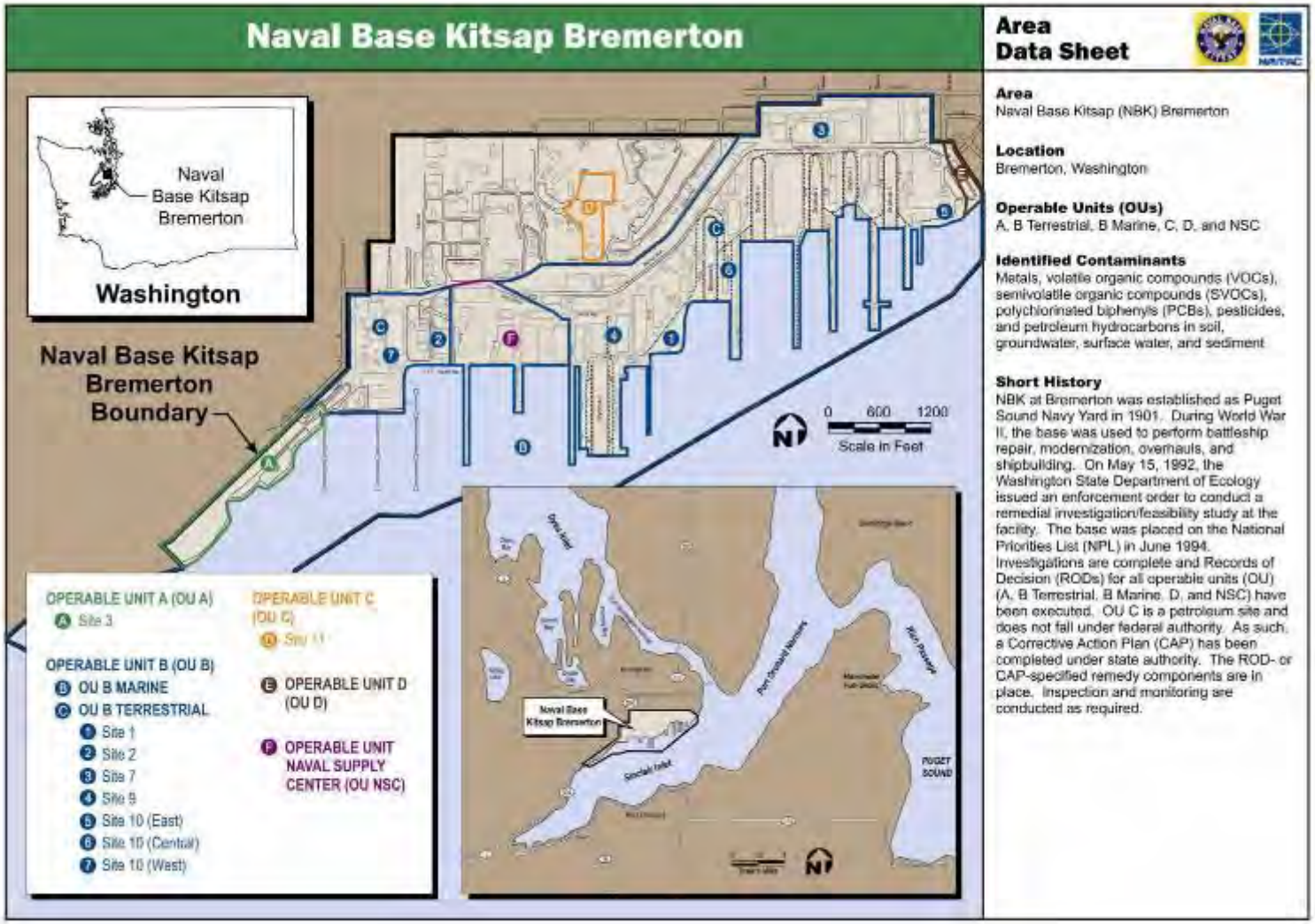
Naval Base Kitsap Bremerton

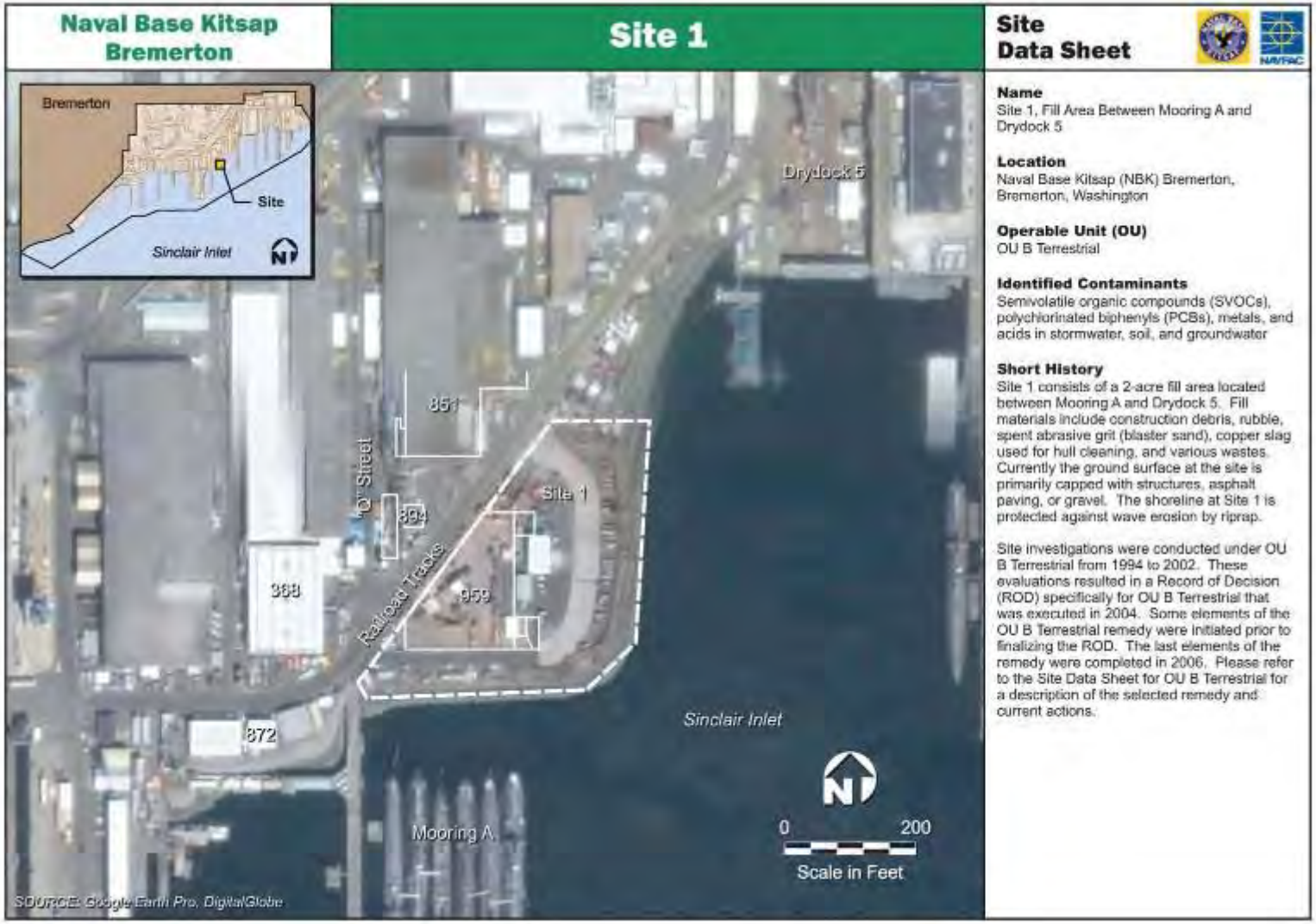
Naval Base Description

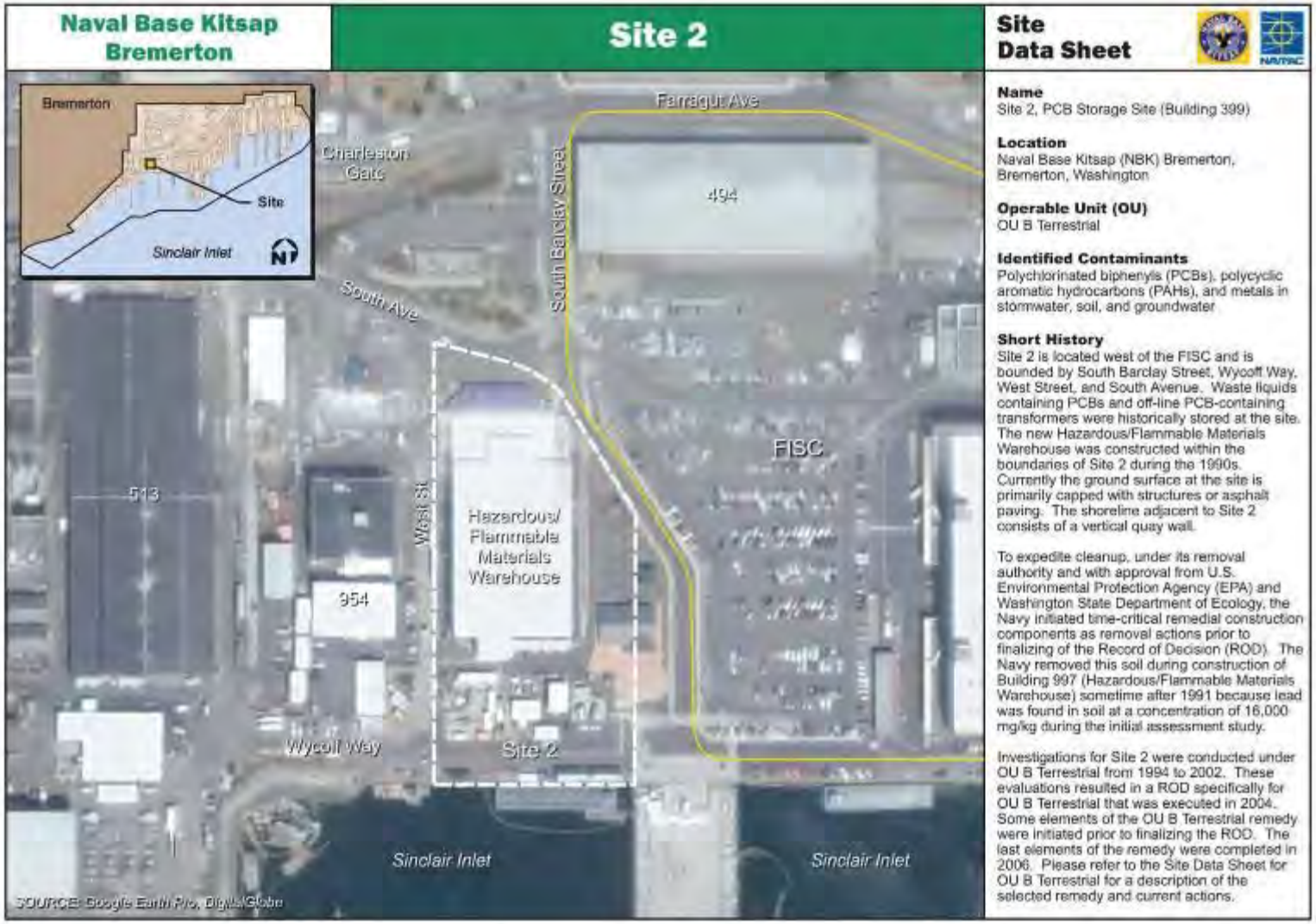
The Bremerton naval complex (Bnc) comprises Naval Base Kitsap (NBK) Bremerton, Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF), and supported commands. NBK Bremerton/Fleet and Industrial Supply Center (FISC), Puget Sound consists of approximately 1,650 acres (terrestrial and marine) located on the Sinclair Inlet in the southeastern portion of the Kitsap Peninsula, approximately 15 miles west of Seattle, Washington. It is surrounded to the west and north by the city of Bremerton's commercial and residential areas, to the northeast by a Washington State Ferry terminal, and to the south and southeast by Sinclair Inlet. The industrial portion of the site contains approximately 380 acres of terrestrial area, 270 acres of submerged land, and 1,000 acres of railroad area that is contiguous. It was established in 1901 as the Puget Sound Navy Yard. The facility is used to perform shipbuilding, repair, modernization, overhauls, and decommissioning.

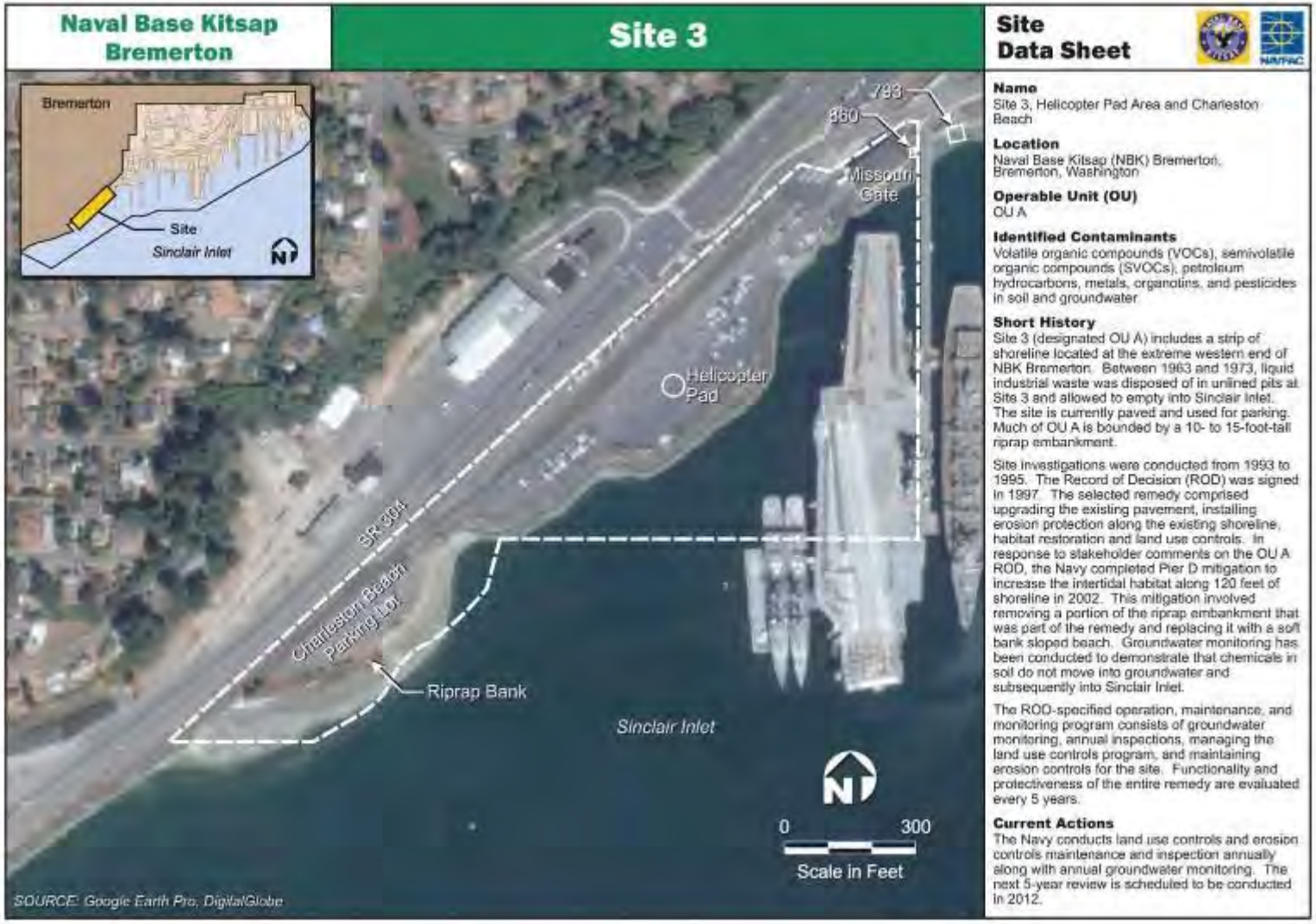
The following is a list of historical events at the Bnc from 1891 to the present:

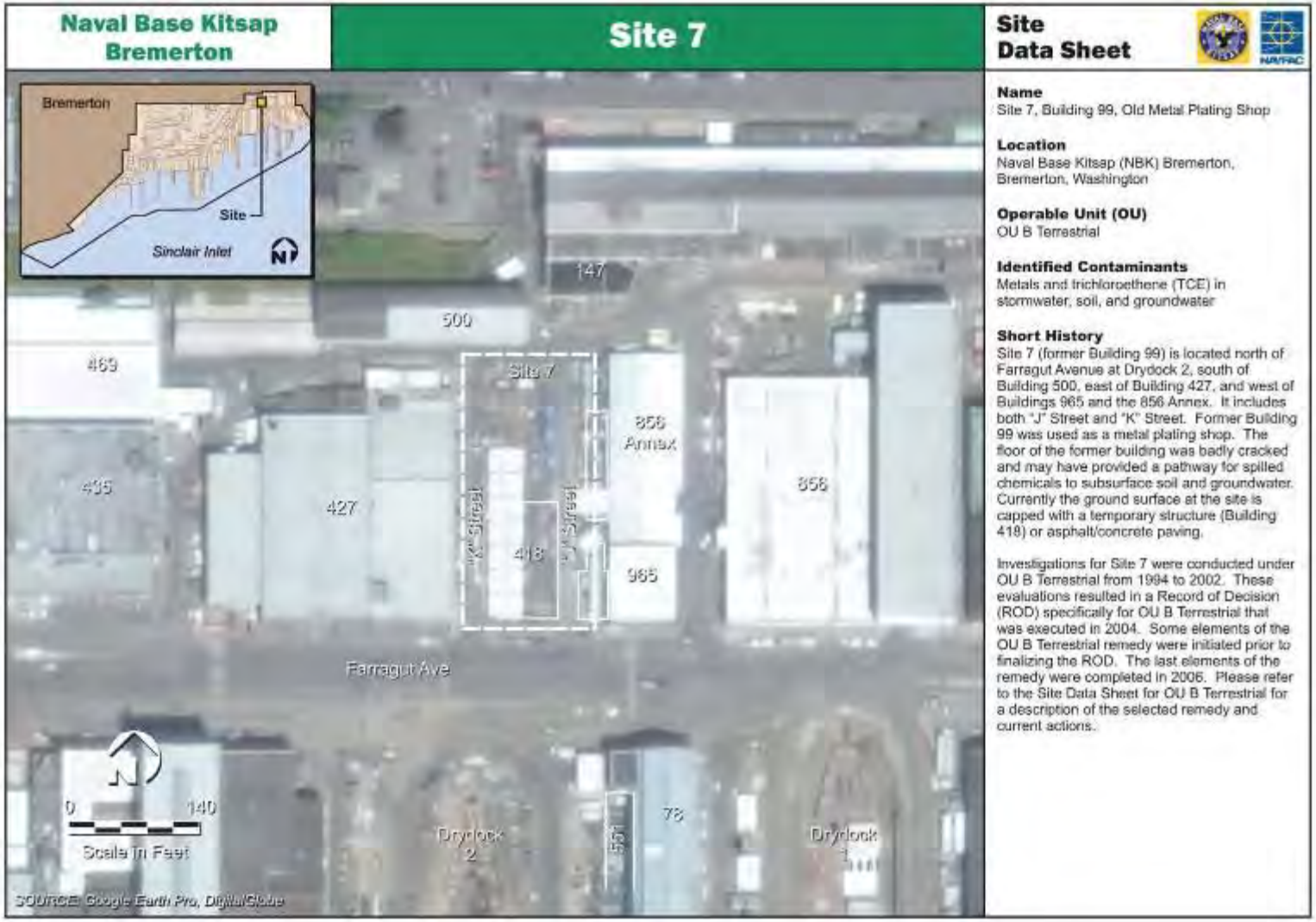
- In 1891 congressional funding led to the purchase of 190 acres on the Sinclair Inlet for the construction of a ship drydock, repair, and overhaul base for the Navy.
- In 1901, Puget Sound Navy Yard was established and in the early 1900s was substantially expanded.
- In 1945, Puget Sound Navy Yard was renamed to Puget Sound Naval Shipyard (PSNS).
- In 1967, Naval Supply Center (NSC) was commissioned.
- In 1979, site discovery was conducted.
- In 1980, the Navy established the Environmental Restoration (ER) Program.
- In 1983, Naval Energy and Environmental Support Activity and the Army Corps of Engineers conduct initial assessment study (IAS) of PSNS.
- In 1990, the Navy reauthorized the ER Program and conducted a supplementary preliminary assessment.
- From 1990 to 1992, the Navy conducted a site inspection (SI) at PSNS.
- From 1990 to 2001, the Navy conducted removal actions at Operable Unit B Terrestrial (OU B T).
- In 1992, the Washington State Department of Ecology issued two enforcement orders resulting in PSNS being divided into OUs A and B. A Resource Conservation and Recovery Act (RCRA) facility inspection was conducted by the U.S. Environmental Protection Agency (EPA).
- In 1993, NSC was renamed FISC.
- In 1994, EPA placed Bnc on the National Priorities List (NPL) and the Navy conducted interim soil removal action at OU NSC.
- In 1995, the remedial investigation/feasibility study (RI/FS) for OU A and OU NSC was completed.
- In 1996, the Record of Decision (ROD) for OU NSC was signed.
- In 1997, the ROD for OU A was signed.
- From 1997 to 1999, the Navy conducted the remedial action for OU NSC.
- In 1998, the Navy entered into an interagency agreement with Washington State Department of Ecology and EPA.
- From 1998 to 2000, the Navy conducted remedial actions for OU A.
- In 1999, the final closeout report for OU NSC and final remedial action report for OU A were completed.
- In 2000, an early action ROD for OU B Marine was signed and an addendum to the final remedial action report for OU A was completed.
- From 2000 to 2004, the Navy conducted a remedial action for OU B Marine.
- In 2002, an RI/FS for OU B Marine and OU B Terrestrial were completed, the RI/FS for OU C was completed, OU D was established, and the first 5-year review for Bnc was completed.
- From 2003 to 2005, the Navy conducted a remedial action for OU B Terrestrial.
- From 2004, an Explanation of Significant Differences (ESD) was issued for OU B Marine, the RI/FS for OU D was completed, and the ROD for OU B Terrestrial was signed.
- In 2005, the ROD for OU D was signed and the final closure report for OU B Marine was completed.
- From 2005 to 2006, the Navy conducted a remedial action for OU D.
- In 2006, the final closure report for OU B Terrestrial was completed and the Cleanup Review Tiger Team (CURTT) was established to evaluate the draft decision framework for OU B Marine.
- In 2007, the final remedial action report for OU A and OU B Terrestrial, OU D, and OU NSC were completed, the OU C Cleanup Action Plan was implemented, and the second 5-year review for Bnc was completed.
- In 2008, the Navy is conducting monitoring to demonstrate that cleanup actions at Bnc are working as intended.


Naval Base Kitsap Bremerton
Area Data Sheet
Naval Base Kitsap Bremerton
Washington
Naval Base Kitsap Bremerton Boundary
0 600 1200
Scale in Feet
OPERABLE UNIT A (OU A)
A Site 3
OPERABLE UNIT B (OU B)
B OU B MARINE
C OU B TERRESTRIAL
1 Site 1
2 Site 2
3 Site 7
4 Site 9
5 Site 10 (East)
6 Site 10 (Central)
7 Site 10 (West)
OPERABLE UNIT C (OU C)
D Site 11
E OPERABLE UNIT D (OU D)
F OPERABLE UNIT NAVAL SUPPLY CENTER (OU NSC)
Naval Base Kitsap Bremerton
Port Orchard Narrows
Sinclair Inlet
PUGET SOUND
Area
Naval Base Kitsap (NBK) Bremerton
Location
Bremerton, Washington
Operable Units (OUs)
A, B Terrestrial, B Marine, C, D, and NSC
Identified Contaminants
Metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, and petroleum hydrocarbons in soil, groundwater, surface water, and sediment
Short History
NBK at Bremerton was established as Puget Sound Navy Yard in 1901. During World War II, the base was used to perform battleship repair, modernization, overhauls, and shipbuilding. On May 15, 1992, the Washington State Department of Ecology issued an enforcement order to conduct a remedial investigation/feasibility study at the facility. The base was placed on the National Priorities List (NPL) in June 1994. Investigations are complete and Records of Decision (RODs) for all operable units (OU) (A, B Terrestrial, B Marine, D, and NSC) have been executed. OU C is a petroleum site and does not fall under federal authority. As such, a Corrective Action Plan (CAP) has been completed under state authority. The ROD- or CAP-specified remedy components are in place. Inspection and monitoring are conducted as required.


Naval Base Kitsap
Bremerton
Site 1
Bremerton
Site
Sinclair Inlet
Drydock 5
851
"Q" Street
Site 1
894
Railroad Tracks
959
388
872
Sinclair Inlet
Mooring A
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Site
Data Sheet
Name
Site 1, Fill Area Between Mooring A and Drydock 5
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, and acids in stormwater, soil, and groundwater
Short History
Site 1 consists of a 2-acre fill area located between Mooring A and Drydock 5. Fill materials include construction debris, rubble, spent abrasive grit (blaster sand), copper slag used for hull cleaning, and various wastes. Currently the ground surface at the site is primarily capped with structures, asphalt paving, or gravel. The shoreline at Site 1 is protected against wave erosion by riprap.
Site investigations were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 2
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
Charleston Gate
Farragut Ave
South Barclay Street
494
South Ave
West St
513
954
Hazardous/ Flammable Materials Warehouse
FISC
Wycoff Way
Site 2
Sinclair Inlet
Sinclair Inlet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 2, PCB Storage Site (Building 399)
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and metals in stormwater, soil, and groundwater
Short History
Site 2 is located west of the FISC and is bounded by South Barclay Street, Wycoff Way, West Street, and South Avenue. Waste liquids containing PCBs and off-line PCB-containing transformers were historically stored at the site. The new Hazardous/Flammable Materials Warehouse was constructed within the boundaries of Site 2 during the 1990s. Currently the ground surface at the site is primarily capped with structures or asphalt paving. The shoreline adjacent to Site 2 consists of a vertical quay wall.
To expedite cleanup, under its removal authority and with approval from U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology, the Navy initiated time-critical remedial construction components as removal actions prior to finalizing of the Record of Decision (ROD). The Navy removed this soil during construction of Building 997 (Hazardous/Flammable Materials Warehouse) sometime after 1991 because lead was found in soil at a concentration of 16,000 mg/kg during the initial assessment study.
Investigations for Site 2 were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a ROD specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 3
Bremerton
Site
Sinclair Inlet
793
860
Missouri Gate
Helicopter Pad
SR 304
Charleston Beach Parking Lot
Riprap Bank
Sinclair Inlet
0
300
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Site
Data Sheet
NAVFAC
Name
Site 3, Helicopter Pad Area and Charleston Beach
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU A
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), petroleum hydrocarbons, metals, organotins, and pesticides in soil and groundwater
Short History
Site 3 (designated OU A) includes a strip of shoreline located at the extreme western end of NBK Bremerton. Between 1963 and 1973, liquid industrial waste was disposed of in unlined pits at Site 3 and allowed to empty into Sinclair Inlet. The site is currently paved and used for parking. Much of OU A is bounded by a 10- to 15-foot-tall riprap embankment.
Site investigations were conducted from 1993 to 1995. The Record of Decision (ROD) was signed in 1997. The selected remedy comprised upgrading the existing pavement, installing erosion protection along the existing shoreline, habitat restoration and land use controls. In response to stakeholder comments on the OU A ROD, the Navy completed Pier D mitigation to increase the intertidal habitat along 120 feet of shoreline in 2002. This mitigation involved removing a portion of the riprap embankment that was part of the remedy and replacing it with a soft bank sloped beach. Groundwater monitoring has been conducted to demonstrate that chemicals in soil do not move into groundwater and subsequently into Sinclair Inlet.
The ROD-specified operation, maintenance, and monitoring program consists of groundwater monitoring, annual inspections, managing the land use controls program, and maintaining erosion controls for the site. Functionality and protectiveness of the entire remedy are evaluated every 5 years.
Current Actions
The Navy conducts land use controls and erosion controls maintenance and inspection annually along with annual groundwater monitoring. The next 5-year review is scheduled to be conducted in 2012.



Site Data Sheet

Name
Site 7, Building 99, Old Metal Plating Shop

Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington

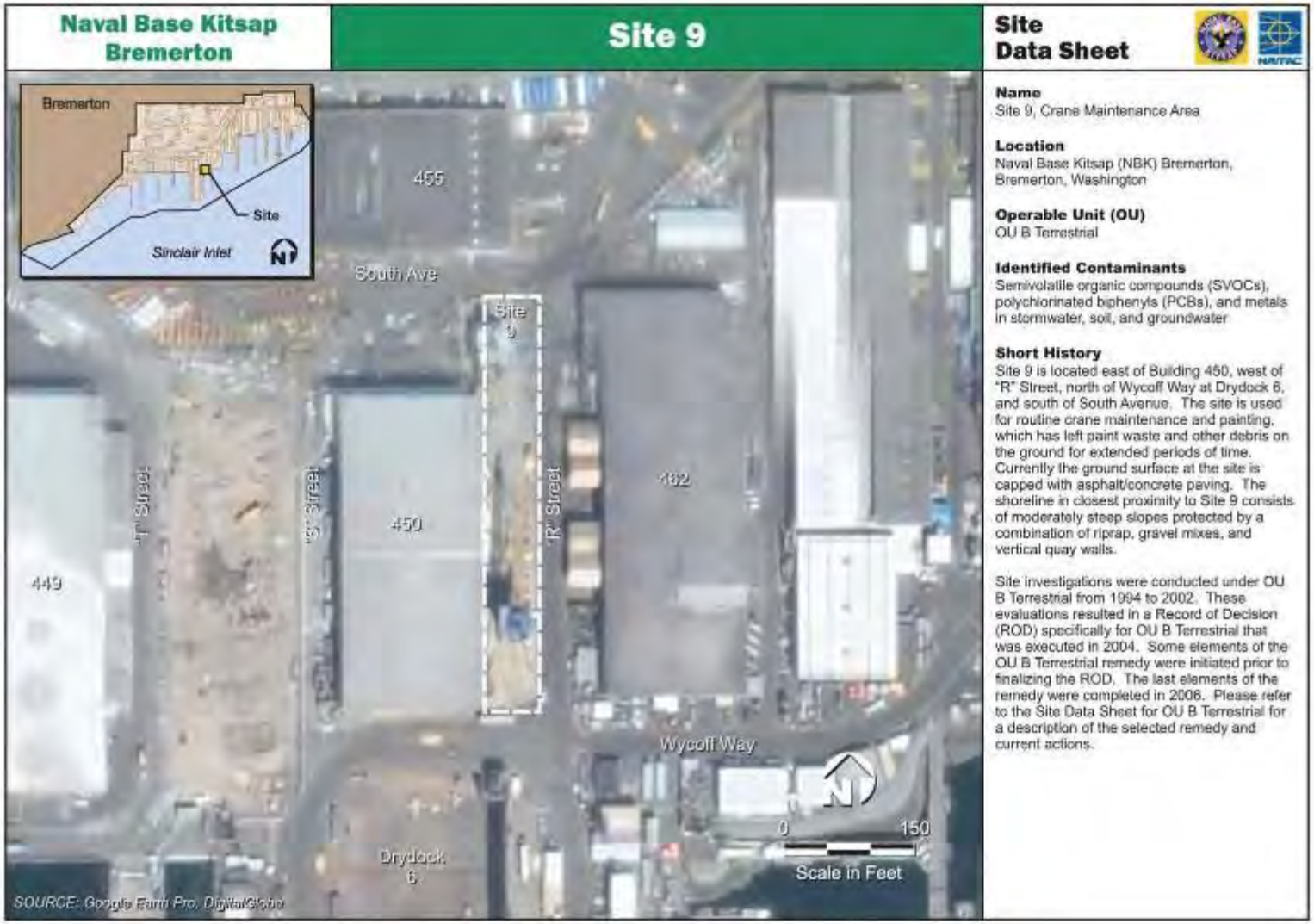
Operable Unit (OU)
OU B Terrestrial

Identified Contaminants
Metals and trichloroethene (TCE) in stormwater, soil, and groundwater

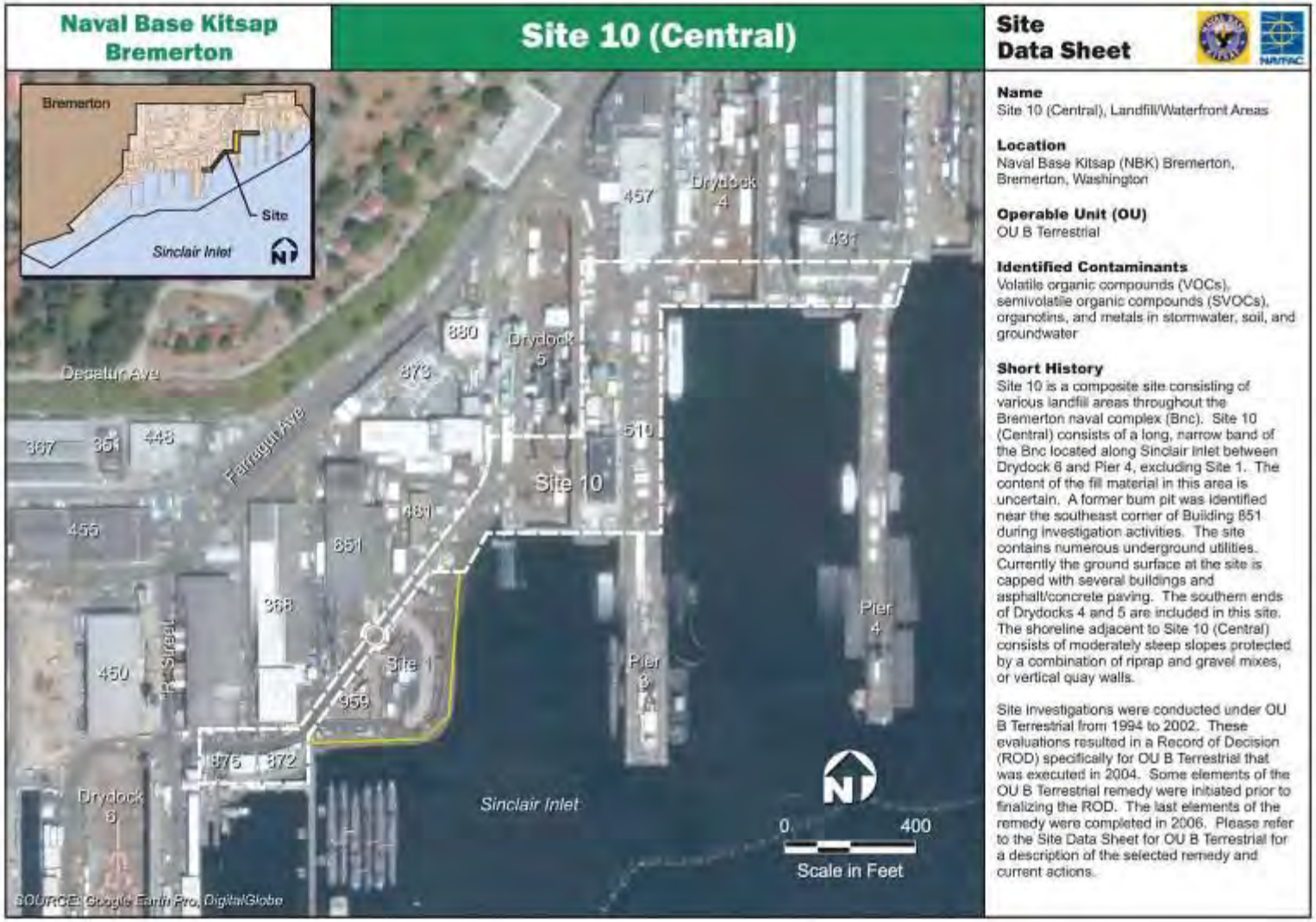
Short History
Site 7 (former Building 99) is located north of Farragut Avenue at Drydock 2, south of Building 500, east of Building 427, and west of Buildings 965 and the 856 Annex. It includes both "J" Street and "K" Street. Former Building 99 was used as a metal plating shop. The floor of the former building was badly cracked and may have provided a pathway for spilled chemicals to subsurface soil and groundwater. Currently the ground surface at the site is capped with a temporary structure (Building 418) or asphalt/concrete paving.

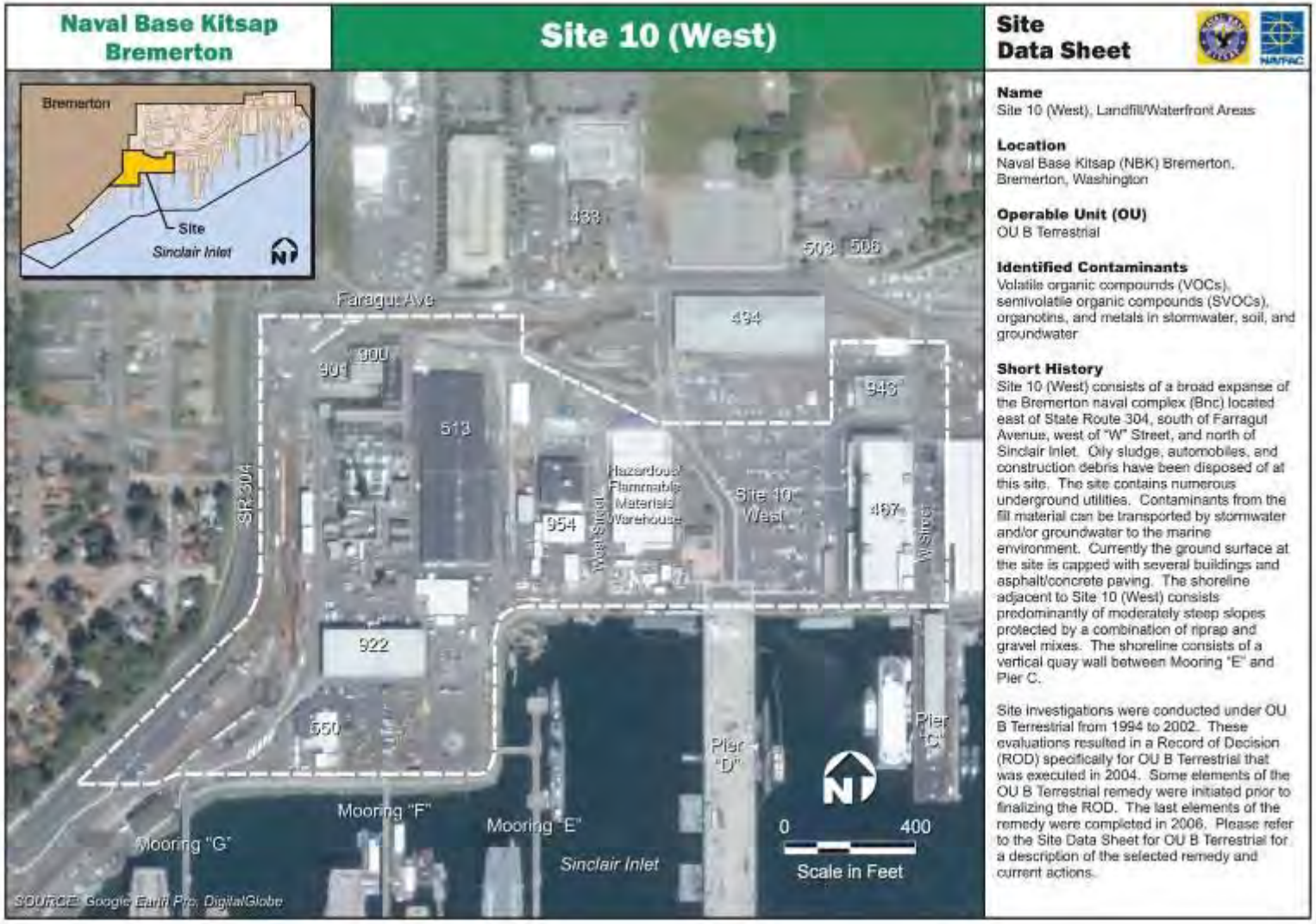
Investigations for Site 7 were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 8
Bremerton
Site
Sinclair Inlet
421
923
106
Site 8
482
529
535
Drydock 1
Drydock 3
Sinclair Inlet
Sinclair Inlet
0
150
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Site
Data Sheet
NAVFAC
Name
Site 8, Building 106, Site of Former Power Plant
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and petroleum hydrocarbons in stormwater, soil, and groundwater
Short History
Site 8 includes the southern half of Building 106 and adjacent areas to the south and east, extending into Drydock 3. Building 106 formerly housed the Central Power Plant for PSNS. Two abandoned oil storage tanks that presumably provided fuel for the power plant were discovered south of Building 106. The tanks that were suspected of leaking fuel oil into Drydock 3 were emptied, cleaned and closed in place during 1994. Currently the ground surface at the site is capped with structures or asphalt/concrete paving. The shoreline in closest proximity to Site 8 consists of a vertical quay wall.
Investigations at Site 8 were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 9
Site
Data Sheet
NAVFAC
Bremerton
Site
Sinclair Inlet
455
South Ave
Site
9
"T" Street
"S" Street
"R" Street
450
462
449
Wycoff Way
Drydock
6
0
150
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 9, Crane Maintenance Area
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals in stormwater, soil, and groundwater
Short History
Site 9 is located east of Building 450, west of "R" Street, north of Wycoff Way at Drydock 6, and south of South Avenue. The site is used for routine crane maintenance and painting, which has left paint waste and other debris on the ground for extended periods of time. Currently the ground surface at the site is capped with asphalt/concrete paving. The shoreline in closest proximity to Site 9 consists of moderately steep slopes protected by a combination of riprap, gravel mixes, and vertical quay walls.
Site investigations were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 10 (East)
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
Ferry Terminal
460
F Street
Site 10 East
862
Drydock 3
495
Pier 6
Pier 7
Pier 8
Sinclair Inlet
0
200
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 10 (East), Landfill/Waterfront Areas
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), organotins, and metals in stormwater, soil, and groundwater
Short History
Site 10 is a composite site consisting of various landfill areas throughout the Bremerton naval complex (Bnc). Site 10 (East), located along Sinclair Inlet between Drydock 3 and the Washington State Ferry terminal, is suspected to contain sandblast grit that was used as fill material. Currently the ground surface at the site is capped with several buildings and asphalt/concrete paving. The shoreline adjacent to Site 10 (East) consists predominantly of moderately steep slopes protected by a combination of riprap and gravel mixes. The shoreline consists of a vertical quay wall between Drydock 3 and Pier 8.
Site investigations were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 10 (Central)
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
Drydock 4
457
431
880
Drydock 5
873
Decatur Ave
Farragut Ave
367
361
443
510
Site 10
481
455
851
368
Site 1
450
959
876
872
Drydock 6
Pier 4
Pier 3
Sinclair Inlet
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 10 (Central), Landfill/Waterfront Areas
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), organotins, and metals in stormwater, soil, and groundwater
Short History
Site 10 is a composite site consisting of various landfill areas throughout the Bremerton naval complex (Bnc). Site 10 (Central) consists of a long, narrow band of the Bnc located along Sinclair Inlet between Drydock 6 and Pier 4, excluding Site 1. The content of the fill material in this area is uncertain. A former burn pit was identified near the southeast corner of Building 851 during investigation activities. The site contains numerous underground utilities. Currently the ground surface at the site is capped with several buildings and asphalt/concrete paving. The southern ends of Drydocks 4 and 5 are included in this site. The shoreline adjacent to Site 10 (Central) consists of moderately steep slopes protected by a combination of riprap and gravel mixes, or vertical quay walls.
Site investigations were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 10 (West)
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
Farragut Ave
433
503
506
434
900
901
513
948
954
West Street
Hazardous/
Flammable
Materials
Warehouse
Site 10
West
487
W Street
SR 304
922
550
Pier
"D"
Pier
"C"
Mooring "F"
Mooring "E"
Mooring "G"
Sinclair Inlet
0
400
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 10 (West), Landfill/Waterfront Areas
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), organotins, and metals in stormwater, soil, and groundwater
Short History
Site 10 (West) consists of a broad expanse of the Bremerton naval complex (Bnc) located east of State Route 304, south of Farragut Avenue, west of "W" Street, and north of Sinclair Inlet. Oily sludge, automobiles, and construction debris have been disposed of at this site. The site contains numerous underground utilities. Contaminants from the fill material can be transported by stormwater and/or groundwater to the marine environment. Currently the ground surface at the site is capped with several buildings and asphalt/concrete paving. The shoreline adjacent to Site 10 (West) consists predominantly of moderately steep slopes protected by a combination of riprap and gravel mixes. The shoreline consists of a vertical quay wall between Mooring "E" and Pier C.
Site investigations were conducted under OU B Terrestrial from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. Some elements of the OU B Terrestrial remedy were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006. Please refer to the Site Data Sheet for OU B Terrestrial for a description of the selected remedy and current actions.


Naval Base Kitsap
Bremerton
Site 11
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
N
466
630
/34
314
192
413
51
642
643
885
942
Under-
ground
Tank
315
674
847
141
Under-
ground
Tank
317
845
644
344
Site 11
657
658
Aboveground
Tank 315
N
0
300
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
Site 11, Oil Tank 316 Area
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU C
Identified Contaminants
Petroleum hydrocarbons, volatile organic compounds (VOCs), organotins, polychlorinated biphenyls (PCBs), and metals in stormwater, soil, and groundwater
Short History
Site 11, also known as OU C, is the location of two abandoned 5-million-gallon underground storage tanks (USTs) and one removed 2-million-gallon above ground storage tank (AST). The site is situated in the north-central upland portion of the Bremerton naval complex (Bnc) between Decatur and Mahan Avenues directly north from Drydock 6. OU C centers on a steep ravine, which was partially filled prior to construction of the petroleum storage tanks. The AST was removed in the 1990s. UST 316 was closed, filled with soil and industrial debris, and paved over in 1986. The area above UST 316 is currently used for parking. UST 317 was closed and filled with clean soil. UST 317, located between 315 and 316 is believed to be the primary source of petroleum contamination found in the subsurface at OU C. Approximately 80,000 gallons of petroleum, primarily bunker C fuel oil, were estimated to be present in the subsurface beneath and downgradient of the tank locations. The potential for petroleum to impact groundwater and possibly be transported off site were the primary potential threats identified at OU C.
The Navy operated a steam sparging system at OU C from August 1996 until September 1999. The total petroleum recovery achieved during sparging system operation was estimated to be approximately 30,000 gallons. Additional wells were installed in July 1999 between OU C and Drydock 6 to monitor for potential migration of petroleum from the site. Quarterly sampling of groundwater was initiated in January 2001. A final focused remedial investigation and screening-level feasibility study for OU C were published in April 2002. The overall conclusion was that the petroleum plume is stable and is not migrating and that therefore No Further Action other than ongoing groundwater monitoring is required to be protective of human health and the environment.
A cleanup action plan was being prepared for OU C at the time of the second 5-year review report (2007). Future CERCLA 5-year reviews will include an assessment of the OU C remedy protectiveness
Current Actions
The Navy conducts natural attenuation monitoring annually. The next 5-year review is scheduled for 2012.


Naval Base Kitsap
Bremerton
OU B Marine
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
Burwell Street
Navy Yard Highway
OU B Marine
Sinclair Inlet
Approximate CAD Pit
Location
0
1,500
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
OU B Marine
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Marine
Identified Contaminants
Polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals, and pesticides in the marine environment
Short History
OU B Marine (formerly known as Site 6) is composed of all of the nearshore marine environment associated with the Bremerton naval complex (Bnc) extending an average of approximately 1,500 feet outward into Sinclair Inlet. Most of the shoreline is composed of moderately steep slopes protected by a combination of riprap, gravel mixes, and quay walls.
Investigations were conducted from 1994 to 2002. The primary potential source of contamination in OU B Marine is contaminant discharges via the Bnc storm drains. Investigations concluded that the primary threat posed by conditions within OU B Marine was human health risk associated with the presence of PCBs in fish. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Marine that was executed in 2000.
The remedy for OU B Marine consisted of dredging PCB-impacted sediments, disposal in a confined aquatic disposal (CAD) area (an offshore pit) and placement of a thick-layer cap offshore of OU A, habitat restoration in the area offshore of OU A and shoreline stabilization at Site 1, development and implementation of a long-term monitoring (LTM) plan, remedy maintenance, and implementation of land use controls.
Construction was completed between 2000 and 2001. A monitoring plan was developed in 2003 and updated in 2005 and 2007. Functionality and protectiveness of the entire remedy are evaluated every 5 years. In addition, a Cleanup Review Tiger Team (CURTT) was established in 2006 to evaluate the draft decision framework for OU B Marine, ensure that the framework is technically defensible, and provide credible evidence that additional action is or is not warranted.
Current Actions
The Navy conducts sediment and tissue monitoring every other year.


Naval Base Kitsap
Bremerton
OU B Terrestrial
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
Burwell Street
Navy Yard Highway
Sinclair Inlet
OU B
Terrestrial
0
1,500
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
OU B Terrestrial
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU B Terrestrial
Identified Contaminants
Metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and pesticides in soil and/or groundwater
Short History
OU B Terrestrial encompasses the heart of the industrial activities at Bremerton naval complex (Bnc), including all six drydocks. Much of OU B Terrestrial was developed in stages, by expanding the original shipyard property through the placement of miscellaneous fill materials in marshes, ravines, and shallow intertidal areas along the shoreline. The site is almost entirely covered by a combination of pavement and buildings. The site features numerous roadways, railways, crane tracks, and a complex network of utility systems.
OU B Terrestrial includes Sites 1, 2, 7, 8, 9, and 10. Investigations for these sites were conducted from 1994 to 2002. These evaluations resulted in a Record of Decision (ROD) specifically for OU B Terrestrial that was executed in 2004. The potential for contaminants present within OU B Terrestrial to impact the OU B Marine environment was a primary concern in selecting the remedy. The remedy for OU B Terrestrial consisted of stormwater system cleaning and restoration, asphalt/concrete paving or installation of a clean soil cover with vegetation, shoreline stabilization measures, institutional controls, long-term groundwater monitoring, and remedy maintenance.
Some elements of the OU B Terrestrial were initiated prior to finalizing the ROD. The last elements of the remedy were completed in 2006.
Current Actions
Groundwater monitoring is conducted to assess groundwater quality at the point of discharge to the marine environment. Annual inspections of pavement, shoreline and access controls are conducted to ensure that these measures continue to remain functional. Functionality and protectiveness of the entire remedy are evaluated every 5 years. The next 5-year review is scheduled to be conducted in 2012.


Naval Base Kitsap
Bremerton
OU D
Site
Data Sheet
Bremerton
Site
Sinclair Inlet
Pacific Avenue
1st Street
OU D
Sinclair Inlet
0
300
Scale in Feet
SOURCE: Google Earth Pro, DigitalGlobe
Name
OU D
Location
Naval Base Kitsap (NBK) Bremerton, Bremerton, Washington
Operable Unit (OU)
OU D
Identified Contaminants
Volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), pesticides, inorganics, and heavy oil in soil and groundwater
Short History
In August 2002, a new OU, OU D, was designated, made up of a limited portion of the far eastern end of OU B Terrestrial. This new OU was established to support the planned conveyance to the City of Bremerton of land for creation of a new city park in conjunction with ongoing development in the vicinity of the Washington State Ferry terminal.
Soil sampling was carried out in 2003 to supplement sampling previously carried out in the area during the investigation for OU B Terrestrial. A final remedial investigation report and feasibility study for OU D was published in March 2004. The primary sources of contamination at OU D are believed to be the materials used as fill in expanding the shipyard area and possible historical releases from industrial operations. The baseline human health risk assessment concluded that risks to site workers and recreational users are acceptable under current and projected future land use conditions. However, remedial action was undertaken at OU D based on the threat to the marine environment from potential off-site transport of contaminants by groundwater and stormwater.
The remedial action components specified in the OU D Record of Decision (ROD) consists of site-wide capping (either with asphaltic concrete, pavement or a vegetative cap), stormwater system sediment removal, cleaning, inspecting, repairing or replacing damaged portions of the stormwater system, disposal of removed debris and sediment, implementing institutional controls, and long-term groundwater monitoring.
The ROD for OU D was executed in May 2005. Remedy implementation for OU D began in June 2006. Site-wide capping and stormwater sediment removal activities were completed in December 2006.
Current Actions
Long-term groundwater monitoring is conducted in conjunction with monitoring conducted for OU B Terrestrial. Future 5-year reviews will include an assessment of the OU D remedy protectiveness. The next 5-year review is scheduled to be conducted in 2012.

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APPENDIX G: FORESTRY PRESCRIPTIONS

Appendix G: Forestry Prescriptions

This Appendix contains detailed information and management prescriptions for the forest stands on Naval Base Kitsap Components.

Naval Base Kitsap forest stand data is found in the following tables in this section:

- Table 1: Stand Data
- Table 2: Stand Data by Decade of Origin
- Table 3: Habitat Data by Cruised Stand
- Table 4: Type Group Summary

A summary of the type symbols used follows.

Species

D	Douglas-fir
H	Western hemlock
RC	Western redcedar
WP	Western white pine
LP	Lodgepole pine (shore pine)
TF	True fir (Grand fir, Silver fir)
SS	Sitka Spruce
RA	Red alder (includes aspen, cherry)
Md	Madrona
Q	Aspen
Hd	Mixed hardwoods
BLM	Bigleaf maple
BC	Black cottonwood

Lower case letter species designations indicate a secondary species which comprises 20% or more of the stand volume as estimated from the aerial photographs or cruisers judgment. The secondary call is useful to indicate that an individual stand is somewhat different from the type group in which it is included.

Non-Forest Types

A	Agriculture
Br	Brush
G	Grass
O	Open (developed)

Size Class

4	21” dbh and larger
3	11-21” dbh
2	5-11” dbh
1	0-5” dbh

Occasionally a size class is difficult to determine because of the broad range of diameters present. In this case, the diameter class may be shown as 4/3 indicating a mixture of size class 4 and 3 trees. Stocking is represented by percent crown closure, based on aerial photo examination.

Stocking
,3 = 70-100 percent
,2 = 40-69 percent
,1 = 10-39 percent

Decade of origin is shown as a two-digit number following the type call. For instance, 92 indicates that the stand began between 1921 and 1930, and so forth.

Origin	
90	1900
91	1910
92	1920
93	1930
94	1940
95	1950
96	1960
97	1970
98	1980
99	1990
00	2000

For volume compilation purposes, cruise data from individual stands is combined with other similar stands into type groups. The groups contain stands with minor species variances that are unique to that stand; however, the volume sample is too small to report individual stand volumes. Occasionally, an individual stand may not receive plots or may be too small to be reported separately. In that case, a judgment is made as to the most appropriate type group. When type groups are indicated with an “a”, this means that the cruiser chose a different basal area factor for that stand, although the group is the same as other stands.

Type Groups	
0	non-timber stands
1	D1,3
2	D2,1
3	D2,2
4	D2,3
5	D3,1
6	D3,2
6a	Lp3,3
7	D3,3ra
8	D3,3
10	D4/3,3
11	D4,1

12 D4,2
13 D4,3
14 Ra1,3
15 Ra3,3
16 Cw3,3
17 M3,2
18 Rc3,2
19 H3,2
20 H3,3
21 H3,3,d
22 H4,3
23 H4,3,d

Volume is calculated from variable radius plots. The plot grid is designed to attain a 5-percent sampling error. Plot grids ranged from one plot per acre to one plot per 6.5 acres depending on compartment size and tree variability. Plot sizes are chosen to achieve a tree tally of 4 to 8 trees per plot. Merchantable timber is cruised in 32-foot logs, to a 6-inch top or 40-percent of dbh. Volumes are calculated using INFO's PACNW timber cruise program. This program is formula based and allows the use of variable log lengths. Gross volumes are adjusted in the field for visible defect, and again in the office for hidden defect and breakage, ranging from 5 to 15 percent. Data by species gathered at each measured sample point (generally every other point) are merchantable tree diameter in 1-inch classes and merchantable height. At each point, subsamples of tree form were also gathered. This information is used to calculate volumes.

Growth increment is determined from standard yield tables[1]. Basal area was calculated for each stand as well as site index on 4 to 20 sample trees per stand. The appropriate cubic and Scribner volume is read from the tables and reported.

Table 1 reports volume data by stand.
Table 2 reports volume data by 10-year age class.
Table 3 reports snag, downed woody debris and vegetation information as well as per acre volume data by stand.
Table 4 reports volume data by type group.

A variable sub plot was taken at each measure point to measure snags. A fixed length transect was taken at each measure point to measure down woody material to a 4-inch diamter[2].

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[1] Chambers, Charles J. Empirical Growth and Yield Tables for Douglas-fir Zone., Dept. of Natural Resources Report No. 41, 1980.
Chambers, Charles J. Empirical Yield Tables for Predominantly Alder Stands in Western Washington., Department of Natural Resources Report No. 31, 1974

[2] Howard, James O. and Franklin Ward. Measurement of Logging Residue., USDA Forest Service, PNW-13.

A 1/20th acre fixed plot was taken at each point to estimate the coverage of brush and ground covers in Table 3, the percentage of ground cover by primary species is provided. In some instances, either by reason of sample size or variability of conditions, the ground cover is reported in combinations such as S/F, meaning salal and ferns. The combination codes are found at the end of Table 3.

Maps are provided on disks in ArcView format. Property ownership information was provided by the Navy. This was adjusted to State Plane Coordinates using electronic information provided by the State of Washington. Roads and other planimetric information as found on the aerial photos are shown with numbers and type call information corresponding with the tables. Acres were calculated electronically.

Site Index. Site quality, is a term used to describe the relative productivity of a land area for a particular tree species. Site quality is usually defined in terms of capacity to produce wood, or the overall health of the dominant species in a stand. The most common expression of site quality is site index. Site index is based on tree growth patterns and refers to the height of dominant or dominant and co-dominant trees in even-aged stands at some index age, usually 100 years. The height growth of such trees is considered to be independent of stand density over a wide range of stand density and strongly related to site quality. Due to prior land management constraints in land acquisition, many stands on Naval Base Kitsap components have not been actively managed to maximize tree growth. Thus, the use of site indices may not always reflect actual site productivity potential. One goal of this plan is to achieve well stocked, regulated stands in order to take advantage of site productivity and to restore the coniferous forest cover previously found on these lands. Thus, site indices based on existing stand characteristics may increase with management and time. Site indices are given in Table 1 for the dominant species in each stand.

FOREST STAND MANAGEMENT

The following prescriptions provide guidance in the preservation, management and treatment of forest stands. The prescriptions are descriptive and prescriptive; meaning that they address, in unrestrictive terms, the management and silvicultural goals and treatments to be applied over the lifespan of this plan and subsequent editions. Management will be adjusted in light of any unforeseen circumstances that pose new situations for forest and land management. Changing or evolving mission requirements and natural disasters may require some adjustment of the location, sequence and timing of silvicultural treatments. Regardless of stand prescriptions, any and all trees determined to be a hazard or safety risk will be removed to eliminate the unsafe condition. The silvicultural policies described elsewhere in this plan are considered ecologically sound and will be adhered to in the absence of urgent and compelling alternative land use requirements documented and adopted through established programmatic and project planning processes.

Due to the sensitive nature of such areas and resources, no information will be included here concerning historical, cultural or archeological items and sites discovered over the years while conducting forestry work. Such information is available from the Forester, EFA NW, through confidential discussions as appropriate and pertinent to land management issues and uses.

Relict Old Growth Forest Trees: While there are no currently delineated stands of old growth timber on Naval Base Kitsap, there are scattered relict old growth trees. To the maximum extent practicable, these will be preserved for the unique characteristics they contribute to forest stands.

Second Growth Stands: Most second growth stands need thinning to focus site potential growth on fewer, larger trees per acre and to foster development of understory vegetation and tree reproduction. The following prescriptions are provided for silvicultural treatments possible under the INRMP for Naval Base Kitsap.

Common Forestry Definitions:

O.C.: On Center, referring to a square spacing used in forestry activities.

T.S.I.: Timber Stand Improvement, referring to any activity which improves stand quality that is not a form of commercial harvesting.

Requirements pertinent to all prescriptions.
Prior to treatment all stands will be evaluated for, nests and associated restricted zones, streams, stream channels and wetlands and the prescription/contract will incorporate the appropriate protection measures whether stated in the following site specific stand prescriptions or not. When prescriptions change the dominant species from broadleaf to conifer 5% or more of the best quality broadleaf species will be retained to contribute to habitat diversity and retain songbird habitat. Exceptions may occur when the objective of site conversion is hazard reduction to adjacent roads and facilities. This requirement overrides any statements to the contrary in the prescriptions below. Additionally, measures to retain and promote merchantable and vigorous western white pine and western redcedar when present will be incorporated into all finalized prescriptions prior to implementation.

NAVAL BASE KITSAP, BANGOR, NORTH, COMPARTMENT 1

Stand prescriptions are developed with the information available and present at the time of their generation. Pending changes in stand data via surveys or field verification, prescriptions are subject to change to meet the needs of the most current stand information available. Silvicultural prescriptions are also subject to change in support of mission related projects.

Stand 1:
This large, 296 acre open area represents the clearing and subsequent paved areas resulting from the road system and utility corridors present in the northern compartment of the installation. Trees and other vegetation may be removed from this stand if it is found to be hazardous to human activity or road structural stability. Also, hazard tree removal or thinning with pruning may occur along this stand's road corridors if security mandates the removal or thinning of trees or vegetation in order to maintain the security of mission related activities. Deciduous trees (primarily alder) within 30 feet of any road corridor that represent a hazard may be subject to removal in a manner that protects streams and wetlands; whereby, the deciduous trees will be removed and the subsequent clear area will be planted with seedlings of various native conifers. Within this stands utility corridors, ground cover and shrub species that encourage the health and vitality of wildlife will be planted to increase wildlife habitat within the area. Any open areas resulting from past disturbance shall have the existing ground cover removed and disposed of off the installation. This will be followed by ripping with a 12" ripping shank in preparation of planting with seedlings of various site representative native conifers.

Stand 2:
This stand represents Cattail Lake; which, in the past was used for fishing and recreation by sailors and their families. However, as a part of NEPA required mitigation, this lake will be drained and the site will be restored to the salt water marsh that existed prior to the man-made formation of the lake. After the lake has been drained and the work is completed to develop the area into a saltwater marsh, the site will be assessed from a forestry perspective to ensure the continuity of the surrounding forest cover type. The area around the future marsh may require thinning and planting to restore the vegetative regimes that would thrive in a salt water marsh environment. Thus, post-conversion, a site survey shall be conducted to determine the future silvicultural prescriptions for this stand.

Stand 3:
This stand is dominated by second growth Douglas-fir with varying amounts of western hemlock and western redcedar. This stand has had two windthrow salvage harvests since the establishment of the base, one in 1979 and the other in 1991. Also, the southern tip of this stand overlaps with an active environmental restoration site (Site A), which will limit the amount of forestry activity that can occur in the area. However, the northern portion of the stand has sufficient size and density to be commercially thinned to a 20' on center (O.C.) spacing; where the residual stand has approximately 100 trees per acre. To encourage vertical and horizontal stratification, seedlings of various native conifers will be planted in the openings created by the thinning. On a side note, the northwest corner of this stand has a listed historical structure that must be evaluated and appropriately buffered before forestry operations can occur in that section of the tract.

Stands 4, 5, and 6:
Stands 4, 5, and 6 are relatively dense and homogenous stands of red alder. The high density and homogeneous nature of the stands shows the need for thinning and subsequent planting. These stands will be thinned using the leave tree release hardwood thinning method whereby a leave tree is selected on a variable residual spacing between 14'-20' O.C. to achieve a residual stand density of 134 trees per acre; whereby, all trees whose crowns are either touching or above the leave tree shall be removed. To encourage both horizontal and vertical stratification within these stands, seedlings of various native conifers will be planted in the newly opened areas. Wetland issues must be addressed prior to forestry operations in this area. Alder thinning will be done in a manner that protects the integrity of streams and wetlands.

Stand 7:
Stand 7 is a Douglas-fir dominated tract with low proportions of mixed native conifers. This stand is not overly dense but could use a light crown thinning to open up growing space and increase the availability of light for photosynthesis to occur in trees of the second and third cohorts. The light crown thinning will consist of the removal of first cohort trees on a spacing of roughly 20' O.C.; whereby, selected stems will be removed on the set spacing and shall not be left. This will open up the canopy and result in greater stand health and vitality without causing the stand to become under-stocked from a heavier thinning. These operations can either be conducted as a commercial timber sale or a TSI project depending on the trees selected for removal. If the TSI option is selected, then the removed stems will be cut and left lie in the stand.

Stand 8:
This stand is primarily within environmental restoration site A, which limits the forestry activities that can be accomplished within the stand. However, the site was a part of a red alder thinning in 2004. Thus, the forested sections of the stand are not overly dense and do not require additional thinning in order to ensure the continuity of the stands health and vigor. However, this site has space for planting of seedlings of various native conifers in both the previously thinned stand and along the edges of the environmental restoration cleared area. In the environmental restoration site, the ground shall be ripped using a 12" ripping shank, top soil added in preparation of planting with seedlings of representative native conifers on 8' O.C. spacing. Prior to planting coordinate with environmental restoration personnel to ensure compliance.

Stand 9:
Stand 9 is a small alder tract with relatively low density and low levels of biodiversity. Thus, hardwood conversion will occur whereby the hardwood over story will be removed and the site shall be planted with seedlings consisting of various native conifer species to increase both the horizontal and vertical stratification of the stand. This will be accomplished through a shelter wood thinning; whereby, the stand will be thinned to a residual spacing of 25' O.C. to achieve 70 trees per acre of residual density. The thinning shall be following with inter-planting with seedlings of various native conifers. Wetland and streams must be delineated and addressed prior to any forestry operations. Alder thinning will be done in a compliant manner that protects the integrity of streams and wetlands.

Stands 10 and 11:
Stand 10 is a very small Douglas-fir dominated stand that shall be thinned to a spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre. Stand 11 will require planting to bring the productivity of the site back to the original condition of the area. Stand 11 will require removal of the brush and vegetation with disposal off site followed by ripping of the whole area with a 12" ripping shank in preparation for planting. The two stands shall be either planted or inter-planted with seedlings of representative native conifers.

Stand 12:
Stand 12 is a Douglas-fir dominated tract that is adjacent to an active environmental restoration site (Site A); but, the stand is considerably over stocked, which is decreasing the stands productivity, crown ratio and health and vigor. This stand shall be thinned to a spacing of 18' O.C. with a residual stand density of 135 trees per acre. The thinning shall be conducted whereby alder, bigleaf maple and any other broadleaved species cannot be marked as "leave" trees but up to 5% of them will be retained on site to contribute to diversity. This treatment will encourage stump sprouting by the broadleaved species leading to the enhancement of residual native conifer health and vigor, while increasing vertical and horizontal stratification, improving forage and maintaining songbird habitat.

Stand 13:
Stand 13 is in the heart of an environmental restoration site (Site A); thus, it is open and denuded of forest vegetation. Scotch broom now dominates the site and should be removed and disposed of offsite followed by ripping with a 12" ripping shank (if approved) and adding top soil to the site. This treatment will release bare mineral soil allowing for easier root penetration and planting success. The invasive species removal and ripping will be followed by planting with seedlings of various native conifers. These operations will be limited in their scope and size by the operations at the environmental restoration facility (Site A). Thus, prior to forestry operations, environmental restoration personnel must be consulted and issues with the ground water barrier addressed.

Stand 14:
Stand 14 is a slightly over stocked Douglas-fir dominated stand that was thinned previously in 1998. This stand shall be thinned again at a spacing of 20' O.C. to enhance residual stand growth and vigor. There shall be approximately 100 trees per acre in the residual stand. This will allow light to reach the forest floor which will develop a healthy understory for the enhancement of wildlife habitat.

Stand 15, 16 and 21:
These three stands run adjacent to Amberjack road. The stands are Douglas-fir dominated with high proportions of alder, bigleaf maple and mixed native conifers. This site shall be crown thinned to a residual spacing of 16' O.C. to achieve a residual stand density of 170 trees per acre; whereby, no red alder or stand dominants shall be marked as leave trees, but approximately 5% of the broadleaf species shall be retained. Conifer selection for retention shall be of healthy co-dominant intermediate and suppressed stems. After the thinning the site shall be planted with seedlings of various native conifers. This will not only open the site for higher levels of growth and forest health but will also help to decrease the number and amount of hazard trees that may present a hazard to Amberjack road.

Stand 17:
Stand 17 is a relatively small tract that is dominated by red alder with a large proponent of Douglas-fir. This stand is under stocked and has a stream with an adjacent wetland running down the middle of the tract. The stand shall be planted with seedlings of various native conifers with an emphasis on western redcedar in order to improve wetland function and vitality. Any identified hazard trees shall be carefully removed and disposed of offsite.

Stand 18
Stand 18 is a red alder dominated tract that is adjacent to an active environmental restoration site; but, the stand is considerably over stocked, which is decreasing the stands productivity, health and vigor. This stand shall be thinned using the leave tree release thinning method whereby the tract will be cut with a variable residual spacing between 14'-20' O.C. with a set residual stand density of 140 trees per acre. Leave trees selection will be of stems with the largest diameter having good health, good form and a well formed crown. Any nearby stem whose crown is either touching or above the leave tree shall be subject to removal.

Stand 19 and 20:
Stands 19 and 20 are located between Amberjack Ave. and Tang Rd. The tract has a high density consisting of Douglas-fir and red alder. This area shall be thinned to a residual spacing of 18' O.C. with a residual stand density of 134 trees per acre to encourage growth but also to ensure the continuity of the shoreline vegetative visual buffer which supports mission objectives.

Stand 22:
Stand 22 is a larger tract that will require two separate prescriptions. The western half of this stand is densely stocked with larger diameter Douglas-fir, with proportions of western redcedar. The western half of this stand shall be thinned to a 20' O.C. residual spacing to achieve a residual stand density of 100 trees per acre which will encourage stand health and vigor, while also increasing understory wildlife habitat. The eastern half of the stand is in close proximity to a unique interior species habitat management area containing aspects of old growth characteristics; thus, the eastern half of the stand will not be thinned but will be managed to enhance the old growth characteristics of the adjacent stand, as outlined in the Forest Service document PNW-RN447.

Stand 23:
Stand 23 is a smaller size tract that is dominated by both red alder and Douglas-fir that is moderate in size and density. This stand will be subject to a general thinning to a 20' O.C. residual spacing with an end objective of 100 trees per acre to encourage vertical and horizontal stratification along with increased understory wildlife habitat.

Stand 24, 25, 26, 27 and 36:
These four stands represent multiple unique habitat types for NBK forests. There is a well defined perennial headwater stream catchment that flows throughout an interior species habitat zone with multiple old growth characteristics, including many relict old growth trees. Thus, typical silvicultural prescriptions and management strategies do not apply to these stands. This stand shall be managed to enhance interior species habitat while increasing the old growth characteristics of the site as outlined in the forest service old growth definition found in the forest service document PNW-RN447. Also, any and all management activities used on these stands must not work to

impede the headwater catchment's structural integrity and water quality. The southern edge of stand 24 runs along Darter road and has been significantly disturbed in the past. Thus, the portion of the stand which lies within 300 feet of Darter road will not be managed for interior species habitat but will simply be treated for hazard tree abatement and mission security. Stand 27 does not fully lie within the interior species habitat management area, thus portions of the northern and southern extents of the stand may be thinned along with adjacent stands to a minimum residual spacing of 20' O.C. and a minimum residual density of 100 trees per acre, to the extent deemed necessary by Navy Foresters prior to treatment.

Stand 28:
Stand 28 is a small stand that lies adjacent to the eastern installation boundary line. This stand is moderately stocked with moderately sized Douglas-fir and western hemlock; thus, this stand shall be thinned to a 20' O.C. residual spacing with a residual stand density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, health and crown. This will allow improved stand structure, health and vigor while also aiding in the development of understory habitat for wildlife and biodiversity.

Stand 29:
Stand 29 is a narrow strip of primarily larger sized red alder that runs along the eastern installation boundary. In order to ensure the efficacy and structural stability of the installation fence-line, this area will be thinned of all poor form and structure hardwood stems and will be replanted with seedlings of various native conifers. The stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stand density of 100 trees per acre; whereby, leave trees shall be stems of good form, health and crown vigor.

Stand 30:
Stand 30 is a red alder dominated stand that has multiple stream channels crossing the stand primarily in the northern portion of the tract. In order to reduce the risk of erosion and sedimentation, this stand shall be thinned using the leave tree release method; whereby, stems of good form health and crown vigor shall be selected at no set spacing in order to achieve a residual density of 140 trees per acre. To release a selected leave tree, any and all stems whose crowns are either touching or above the crown of the leave tree shall be subject to removal. Due to waterway and wetland concerns, careful planning of ground based yarding and development of effective best management practices shall be used for all operations on this stand.

Stand 31:
Stand 31 is a lower density stand with fairly large timber throughout the stand. A light low thinning, whereby intermediate and suppressed stems will be removed, will be needed to bring the overall stand density down to 100 trees per acre. In open areas, seedlings of various native conifers will be planted to allow for the vertical and horizontal stratification of the stand. This can be achieved as a TSI project, whereby non-merchantable stems will be cut and left in the stand while leaving all merchantable stems as standing timber.

Stand 32:
Stand 32 is a moderately large tract with a high stand density that is dominated by larger diameter Douglas-fir. Thinning to a residual spacing of 20' O.C. to achieve a residual stand density of 100 trees per acre will be conducted. Red alder stems may not be counted as leave trees except in contiguous blocks of red alder, which will be thinned at the spacing of the rest of the stand. Subsequent open areas will be inter-planted with seedlings of various native conifers. This thinning must be conducted with careful planning of yarding strategies and best management practices to protect nearby headwater catchments. The thinning will allow for a vigorous and productive understory especially with inter-planting which will increase biodiversity both horizontally and vertically.

Stand 33:
Stand 33 is a small tract that runs along the eastern installation boundary. The small size and relative low density of stems does not allow for a thinning or any other type of harvest unless the stand is combined with another stand to form a more contiguous tract of merchantable timber. Thus, this stand will be managed for hazard tree abatement for installation fence-line structural stability and efficacy.

Stand 34 and 35:
Stands 34 and 35 have present stocking levels of approximately 140 trees per acre, thus any thinning that would occur to bring the stocking down to the desired 100 trees per acre would be relatively light. Thus, this stand shall be thinned in concurrence with adjacent stands to a residual spacing of 20' O.C. to achieve a residual stand density of 100 trees per acre; whereby, selected leave trees shall be stems with good form, health and crown vigor.

Stand 37:
Stand 37 is a small stand which lies to the east of the Flier road clearing and thinning project. The stand has a moderate, 170 trees per acre, current stocking density, with large diameter Douglas-fir dominating the stand. Thus, this stand is to be thinned to a residual spacing of 18' O.C. to achieve the desired residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with a straight bole, good form, good health and a vigorous crown. This spacing will allow for the development of pole quality timber while still providing light to the forest floor to develop a vigorous understory for wildlife habitat development.

Stand 38:
The entire stand is composed of wetland features making forest operations very limited. Hazard tree abatement along with support for mission related projects will be permitted but otherwise no management in this stand is planned at this time. The stand shall be surveyed at a future time to determine the applicability of various management strategies.

Stand 39:
Stand 39 was cleared and thinned in support of the Flier road clearing and thinning project. The security stipulations of that project prevent the planting or further habitat enhancement of the stand. Thus, this stand will be managed for hazard tree abatement and for the support of future mission security objectives. However, pending a change in security requirements, this stand shall be planted and inter-planted with seedlings of various native conifers.

Stand 40:
Stand 40 was completely denuded of standing timber in support of the Flier road clearing and thinning project. Since the project prohibits the planting of seedlings, this area will not be treated at this time for timber but will be managed for wetland stability and efficacy. However, pending a change in security requirements, this stand shall be planted and inter-planted with seedlings of various native conifers.

Stand 41:
The eastern portion of stand 41 has been either cleared or thinned in support of the Flier road clearing and thinning project. The western portion of the stand has a large contiguous wetland with perennial flowing waterways. Thus, this stand will be managed to enhance wetland functionality and stability. A light low thinning using the leave tree release method to a residual stocking of 100 trees per acre will occur; whereby, leave trees shall be stems of good form, health and crown vigor. This can be accomplished as TSI; whereby, removed trees are cut and left in the stand. This approach will prevent major impact to either the water ways or the wetlands from yarding activities. Open areas to the west of the Flier road project area will be planted with seedlings of various native conifers. Pending security requirement changes, the eastern portion of the stand shall be planted or inter-planted with seedlings of various native conifers.

Stand 42:
The eastern portion of stand 42 was thinned in support of the Flier road clearing and thinning project. The western side of the stand could be thinned to a 20' O.C. residual spacing to achieve a residual stand density of 100 trees per acre in order to improve heath and vigor of the residual stand. However, management of this stand will be greatly hindered by the security requirements of the area, which prevents the planting of seedlings. Pending security requirement changes, the eastern portion of the stand shall be planted or inter-planted with seedlings of various native conifers.

Stand 43, 44, 45, 46 and 47:
A majority of stands 43, 44, 45, 46 and 47 will be removed in support of a mission related project. Thus management of the small, if not insignificant, portions of the stand left un-cleared will be combined with adjacent stand management prescriptions. However, the minimum residual spacing shall be 20' O.C. to achieve a minimum residual density of 100 trees per acre; whereby, leave trees shall be stems with good health, form and crown vigor.

Stand 48:
A small portion along the northern boundary of stand 48 will be removed in support of a mission related project. Although the rest of the stand will not be cleared the topography of the stand hinders the ability of active management activities from occurring on this stand. Thus, this stand will be managed for shoreline habitat and hazard tree abatement.

Stand 49:
Stand 49 is a red alder dominated stand with a relative high density of small pioneering stems. This stand shall be pre-commercially thinned to a residual density of 170 stems per acre with a residual spacing of 16' O.C.; whereby, leave trees shall be stems with the best health, form and crown vigor. The topography of this stand will hinder the types of equipment that can be used for forestry operations; thus, a stand survey shall be conducted prior to implementation as a TSI project.

Stand 50:
Stand 50 is located near the shore line with drastically steep topography with a relatively low density of merchantable timber. Thus, this area will be managed for shoreline habitat enhancement and for hazard tree abatement.

Stand 51:
The eastern portion of the stand 51 will be cleared in support of a mission related project. The remaining timber is dominated by larger diameter Douglas-fir with a moderate stocking density. The stand shall be thinned to a residual spacing of 20' O.C. to achieve a desired stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with the best form, health and crown vigor. However, special care must be taken in the vicinity of a building located along the boundary of this tract. With a close proximity to an existing facility, a distance of one tree length into the stand shall be managed for hazard tree abatement.

Stand 52 and 53:
The eastern half of both stand 52 and stand 53 will be cleared in support of a mission related project. The western halves will not have sufficient timber both in terms of number and quality to warrant a commercial thinning. Also, the topography of stand 52 will hinder any forestry activities from occurring on the site. Thus, no management will be prescribed at this time for these two stands, reevaluation of these stands will occur at a later date to define future management objectives for these stands.

Stand 54:
The western portion of stand 54 will be cleared in support of a mission related project. However, the eastern portion of the stand is dominated by larger diameter Douglas-fir stems that have a moderately high stocking density. This stand will be thinned to a residual spacing of 18' O.C. with a residual density of 134 trees per acre; whereby, selected leave trees shall be native conifers with a straight bole, good form, good health, a relatively low number of lower stem branches and a full vigorous crown. This thinning will encourage the growth of pole quality timber, while still achieving a vigorous understory for structural stratification and wildlife habitat.

Stand 56 and 57:
Stand 56 and 57 have either been cleared or thinned in support of the mission related Flier road clearing and thinning project. There are no prescriptions for these stands at this time, reevaluation at a future time will occur to reassess the applicability of these stands for active forest management. Pending changes in security requirements, these stands shall be either planted or inter-planted with seedlings of various native conifers to encourage stand health through structural stratification.

Stand 58:
The timber along the western boundary of stand 58 has either been removed or thinned in support of the mission related Flier road clearing and thinning project. The remaining timber is larger diameter second growth dominated by Douglas-fir. The stand is fairly dense and shall be thinned to a 20' O.C. residual spacing to achieve a residual density of 100 trees per acre; whereby, leave trees shall be selected that are of large diameter, good form, good health and vigorous crowned stems. This thinning will work to encourage stand vigor and health, while meeting the security objectives of the area.

Stand 59:
Stand 59 is a larger tract of sawlog sized Douglas-fir, hemlock, and redcedar that has a high stocking density. The stand shall be thinned to a residual spacing of 18' O.C. in order to achieve 134 trees per acre of residual density for the production of pole quality timber. Leave trees shall be large native conifers with a straight bole, good health, good form and a well formed vigorous crown. No hardwoods are to be marked or tallied as leave trees and must be removed. Any subsequent open areas shall be inter-planted with seedlings of various native conifers.

Stand 60 and 61:
The western half of both stands 60 and 61 was cleared or thinned in support of the mission related Flier road clearing and thinning project. The remaining timber of stand 61 has a perennial stream flowing through it with wetlands adjacent to the channel. Stand 60 is a small patch of timber that is of lower value and is between roads and a building. Thus, management of these two stands will be for the abatement of hazard trees and the enhancement of water quality and wetland vitality.

Stand 62:
Stand 62 is a small strip of timber that lies between Seawolf road, Archerfish road and a turnout for a service well. There is insufficient volume of timber to warrant the thinning or active management of this stand. Thus, this stand will only be managed for the abatement of hazard trees or for mission related projects.

Stand 63:
Stand 63 is an isolated tract of primarily sawlog size red alder that has a fairly high stocking density. This stand shall be thinned to a residual spacing of 18' O.C. to develop a residual stocking density of 134 trees per acre to encourage the diameter growth of the alder to form veneer quality sawlogs. The thinning shall be a leave tree release, whereby any and all stems whose crowns are either touching or above the crown of the leave shall be subject to removal. Logistically, this tract should be thinned in conjunction with stand 12 and only to the extent allowable by the operations at the environmental restoration site A.

Stand: 64, 65 and 66:
These three stands are primarily open with some standing timber in the form of small non-contiguous strips. Any and all invasive species in the open areas shall be removed and disposed of off the installation followed by an herbicide treatment with approved chemicals at the appropriate time of use. The open areas shall be ripped using a 12" ripping shank in preparation of planting with seedlings of various native conifers. The standing strips of timber shall be managed for the abatement of hazard trees.

Stand 67:
The south eastern corner of stand 67 has been both cleared and thinned in support of the mission related Flier Road clearing and thinning project. The residual timber both the previously thinned stems and the previously un-thinned stems surround an ephemeral stream channel. However, this stand is overstocked with pole quality Douglas-fir. Thus, this stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual density of 100 trees per acre in order to encourage vigorous growth and healthy crown production. Logistically, this stand should be thinning in correlation with stand 59.

Stand 215 and 315:
Stand 215 and 315 were previously thinned to a wide (25' O.C.) residual spacing in 2001. A stand survey must be conducted to determine the extent of regeneration that has occurred since the previous thinning. From brief field visits, it has been determined that there is a prevalence of western white pine regeneration within this stand. This stand will require both a pre-commercial thinning to a 16' O.C. residual spacing and pruning of the residual stems. Pruning would be required because of the widespread infestation of pine rust in lower bole branches of western white pine. Thus, the bole of the western white pine regeneration would need to be pruned to a height of one third of the total height of the tree with the branches being trimmed from a distance of 6 inches from the bole up the branch in order to prevent the entrance of pine rust into the main bole of the regeneration.

Stand 222, 322 and 323:
These three stands are highly dense stands that are dominated by large diameter Douglas-fir. These stands shall be thinned to a residual spacing of 20' O.C. to achieve a residual stand density of 100 trees per acre. This timber is of pole quality and can be marked and sold as such. Also, this area has a forest road mapped through it that has not been constructed yet; thus, when planning the thinning, the previously designed road should be considered when laying out the harvesting haul roads.

Stand 254:
The south western corner of stand 254 shall be cleared in support of a mission related project. In the northwestern portion of the tract there is an extensive wetland that is being cleared for the maintenance of the power line right-of-way adjacent to the stand. The rest of the stand is intermixed with large coniferous saw-timber and pockets of pure red alder regeneration. The larger saw-timber shall be commercially thinned to a 20' O.C. residual spacing to achieve a residual stand density of 100 trees per acre which will encourage tree growth and ecosystem function. Leave trees shall be native conifers with good form, health and crown vigor. The pockets of regeneration shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual density of 170 trees per acre.

Stand 303:
Stand 303 lies partially along the northern installation boundary line and to the north of environmental restoration site A. The stand is a moderately dense, saw-timber sized Douglas-fir dominated stand with proportions of western hemlock and western redcedar. This stand shall be thinned in combination with stand 3, whereby the residual spacing shall be 16' O.C. in order to achieve a residual stand density of 170 trees per acre. The close spacing will be used to encourage the growth of pole quality timber. A distance that is one tree length into the stand from the installation fence line shall also be managed for the hazard tree abatement in order to maintain the structural stability and efficacy of NBK security.

Stand 308:
Stand 308 is completely within a marked wetland; thus, stand 308 will be managed for vertical and horizontal stratification by inter-planting seedlings of various native conifers. Also, the management of this stand shall include actions to encourage and foster wetland function and vitality. TSI shall be conducted whereby poor health, form and crowned stems shall be cut and left in the stand to a residual stocking density of 134 trees per acre. The TSI will improve the ecosystem function of the stand which will invariably improve the functionality and vitality of the wetlands in the stand.

Stand 309:
Stand 309 has no merchantable timber but does have significant brush that is primarily dominated by invasive species. The brush on this stand shall be cleared and disposed of offsite and the cleared ground shall be ripped with a 12" ripping shank in preparation of planting. Once ripped, the site shall be planted with seedlings of various native conifers in conjunction with stands 10 and 11. This will work to increase the vertical and horizontal diversity of the stand while also eliminating invasive species in favor of native species.

Stand 319:
Stand 319 is a small but moderately dense stand along the shoreline to the north of Flier road. This stand shall be thinned to a residual spacing of 15' O.C. to achieve a residual density of 194 trees per acre. The shallow spacing will allow for some growth and increased crown health but will also protect the visual buffer this stand provides from the shore to the installation. Thinning to be conducted in concert with stands 19 and 20.

Stand 320:
Stand 320 was completely cleared and thinned in support of the mission related Flier road clearing and thinning project. The large residual spacing and the security requirements of the stand prevent harvesting or planting at this time. However, pending future removal of vegetation restrictions this stand shall be planted or inter-planted with seedlings of various native conifers, to the extent allowable by security restrictions.

Stand 337:
Stand 337 lies to the north of compartment 04 (Keyport Annex) and to the south of Darter road. The southeast corner of the stand is primarily brush which shall be removed and disposed of offsite. The cleared area from the brush removal shall be ripped with a 12" ripping shank to foster tree planting with seedlings of various native conifers. The rest of the stand is very small and dense Douglas-fir and red alder, which shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual density of 170 trees per acre.

Stand 338:
The western stand boundary of stand 338 is an extensive wetland that will hinder forestry activities in that portion of the stand. The rest of the stand is small diameter red alder that shall be removed to support the hardwood conversion of the site from hardwoods to conifers. This will prevent the leaching of nitrogen from the nitrogen fixing alder into the down slope wetland along the western boundary of the stand. Upon hardwood removal, the site shall be planted and inter-planted with seedlings of various native conifers. Any and all conifers already present within the stand shall be

retained as leave trees along with any and all stems, hardwood and conifer, that lie within the western boundary and buffer of the wetland.

Stand 342:
Stand 342 lies at the outlet of the hunter's marsh wetland. This stand also has multiple eagle nesting points within the stand boundaries. Thus, no active management shall occur within this stand, in order to ensure the efficacy and retention of threatened or endangered species habitat.

Stand 344:
The northern majority of stand 344 was either thinned or cleared in support of the mission related Flier road clearing and thinning project. The remaining standing timber shall be managed for the abatement of hazard trees. Pending changes in security requirements, this stand shall be planted with seedlings of various native conifers.

Stand 346 and 347:
These two stands shall be either partially or fully cleared in support of a mission related project. Any remaining timber shall be managed the abatement of hazard trees and to foster adjacent wetland functionality and vitality.

Stand 354:
Stand 354 was completely cleared or thinned by the mission related Flier road clearing and thinning project. Pending future changes in security vegetation requirements, this stand shall be planted with seedlings of various native conifers.

Stand 356:
The southern boundary of stand 356 was thinned in support of the mission related Flier road clearing and thinning project. The rest of the stand consists of Douglas-fir dominated, pole quality saw-timber that has a moderately high density. The northern half of the stand shall be thinned to a 20' O.C. residual spacing to achieve a residual density of 100 trees per acre, which will encourage healthier crowns and increased growth. Pending future changes in security vegetation requirements, the southern half of the stand shall be planted with seedlings of various native conifers.

Stand 363:
Stand 363 lies completely within a wetland. Thus, the management of this stand shall be for the enhancement and vitality of wetland ecosystem processes and function.

Any other stands not specifically addressed above will be considered eligible for pre-commercial thinning, timber stand improvement treatments, clearing and planting or any other silvicultural treatment that will enhance stocking and long term forest and tree productivity. In all forest areas, diseased trees may be cut down. Prescriptions will follow the silvicultural criteria and goals discussed for all other stands.

NAVAL BASE KITSAP, BANGOR, CENTRAL, COMPARTMENT 2

Stand 1:
Stand 1 represents both the MLA and production area of SWFPAC along with all contiguous open areas and roadways. There is no timber within the MLA and some scattered clumps of young planted Douglas-fir in the production area. The scattered clumps of Douglas-fir shall be pre-commercial thinned o a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, residual stems shall be pruned to a height equal to one third of the total height of the tree. Furthermore, in the production area, seedlings shall be planted of various native conifers in remaining open areas to provide visual security for that part of the installation. In the contiguous open areas of this stand that are outside of SWFPAC; any and all invasive vegetation shall be removed and disposed of offsite followed by ripping with a 12" ripping shank in preparation of planting with seedlings of various native conifers. Along all roadways, a distance equal to one full tree length from the road edge into the stand shall be managed for hazard tree abatement.

Stand 2:
Stand 2 represents Devil's Hole Lake which lies along the waterfront area of the installation. This lake was once a prominent recreation area for sailors and their families; however, with increased security requirements the recreation areas became derelict and overgrown. This stand shall be managed to encourage the vitality and water quality of the lake and its inhabitants.

Stand 3:
Much of stand 3 has been previously cleared in support of an expansion to the refit parking lot. However, there is still a small strip of timber located within the stand. The small strip has the potential to be removed in support of a mission related project. But, pending further delineation of project boundaries, these trees are to be managed for hazard tree abatement and for structural diversity by removing invasive species and planting seedlings of various native conifers. Any and all invasive species removed from the site shall be disposed of off the installation.

Stand 4:
A portion of stand 4 was previously used as a parking lot for recreation activities at Devil's Hole Lake. At the present this site is a conglomeration of a couple of relict second growth madrone trees and various invasive species. Thus, for the open areas of this stand, the invasive species and all other shrub species shall be removed from and disposed of offsite. The ground is to be ripped with a 12" ripping shank which is to be preceded by planting with seedlings of various native conifers. Care must be taken to ensure the continuity and efficacy of the three relict pacific madrone trees in the open areas. The timbered portion of this stand shall be thinned to a 20' O.C. spacing to achieve a residual stocking density of 100 trees per acre. No hardwoods shall be selected as leave trees to allow for planting with seedlings of various native conifers in the subsequent open areas.

Stand 5:
Stand 5 was thinned in 2003, which brought the stand to a relatively productive spacing, in terms of health and crown vigor. The previous thinning coupled with the presence of a known and documented bald eagle nesting site, leads to the management objective for inter-planting with seedlings of native shade tolerant conifers. This will allow for vertical and horizontal stratification

without infringement upon the bald eagle nesting site. However, if harvesting of any nature is required in this area, it shall occur during the inactive nesting season. Also, this will ensure the visual security of the waterfront area by providing an intact buffer strip of standing timber.

Stand 6:
Stand 6 represents a long narrow strip of timber that lies along the southern portion of the waterfront area for the installation. This strip of trees works to stabilize the very steep and geologically unstable hill slopes and provides visual security from the water to the facilities located behind this strip of timber. Thus, this stand will be managed solely for hazard tree abatement.

Stand 7:
Stand 7 is an alder dominated stand that was thinned in 2003 along with stand 5; thus, stand 7 has a relatively productive spacing. There is a wetland which runs down the center of the stand. This stand shall be the subject of timber stand improvement (TSI) whereby, individual tree selection will occur where the selected individual will be released on all sides from competition. Leave trees shall be those of higher importance for wildlife habitat and wetland function. A leave tree shall be selected every 25' O.C. with only those trees in direct competition with the leave tree being removed, all others shall be left standing and shall not be damaged. This will enhance the wildlife habitat along with increasing the vertical and horizontal stratification of the stand.

Stand 8:
Stand 8 is a moderately dense, Douglas-fir dominated tract that lies along the southwestern shore of Devil's Hole Lake. The entire northern half of this stand lies directly against the water of the lake and would require at least a 100 foot vegetative buffer to ensure the prevention of sedimentation and erosion directly into the water body. However, the stand shall be thinned to a 20' O.C. residual spacing with a residual density of 100 trees per acre; whereby, only native conifers shall be selected as leave trees. Any large openings resulting from the removal of hardwoods shall be planted with seedlings of various native conifers. The removal of primarily the alder in this stand will work to reduce the nitrogen runoff from this stand into Devil's Hole Lake.

Stand 9:
Stand 9 is a small tract which lies along the southeastern side of Devil's Hole Lake and to the south of the recently expanded pier parking lot. This stand is a moderately dense tract which is dominated by larger diameter Douglas-fir and red alder. This stand shall be thinned to a 20' O.C. residual spacing to achieve a residual stand density of 100 trees per acre. The use of a carefully planned yarding strategy will be required on this stand due to the slope and proximity of this stand to a water body and an adjacent stream.

Stand 10 and 18:
Stands 10 and 18 are moderately dense stands that are dominated by larger diameter Douglas-fir and red alder. These stands shall be thinned to a 20' O.C. residual spacing to achieve a residual stand density of 100 trees per acre; whereby, no red alder stems may be selected as leave trees. Logistically, this stand shall be harvested along with a strip thinning that will be discussed herein with the prescriptions for stands 54 and 62 of this compartment.

Stand 11:
Stand 11 is a long, narrow, meandering corridor which runs along and with a flowing stream and the streams associated wetlands which lie in the eastern half of the stand. This stand is dominated by moderate to larger diameter red alder which has a severely high density. The western half of the stand shall be thinned using the crop tree selection system whereby a leave tree shall be selected at a residual spacing in the range of 14' to 20' O.C. to achieve a residual stocking density of 140 trees per acre. Leave trees shall be selected based on their ability to enhance wetland and stream ecology and aquatic habitat. Once a tree is selected as a leave tree, any and all crowns either touch or above the crown of the leave tree shall be removed.

Stand 12:
The southwestern two thirds of this stand have previously been cleared in support of a mission related project. Thus, only the northern third of the stand has viable timber remaining. The remaining timber shall be managed for hazard tree abatement and for bald eagle management. This stand also includes a documented historical structure; thus, any and all forestry actions on the remaining timber shall include a consultation with cultural resource personnel.

Stand 13:
Stand 13 is a smaller sized tract which lies to the west of the power line right-of-way and to the north of Sturgeon Street. The tract is smaller in size (6.3 acres) and is dominated by highly dense smaller sized red alder. This stand shall be, pending a survey, either pre-commercially thinned or commercially thinned depending on the average stand diameter found during the survey. If the average stand diameter is less than 8 to 10 inches then the stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stand density of 170 trees per acre. If the average stand diameter is greater than 8-10 inches, then the stand will be commercially thinned to an 18' O.C. residual spacing to achieve a residual stand density of 134 trees per acre. This stand is drastically overstocked which is resulting in a loss of crown vigor and health; thus, thinning will open up growing space to allow for the development of healthier more vibrant and vigorous crowns which in turn will improve the overall ecosystem function of the area.

Stand 14:
Stand 14 represents a long narrow strip of timber that lies along the southern portion of the waterfront area for the installation, further to the south of stand 6. This strip of trees works to stabilize the very steep and geologically unstable hill slopes and provides visual security from the water to the facilities located behind this strip of timber. Thus, this stand will be managed solely for hazard tree abatement.

Stand 15:
Stand 15 lies directly beside an existing facilities building on the installation. The southern half of the stand is moderately dense, whereas the northern half of the stand was thinned in 2003 and has spacing conducive for tree health and vitality. The entire stand has larger diameter Douglas-fir in dominance. However, the proximity to an existing building will inhibit the amount of forestry actions that can be conducted on the site. The southeastern half of this stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre. The western half of this stand shall be managed for the abatement of hazard trees to a distance of one full tree length from the building opening into the stand.

Stand 16:
The northwest section of this stand was thinned in 2003 to a residual spacing that is conducive to productive tree growth, health, and crown vigor. This stand also has a wetland that runs down the middle of the northern two thirds. The non-thinned portions of the stand are dominated by primarily red alder with considerable amounts of Douglas-fir intermixed. The non-thinned areas of this stand shall be thinned to a residual spacing of 20' O.C. to achieve the desired residual stand density of 100 trees per acre; whereby, no red alder shall be marked as leave trees. All open spaces generated by the removal of red alder shall be planted with seedlings of various native conifers. In order to diminish the impact of harvesting operations on the wetland within this stand, all yarding shall be done utilizing a sound strategy as the primary moving force, with all decking or landings being placed outside of the stand boundary itself.

Stand 17, 23 and 317:
Stand 17 is a fairly large (27.1 acres) tract and stand 23 is a moderately sized (11.0 acres) tract which both support larger diameter redcedar and Douglas-fir stems at a moderately high density. Stand 317 is a small (4.3 acres) stand that borders a navy facility and is highly dense larger diameter Douglas-fir. There is an employee walking trail through these stands that must be taken into account prior to forestry actions commencing. This tract shall be crown thinned to a 16' O.C. spacing to achieve 170 trees per acre residual density; whereby, the largest stems with the best form and the straight boles that are native conifers shall be selected as leave trees in order to support the development of pole quality timber and a thriving ecosystem. Along with the crown thinning, a low thinning will occur, which will remove any and all poor quality (poor form, noticeable rot, immense epicormic branching, etc.) suppressed stems.

Stand 19:
Stand 19 lies to the north of Sturgeon Street and to the east of installation building 7001**.** This stand supports a perennial stream with an associated wetland feature. This stand is moderately overstocked primarily with moderate diameter red alder. This stand shall be thinned using the leave tree release system; whereby, a leave tree will be selected along the range of residual spacing 12'-20' O.C. to achieve a residual stocking density of 140 trees per acre. The range of spacing will allow the forester to adaptively manage the stand for ecological needs unique to the site. Leave trees shall be those with the greatest diameter, good form, good health and a vigorous crown. Any and all stems whose crowns are either above or touching the crown of the leave tree shall be subject to removal.

Stand 22:
Stand 22 is a unique site in NBK forests. In the southwestern corner of the stand lies a clump of Douglas-fir trees and within the clump there is a derelict homestead from before the base was constructed. The open brush area in this stand is the result of a fruit tree orchard that is still partially standing from the homestead. The area around the orchard and the multiple historic structure points within the stand will prevent active silvicultural management in this stand. However, this stand shall be managed for the abatement of hazard trees and in support of mission related projects. Also, since the orchard trees on this site are fairly old and have most likely not hybridized with other species, the USDA shall be permitted to enter into the area and harvest seeds from the orchard trees in order to enhance the biodiversity of seed banks in the region for those represented species.

Stand 24 and 25:
Stands 24 and 25 are moderate sized tracts which support moderately dense small diameter Douglas-fir with patches of sparsely stocked red alder. The center area within the two stands is considerably wet. This stand shall be surveyed for wetlands and if any are found they must be delineated, flagged and mapped using GPS. This stand shall also be thinned to a 25' O.C. residual spacing in order to open up areas to be inter-planted. The open brush areas of this tract shall have all brush and invasive species removed and disposed of offsite followed by ripping with a 12" ripping shank in preparation of planting. After brush removal, the entire site shall be planted and inter-planted with seedlings of various native conifers.

Stand 26, 27 and 28:
Stand 26 is an overstocked Douglas-fir dominated tract; whereas, stands 27 and 28 are moderate density red alder dominated stands. This area shall be thinned to a 20' O.C. spacing to achieve a residual stand density of 100 trees per acre; whereby, alder cannot be selected as a leave tree and must be removed. The subsequent open areas from the hardwood conversion shall be planted with seedlings of various native conifers, along with inter-planting with seedlings of various native conifers in the thinned areas. The hardwood conversion will support the enhancement of water quality by decreasing the exportation of nitrogen from these stands to the watershed.

Stand 31:
Stand 31 is a large (59.4 acres) stand that is dominated by highly dense moderately sized red alder with major components of large Douglas-fir intermixed. There are four separate free flowing drainages within this stand with moderately expansive wetlands associated with each individual drainage. The northern end of this stand will be cleared in support of a mission related construction project. The remaining timber is rather unique in that it has large diameter native conifers intermixed with smaller diameter red alder. There is also an old skid road that runs throughout the stand that is currently populated by smaller sized red alder. The site must be completely surveyed for wetlands prior to any forestry operations occurring. In the red alder dominated portions this stand shall be thinned to a residual spacing of 25' O.C. to achieve a residual stocking density of 70 trees per acre. After thinning, the red alder areas shall be inter-planted with seedlings of various native conifers along with planting in any open areas of the stand. In the coniferous portions of the stand, the site shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be selected that are native conifers with a larger diameter, good form, good health and a vigorous crown. No skidding, yarding, dragging, rolling, or driving shall occur within 50' of drainages or wetlands. Stems may be cut and carried or picked up and carried from these areas as long as the action does not drag, roll or pull stems through a wetland and providing the removal will clearly benefit the wetland.

Stand 32:
Stand 32 is a small (3.5 acres) stand with a relatively high density of Douglas-fir and red alder. This stand shall be thinned to an 18' O.C. residual spacing to achieve a residual stocking density of 134 trees per acre; whereby, no red alder, larger than 8" in diameter, shall be marked or tallied as a leave tree. Any open areas larger than the uniform residual spacing openings shall be inter-planted with seedlings of various native conifers.

Stand 33 and 34:
Stand 33 and 34 are alder dominated stands that have moderate stem densities. However, most of stand 33 and all of stand 34 will be removed in support of a mission related project. The remaining vegetation in either stand 33 or 34 will be used as a vegetative filter for the minimization of erosion and sedimentation from construction sites. Also, any standing timber shall be managed for the abatement of hazard trees

Stand 35 and 38:
The tract created by stand 35 and 38 is one of the largest contiguous stands on the installation with stand acreages of 73.1 acres and 41.1 acres respectively. The south and east boundaries of the tract have already been thinned in support of the mission related Flier road clearing and thinning project; along with the Archerfish thinning and Jefferson Street timber sale thinning. Despite the previous thinning, the stand is moderately dense with larger diameter Douglas-fir that is of pole quality. Thus, these stands are to be thinned to a residual spacing of 18' O.C. to achieve a residual stand density of 170 trees per acre. The tight spacing will allow the stands to continue to produce straight bole stems while still allowing for light to penetrate through the crown and hit the forest floor to develop a vigorous understory for biodiversity and wildlife habitat. This stand will also have a 7 acre block of timber along the northwestern boundary removed in support of a mission related project.

Stand 36 and 37:
Stands 36 and 37 are small odd shaped stands that serve as a vegetative break between a security road and Seawolf Road. Much of stand 37 has already been either cleared or thinned in support of the mission related Flier road clearing and thinning project. Thus, any remaining timber shall be thinned to a 20' O.C. residual spacing to achieve a residual stand density of 100 trees per acre.

Stand 39:
Stand 39 is a small tract of mixed conifer and hardwood species. This stand is partially within the clearing limits of a mission related project and could be slated for removal in support of future mission related security needs. Thus, this stand shall be managed for hazard tree abatement and for the support of mission related projects.

Stand 40:
Stand 40 is a small tract of primarily larger Douglas-fir and smaller red alder that borders a soil deposition site for multiple mission related projects. This stand is moderately dense and shall be thinned to a residual spacing of 16' O.C. to achieve a residual stand density of 170 trees per acre, whereby no red alder shall be selected as leave trees. This narrow spacing will maintain visual security for the open soil deposition site from the roadway. The removal of the red alder will prevent future hazards from developing from the standing timber in this area.

Stand 41:
Stand 41 is a tiny (1 acre) stand which is dominated by red alder regeneration. However, much of the site is open grass; thus, this stand shall be inter-planted with seedlings of various native conifers that emphasize western redcedar (*Thuja plicata)*. This will allow for the vertical and horizontal stratification while also capitalizing on the wetter soil conditions of the site to enhance the growth of western redcedar.

Stand 42:
The western one quarter of stand 42 shall be cleared in support of a mission related project. In addition, the southern panhandles of this stand have already been cleared in support of a mission related project. However, a handful of trees have been left in the southern extent of the stand for the support of visual security and unique species; these residual trees shall be managed for the abatement of hazard trees. The remaining three quarters represents one of the best examples of vertical and horizontal stratification found on the installation. Thus, the management of this stand shall be to emphasize biodiversity through the use of selective cutting whereby certain habitat trees are selected to be released and any tree that is either touch or above that tree will be removed. Also, inter-planting shall occur in this stand to establish a new cohort of various native conifers and if available various native hardwoods. Also two large drainages flow through this stand that shall be protected with at least fifty foot buffers or from the top of the hill slope.

Stand 43:
Stand 43 is a large (44.7 acre) stand that is dominated by saw log sized red alder. The eastern spur of this stand follows a drainage, which includes the stream and the wetlands associated with the channel. Thus, this portion of the stand shall be managed for wetland function and water quality. The eastern spur shall be selectively crown thinned whereby larger over-mature red alder trees shall be selected at a variable 14'-25' spacing in order to open the area up for planting with seedlings of various native conifers with an emphasis on western redcedar (*Thuja plicata)*. However, the minimum residual density that this stand may be thinned to is 70 trees per acre. The western and southern extents of the stand are almost pure stands of red alder and have some wet areas but no pronounced drainages. Thus, this area shall be crown thinned using the leave tree release method; whereby, an intermediate or suppressed stem shall be selected as a leave tree and all dominate and co-dominate stems that are above or touching the leave tree shall be removed. This portion of the stand has a minimum residual density after any thinning operation of 100 trees per acre. Due to the proximity of this stand to a roadway and the wet nature of the site, this stand will only be thinned if yarding can be done in a manner that maintains the integrity of the wet area; this includes prevention of soil erosion and sedimentation. After thinning the stand shall be inter-planted with seedlings of various native conifers with an emphasis on western redcedar because of the wetter characteristics of the stand.

Stand 44:
Stand 44 is a small (4.4 acre) stand that is dominated by moderate diameter Douglas-fir. This stand is not overly dense but could be opened up a little more to enhance the growth of the pole quality Douglas-firs in the stand. Thus this stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre. This will open the area up to ensure productive growth and crown health of the residual stand, while also allowing for the development of a vigorous understory to enhance biodiversity and wildlife habitat.

Stand 45 and 47
Stands 45 and 47 are small moderately dense stands dominated by moderate size Douglas-fir. This stand shall be thinned to a residual spacing of 25' O.C. to achieve a residual stocking density of 70 trees per acre. This wide residual spacing will open these stands up for inter-planting with seedlings of various native conifers with an emphasis on western white pine to provide increased biodiversity and age diversification while attempting to develop a regime of an uncommon species.

Stand 46:
Stand 46 is a small (2.1 acre) strip of timber, of which the northern half will be cleared in support of a mission related project. Thus, the southern half will not provide sufficient area or timber volume for a timber sale. This stand shall be managed for the abatement of hazard trees and for the support of mission related projects along with invasive species removal.

Stand 48, 49, 50 and 51:
This tract covers a large (106.6 acres collectively) area that has had some previous thinning and active management. In previously thinned portions of the tract, inter-planting shall occur with seedlings of various native conifers to the extent allowable by security regulations along the eastern boundary of the tract. In the un-thinned areas of this tract, thinning shall occur to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; which will allow for increased crown production and health while still achieving the development of pole quality timber.

Stand 54:
Stand 54 is a critical stand of moderately dense Douglas-fir. This stand is adjacent to a large contiguous block of red alder that will be significantly managed in the coming years. Thus, this stand shall be thinned to a 20' O.C. residual spacing with a residual stocking density of 100 trees per acre; whereby, the largest most vigorous stems shall be selected as leave trees in order to ensure good progeny for seeding of the adjacent stand. Having this stand healthy and vigorous will ensure that a healthy, vibrant crown is developed to enhance the ability of the stand to seed and protect the adjacent stands.

Stand 55:
Stand 55 is a red alder dominated heavily dense stand that needs active management to decrease the crown volume of the stand. This stand shall be thinned to a 20' O.C. residual spacing to achieve a residual stocking density of 100 trees per acre. When selecting leave trees, all healthy and good formed coniferous trees shall be selected over hardwood trees. However, considering the density of red alder in this stand some alder shall be selected as leave trees as long as it is of good form and size (>= 10" DBH). Due to the presence of some wet areas and drainages, the use of a sound strategy to achieve yarding and compliance objectives is required in order to protect wetland function and water quality by decreasing the amount of exposed bare mineral soil which in turn will decrease erosion and sedimentation.

Stand 56 and 59:
Both stands 56 and 59 were previously thinned to a rather wide residual spacing during the Escolar Timber Sale. The site is at a spacing which is advantageous to crown production and growth. However, with ever changing regimes this site will require additional management to ensure biodiversity. Thus, this site shall be thinned using the single tree selection method whereby a tree is selected for removal based on habitat requirements, disease prevention, stand health, or crown function. There is no set spacing or residual density requirements for this stand. However, under no circumstance other than natural succession shall this stand fall below 70 trees per acre of stocking density. This stand shall also be inter-planted with seedlings of various native conifers.

Stand 57:
Stand 57 was thinned to a wide residual spacing in support of the mission related Flier road clearing and thinning project. This stand shall be successively inter-planted with seedlings of various native conifers; whereby, the stand shall be planted every five years for fifteen years. The species used will have an emphasis on western white pine on the drier portions of the stand and western redcedar on the wetter portions of the stand for the first planting. The second planting will emphasize the selection of shade tolerant species, while the third planting will focus on the development of hardwood (primarily big-leaf maple) regimes. The wide spacing of the first cohort and the complete removal of all understory vegetation has left this stand with a single age class that has a moderately narrow species regime. Thus, the successive inter-planting of the stand will allow for the development of multiple age classes and broader species distribution, to encourage vertical and horizontal stratification.

Stand 58 and 60:
Stands 58 and 60 should be the site of a pole thinning in order to release the co-dominant and intermediate stems. The thinning shall be a single tree selection thinning whereby the trees selected for removal shall be of pole quality and size. The residual stocking density shall be 170 trees per acre and care should be taken to ensure a residual spacing of 16' O.C. The tight spacing and moderate density is required in order to keep the stands crown in pole production. This stand shall also be thinned in five to ten years with an 18' O.C. residual spacing whereby the removed trees are also of pole quality and size.

Stand 61 and 360:
Stand 61 is a small stand with a lower density of stems dominated by Douglas-fir and red alder. Most of the stand is populated in an expansive wetland and a drainage channel. This stand shall be thinned to a 20' O.C. residual spacing to achieve a residual stand density of 100 trees per acre; whereby, all activities shall address wetland issues prior to operations and shall use a carefully planned yarding strategy to reduce erosion and sedimentation. The leave trees shall be based on a set of priorities whereby large, good from, and healthy coniferous trees shall be selected first, with good form and health hardwoods next, followed by poorer form but good health coniferous trees and under no circumstance shall a poor form hardwood tree be selected as a leave tree. Any large open areas resulting from the removal of poor form hardwood stems shall be inter-planted with seedlings of various native conifers with an emphasis on western redcedar due to the wet nature of the stand.

Stand 62, 63, 64 and 362:
These stands are primarily dominated by large contiguous blocks of red alder that is of sawlog size and quality. These stands also include minor components of larger diameter Douglas-fir. The density of these stands is moderately high and will require thinning to increase the productivity of the crowns. Most of the tract is considered a wet area with intermixed wetlands; thus, a unique thinning method will be used to diminish the impacts that thinning would have on the stand and on wetland function. This tract shall be strip thinned during the dry season; whereby, a one crown wide strip of timber is removed running generally from east to west at one tree length from the southern boundary and is yarded out of the tract along that same strip. From the strip the faller will go into the stand both to the north and to the south of the strip and cut stems on an 18' O.C. residual spacing up to one tree length away from the strip. The removed trees to the north and south will be

directionally felled away from any wetlands and toward the strip so that all yarding activities occur solely in the strip previously removed. Once the thinning has occurred from one tree length to the north and south of the strip is complete, another strip is cut that is two tree lengths to the north of the previous strip and the process repeats itself until the entire stand is thinned. Care should be taken to locate the strips in areas with significantly less water and decreased soil moisture conditions than the rest of the stand; this will prevent yarding through and compaction of true wetlands. All yarding within the strips shall be conducted with a sound strategy to reduce the amount of bare mineral soil exposed so that erosion and sedimentation from the strips is diminished in comparison to mechanized yarding. This thinning method will enhance the production and vigor of the residual crowns while minimizing soil compaction and wetland disturbance which would detract from the area's wetland habitats. The increased vertical and horizontal stratification will also improve this sites biodiversity and habitat structure for wetlands. After the thinning has been completed the site shall be inter-planted using seedlings of western redcedar in order to enhance the wetland ecosystem by changing from a very unstable and short lived dominant tree species to a stable long lived dominant species; thus, providing a stable ecosystem for the enhancement of wetland functionality and vigor. Western redcedar will also provide shade throughout the year which will help alleviate the reed canary grass problem that is found throughout this area. Reed canary grass shall also be combated on the dry portions of this site via the application of approved herbicides. This stand shall also be managed for hazard tree abatement along Escolar Road. On a side note there is an old foundation identified by cultural resources to be non-significant in this tract that could pose issues to forestry operations.

Stand 65 and 66:
Both stands 65 and 66 are red alder dominated with multiple stream channels flowing through the tract along with some expansive wetland areas. The alder in this area is smaller in size and has a density that reduces crown production. Thus, this area is to be thinned using the leave tree management method to a residual density of 100 trees per acre; whereby, leave trees will be selected based on their function in the overall habitat of the site and any tree that is either touching or above the leave tree shall be removed. This thinning will release the crowns of the residual trees to improve crown production, health, and vigor which will in turn increase the size and ecosystem function of the residual stems, making an overall more productive ecosystem in terms of water quality and wetland function.

Stand 67:
Stand 67 is a moderate sized stand that is dominated by larger diameter Douglas-fir stems. The stand density is just above the desired 100 trees per acre residual stocking density for the installation. Thus, in order to provide a spacing that will maximize crown light exposure and maximize crown production and health, this stand shall be single tree selection thinned. The single tree selection will bring the stand down to the desired 100 trees per acre residual stocking density. The thinning will include the selection of single non-desirable trees to be removed from the stand at no set spacing or design to the extent needed to hit the desired stocking density. This could be achieved using simple TSI; whereby, the non-desirable trees are cut and left in the stand to provide wildlife habitat along with improved crown health.

Stand 68 and 71:
Stand 68 is a moderately large (23.5 acres) stand that is dominated by larger diameter Douglas-fir and western white pine. Stand 71 has similar characteristics as stand 68 however it is dominated solely by Douglas-fir and is not as large in terms of acreage. The densities of both stands are moderately high which is preventing the crowns from maximizing their health and production. Thus, this stand is to be thinned to a residual spacing of 20' O.C. to achieve a residual stand density of 100 trees per acre; whereby, leave trees are to be among the largest, most healthy, and straightest native conifer stems in the stand. Big-leaf maple may be selected as some leave trees because of the increased wildlife habitat and biodiversity that species provides.

Stand 69 and 79:
This stand was previously cleared of all forest cover in support of a mission related project in the production area of SWFPAC. Pending completion of the project and consideration of security requirements, the stand could potentially be ripped with a 12" ripping shank and planted with seedlings of various native conifers with an emphasis on western white pine.

Stand 70 and 379:
Stand 70 is a larger stand that consists of moderately dense large diameter Douglas-fir. Stand 379 is similar in that it is also moderately stocked and has a major component of the stand as larger diameter Douglas-fir but it also has a major component of moderately sized and densely stocked red alder. Both stands have considerable wetland areas and prevalent drainages; thus, forestry activities shall be restricted to enhance the function and vitality of the drainages and their subsequent wetlands. This tract shall be thinned to a 20' O.C. residual spacing to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers and bigleaf maple that has a larger diameter, good form, good health and a vigorous crown. Red alder and other hardwood species shall not be marked as leave trees, but uncommon hardwoods such as, wild cherry, willow, etc. shall be retained for wildlife habitat. Upon removal of the red alder component of the stand, this tract shall be inter-planted with western redcedar to provide a more stable ecosystem for wetland vitality and function.

Stand 72 and 78:
These stands are moderately stocked tracts that are dominated by large diameter Douglas-fir and western redcedar. Along Escolar Road and the power line trail to a distance of one tree length into the stand, management for the abatement of hazard trees and the protection of edge habitat for wildlife shall occur. The interior of this tract will be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby leave trees shall be the largest diameter and best form native conifers or bigleaf maple. No red alder shall be selected as a leave tree. This thinning will enhance the crown productivity and health of the stand by releasing leave trees to increased sunlight; subsequently, releasing the stand will allow light to penetrate the canopy and strike the forest floor which will develop a vigorous understory for improved wildlife habitat. Higher production crowns will produce more mast and browse for wildlife and will increase the vitality and function of the ecosystem as a whole. There are three stream channels that run in the northeast of this stand; care should be taken to minimize or prevent any and all disturbances to the stream channel.

Stand 73 and 373:
Stand 73 is a moderate diameter red alder dominated stand that is densely stocked and has an expansive wetland which almost covers the entire southern half of the stand. Stand 373 is a smaller stand that is dominated by Douglas-fir and red alder at moderate diameters with a relatively moderate stocking density. This stand shall undergo a light crown thinning to remove portions of the red alder overstory to open area up for inter-planting of more stable species. The thinning shall have a remove tree spacing of 20' O.C. in order to remove 100 trees per acre; whereby, removal trees will be the stems which opens up the largest space for planting. In the open areas, inter-planted shall occur with seedlings of primarily western redcedar along with other various native conifers. This will interject a regime that is dominated by a species that is a lot more stable for wetland function and vitality.

Stand 74:
Stand 74 is a small stand which has very little forest cover. There are a few small red alder stems on the stand that will be removed in the site preparation for planting. This site shall have all invasive and large woody vegetation removed and disposed of offsite and shall be ripped with a 12" ripping shank to loosen up the soil for seedling vitality after planting. The site is to then be planted with seedlings of various native conifers. This will return the site to its native vegetative cover and increase the ecosystem function of the installation.

Stand 75, 76 and 77:
These stands are all smaller stands (< 6 acres) that are dominated by larger diameter Douglas-fir that is moderately stocked. These stands shall be thinned to a residual spacing of 20' O.C. to achieve a residual stand density of 100 trees per acre; whereby, the leave trees will be the largest most healthy stems on the set spacing. The portions of this tract which are along Golet road and Plunger Street shall be managed for the first one tree length from the roadway into the stand for the abatement of hazard trees along with the development of wildlife habitat for edge species.

Stand 80:
Stand 80 is a large (44.9 acres) contiguous stand of larger diameter well stocked Douglas-fir. This stand is located to the west of Escolar road and to the north of Trigger road. This stand shall be thinned with a TSI single tree selection; whereby, the stems selected will be cut and left lay in the stand in order to ensure a uniform residual stocking density of 100 trees per acre. This operation will develop stand characteristics which support interior species wildlife habitat and ensure vegetative biodiversity. There is no set spacing for removal but trees will be selected based on form, health, ecosystem function, and uniqueness for the habitat.

Stand 81 and 82:
Stands 81 and 82 are Douglas-fir dominated densely stocked smaller stands. The portions of the tract which lie along the power line trail or the adjacent installation facility shall be managed to the first one tree length for the abatement of hazard trees as well as for edge species habitat. The rest of the stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, the selected leave trees shall be of good form, health and diameter. This will allow the stand to increase its crown production and health and increase the overall ecosystem function of the tract.

Stand 83, 84, 85 and 86:
These stands are primarily red alder dominated with intermixed coniferous species throughout. They run along and to the north of Trigger Avenue and have either moderate or low stocking densities, with some open brush areas. In the moderately dense portions of the stand, thinning shall occur to a residual spacing of 25' O.C. to achieve 70 trees per acre of residual stocking density which is conducive for planting. Leave trees shall be of native conifers with good form and health that will not be susceptible to sun shock. In the brush areas, the invasive species and any other woody groundcover shall be removed and disposed of offsite. After the brush has been removed, the site shall be ripped with a 12" ripping shank with herbicide treatment directly following the shank. The entire tract: thinned areas, low density areas, and ripped areas shall be planted and inter-planted with seedlings of various native conifers. This will revive the ecosystem of the stand toward native coniferous regimes and will remove invasive species and bring areas back into forest production. This will in turn increase wildlife habitat and encourage ecosystem health and growth.

Stand 87 and 88:
Stand 87 is a well stocked stand dominated by larger diameter Douglas-fir and western redcedar. Within stand 87 is stand 88, which is a highly stocked red alder and western redcedar stand. These stands shall be thinned concurrently with separate thinning methods. Stand 87 shall be thinned with single tree selection; whereby, trees shall be selected at no set spacing in order to allow for the uniform density of 100 trees per acre to be achieved. Stand 88 shall be thinned to 20' O.C. to achieve a residual spacing of 100 trees per acre. In stand 87 the selected trees will be stems of poor form and poor health that will be cut and removed or left lying in the stand. In stand 88, the selected leave trees will be stems of good form and health with a vigorous crown. No western redcedar shall be removed from either stand.

Stand 89:
Stand 89 is a larger (37 acres) stand that is dominated by large diameter well stocked Douglas-fir. This stand shall be managed for interior species wildlife habitat, whereby any and all management that occurs will be to enhance the old growth characteristics of this stand. Meaning TSI single tree selection will occur; whereby, trees will be selected for removal due to poor form and poor health and will be cut and left lie in the stand to increase wildlife habitat. Large standing dead stems will remain standing unless within one tree length of Trigger Avenue and/or Grampus Road, which would require dead stem removal, as they would be a hazard to the roadway. Along the eastern boundary of the stand, some timber may be included into a thinning on an adjacent stand. But under no circumstance shall the thinned areas residual stocking fall below 70 trees per acre unless made so by natural causes. Also, inter-planting shall occur to increase the vertical and horizontal stratification of the stand as aligned with management toward old growth characteristics.

Stand 90:
Stand 90 is a very small (1.3 acres) stand that is predominately larger diameter Douglas-fir. The close proximity of this stand to both Trigger Avenue and a naval facility prevents active management of the stand. Thus, this stand shall be managed for hazard tree abatement.

Stand 91 and 92:
These stands are moderately dense stands of larger diameter Douglas-fir and western hemlock. The tract shall be thinned to a residual spacing of 20' O.C. to achieve a residual spacing of 100 trees per

acre in order to enhance ecosystem function by increasing crown vigor and health. Along the western boundary of this tract lies Skipjack Circle, Grampus Road and SWFPAC parking lots which require management for hazard tree abatement within the first one tree length from the edge of the roadway or parking lot into the stand.

Stand 93, 94, 95, 96, 97, 98 and 296:
Portions of this tract have been recently thinned or cleared either for Silvicultural purposes or in support of mission related projects. However, the uniform management of this contiguous block of timber is desired to enhance the ecosystem vitality and function in the area. This tract is primarily Douglas-fir dominated with patches of red alder and western white pine. The density of this tract is variable because of past forestry activities but in all stands it is above the desired 100 trees per acre stocking density for optimal crown vigor and health. Thus, this stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees will be native conifers or bigleaf maple which have good form, good health and a vigorous crown. Red alder shall not be selected as leave trees; all other hardwoods, other than bigleaf maple, may not be selected as leave trees but shall be retained to preserve biodiversity and wildlife habitat. In some parts of this stand, only single tree selection will be needed to obtain the 100 trees per acre of stocking density. But having a uniform stocking density will allow for adaptive management to occur whereby inter-planting and TSI can occur to increase and improve ecosystem function.

Stand 99, 100, 101, 103, 109 and 304:
These stands are composed of smaller diameter Douglas-fir that has variable densities due to previous harvesting and thinning. These stands shall be thinned to a residual spacing of 18' O.C. to achieve a residual stand density of 134 trees per acre. The slightly tighter spacing will prevent the smaller sized timber of this tract from developing poor form features or have sun shock from thinning, while still provide extra light in order to enhance crown production, growth and health. These stands are bordered by Flier Road, Lafayette Street and a patrol road; thus, any and all management of this tract must include the abatement of hazard trees for the first one tree length into the stand.

Stand 102, 104 and 107:
These stands consist of small and moderately sized Douglas-fir and western white pine with high to very high stocking densities. This stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre. This tighter spacing will allow for the younger timber to thrive and grow while preventing the same timber from developing poor features which would detract from the health and vitality of the stand and decrease the ecosystem function of the areas by inviting disease and insects into the stand. Continuing to rely on density dependent mortality is both a fire hazard and a pathogen hazard because in dense stands, both fire and pathogens spread quickly and can soon become out of control. Thus, pre-commercial thinning of this stand will be exponentially beneficial to the installation.

Stand 105, 106, and 503:
These stands are primarily dominated by moderately dense moderate diameter Douglas-fir with some smaller blocks of red alder and white pine. These stands shall be thinned to a 20' O.C. spacing to achieve a residual stand density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown. However, bigleaf maple and other

hardwood species besides red alder shall be left standing but will not count toward the leave tree tally. This will allow the stand to become more productive and increase crown vigor and health. Also, reducing the density of these stands will decrease the risk of fire and pathogen spread and will lead to increased wildlife habitat. The eastern boundary of this tract runs along the security gate and boundary for the Keyport annex; thus, the first one tree length into the tract from the eastern boundary shall also be managed for the abatement of hazard trees.

Stand 110:
This stand has very little if any forest cover and is primarily covered by brush and other ground cover species. This stand shall have all non-native vegetation removed and disposed of offsite. The site shall also be ripped with a 12" ripping shank to break loose the soils for planting. The stand shall be planted using seedlings of various native conifers with an emphasis on western white pine and Douglas-fir.

Stand 112:
This stand is densely stocked with Douglas-fir and red alder that is of small non-merchantable size that is currently in a stage of density dependent mortality. This stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre. This tighter spacing will allow for the younger timber to thrive and grow while preventing the same timber from developing poor features which would detract from the health and vitality of the stand and decrease the ecosystem function of the areas by inviting disease and insects into the stand.

Stand 113 and 114:
These two stands are both moderately stocked with moderate diameter Douglas-fir in dominance. These stands shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre. This spacing will allow the moderate sized stems to add diameter from increased crown production and health but will prevent sun shock and poor form from occurring as a result of too wide of a spacing. Leave trees shall be native conifers with good form, good health and a vigorous crown. No red alder shall be selected and tallied as leave trees in order to prevent the development of hazard trees along the Lake Ruth soil deposition site.

Stand 116, 117, 119 and 517:
The western boundary of this tract has been drastically thinned in support of the mission related Flier road clearing and thinning project. The western half of the tract is primarily Douglas-fir with small patches of red alder whereas the eastern half of the tract is primarily red alder with patches of Douglas-fir. The timber on this tract is relatively small to moderate in diameter; thus a mixture of pre-commercial thinning and commercial thinning will be used. The northern half of the stand will be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre. This will increase the crown productivity, vigor, and health without causing poor form feature from developing with too wide of a spacing. The southern half of the tract will be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre. This will take the stand out of density dependent mortality and allow the stand to develop a more vigorous and healthy canopy while preventing the spread of disease and other pathogens throughout the tract. Leave trees in both thinning types shall be stems with good form, good health and a large vigorous crown. Western white pine, western redcedar and bigleaf maple shall not removed unless

they posses extremely poor form and health. Thus, maintaining the horizontal biodiversity of the site.

Stand 123:
The western one quarter of this large (62.8 acres) stand has been thinned to a drastic spacing in support of the mission related Flier road clearing and thinning project. The remaining three quarters of the stand is moderately sized and moderately dense Douglas-fir. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native coniferous stems with good form, good health and a vigorous crown. This thinning will allow the residual stems to increase their crown production which will lead to larger diameters, increased tree health and greater crown vigor; which will improve the ecosystem function of the entire installation.

Stand 124, 125, 126 and 127:
These stands are dominated by moderate diameter moderate stocked Douglas-fir. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native coniferous stems with good form, good health and a vigorous crown. However, one tree length from the north and east boundary of the track management should be focused on hazard tree abatement due to the close proximity of the stand to Scorpion Avenue and Seawolf Road.

Stand 129:
Most of stand 129 has been harvested and replanted in support of a mission related construction project. Thus, the stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stand density of 170 trees per acre. Any areas where the seedlings did not become established, planting shall occur with seedlings of various native conifers. These actions will help develop a health and vigorous stand that will be stratified both horizontally and vertically, because of the presence of an older regime of red alder at a lower density within the stand.

Stand 301 and 302:
These stands represent a small vegetated strip of timber that separates Sealion Road and Escolar Road from the waterfront. These stands are so steep and provide such important structural stability to the slope that they cannot be removed unless as part of a hazard tree abatement or a mission related project. Thus, if not deemed as a hazard tree but visibility is needed then the stems can be pruned to a height no greater than 2/3 of the live crown height; but, the stems must be kept alive and cannot be removed as it may impact the structural integrity of the waterfront bank.

Stand 305:
This stand is a small (4.1 acres) stand that is moderately dense and is dominated by moderate sized Douglas-fir and red alder. The western boundary of this stand lies along the eastern shore of Devil's Hole Lake; while the northern boundary wraps around the refit parking lot. The rest of the stand boundaries either run along the power line right-of-way or an adjacent forested stand. Also, there is a historical structure which needs to be taken into advisement whenever planning forestry operations in the area. This stand has a lot of restrictions to forestry activities; however, a distance from the boundary of one tree length within the stand shall be managed for hazard tree abatement. There shall be at least a 50' buffer for all forestry activities from the eastern boundary along Devil's

Hole Lake. The rest of the stand shall be thinned to a residual spacing of 25' O.C. to achieve a residual stand density of 70 trees per acre; whereby leave trees shall be selected if they are native conifers with good form, good health, and a vigorous crown. Red alder cannot be selected as a leave tree. The subsequent open areas from the wide spacing thinning shall be inter-planted with seedlings of western redcedar and other native conifers in order to develop a more stable ecosystem for drainage into Devil's Hole Lake.

Stand 329 and 330:
Both stands can be characterized by having areas of extreme graded slopes and areas with relatively flat terrain. Both stands are dominated with small to large diameter red alder with intermixed conifers. The extreme grades on these stands mixed with previous disturbances have caused serious geological and slope instability which is evident by the slides and break offs the slope has already experienced. Thus, removal of the timber on these stands would be increasingly detrimental to the structural integrity of the slope. This stand shall be managed for hazard tree abatement and for mission related projects. However, timber stand improvement shall be conducted on this stand to remove brush, invasive species and small poor formed red alder. The brush and invasive species shall be removed and disposed of offsite while the poor form stems shall be cut and left in the stands, which will be followed by planting in the open areas with seedlings of various native conifers with an emphasis on western redcedar. This will provide a longer lasting and more stable ecosystem within this stand which will support wetland health and function while providing some amount of slope stability as well.

Stand 352:
Stand 352 is a small (3.3 acre) red alder dominated stand that is almost completely within a wetland. This stand shall undergo selection thinning whereby trees within the wetland will be cut only if they are within one tree length from the edge of the wetland so as to prevent driving, dragging, or rolling downed timber in the wetland. Remaining stems within the wetland will be cut and left lie as a form of timber stand improvement. The selection thinning of the stand will have no set spacing but will target the residual stand density of 150 trees per acre; whereby, leave trees shall be those stems with good form, good health and a vigorous crown. These forestry actions will help improve the function and vitality of the wetland while also providing wildlife habitat through the downed woody debris.

Stand 353:
This stand is a small (0.7 acre) tract that has a relatively low density of primarily red alder. The western boundary of this stand runs along Escolar road, while the rest of the stand runs along a service road for a pumping station. The close proximity to roadways coupled with the small size of the stand will inhibit timber harvesting due to logistics. However, this stand shall be managed for the abatement of hazard trees and for the support of mission related projects. Pruning may also occur when applicable to a height no greater than one third of the height of the live crown.

Stand 395 and 511:
These stands are long and narrow (9.0 and 5.0 acres) tracts that are completely within other stands on all sides. The stands are dominated by highly dense larger diameter red alder with some pockets of mixed conifers. There is a small wetland at the northern boundary of stand 395 and the south of stand 511. Since red alder is a species which derives from disturbance and the surrounding vegetation is mostly native conifers, a heavy crown thinning would help to bring this stand back into

the native cover type for the area. This stand shall be thinned to a 25' O.C. residual spacing to achieve a residual stand density of 70 trees per acre; whereby leave trees shall be native conifers, bigleaf maple and the best form and health red alder, all other stems shall be cut and removed from the site. The stand shall then be inter-planted with seedlings of various native conifers

Stand 510:
Stand 510 is solely Lake Ruth, which is a standing water body that is 5.7 acres in size. This stand incorporates no vegetation thus no forest management can occur on the site.

Stand 513:
Stand 513 is a vegetated buffer that surrounds Lake Ruth. The primary composition of the vegetation is scotch broom which is an invasive species. To the north of the stand there is some standing timber which works as shelter for wildlife and a visual barrier for Lake Ruth. This stand will have a site conversion from invasive species to native species whereby any native standing timber shall not be removed but all non-native timber, brush and shrubs shall be removed and disposed of offsite. After vegetation removal, the site shall be ripped using a 12" ripping shank to churn the soils in preparation for planting. The site then shall be planted with seedlings of various native conifers. The next 2 to 10 years will require annual herbicide or mechanical treatment to keep the invasive regeneration at bay until the planted native species will be large enough to shade out the invasive species; at that time herbicide and mechanical treatments will no longer be needed.

Stand 518:
This stand is a small stand (5.4 acre) in which the majority of the stand is Bullhead Lake with the remainder being a small vegetated buffer strip around the lake. The vegetated buffer strip shall be thinned along with adjacent stands whereby the residual spacing shall be no less than 20' O.C. and the residual stand density shall be no less than 100 trees per acre. There will be no skidding or yarding on the site due to the close proximity to the lake but a harvester or loader can cut and carry or pick up and carry the downed stems from the site. Preventing skidding or yarding in this stand will diminish the amount of bare mineral soil exposed, thus decreasing the amount of erosion and sedimentation that could occur from forestry activities to Bullhead Lake. A well stocked stand is required on this site to ensure proper ecosystem function for the water body and its shoreline.

Stand 520:
Stand 520 is primarily an open brush filled area with forest vegetative cover in the north of the stand. This stand shall be surveyed for wetlands prior to any operations occurring; if wetlands are found they are to be delineated, marked on the ground and mapped using GPS.
In non-forested, non-wetland portions of this stand the brush shall be removed and disposed of offsite which will be followed by ripping with a 12" ripping shank in preparation of planting. The area will be planted with seedlings of various native conifers. The forested areas and wetland areas shall undergo timber stand improvement whereby poor form and poor health trees will be singly selected for removal and the stem will be cut and left lie in the stand.

Stand 521 and 522:
These stands are smaller sized (6.7 and 2.4 acres, respectively) with moderately dense moderate diameter Douglas-fir and western white pine forest cover. This stand shall be surveyed for wetlands prior to any operations occurring; if wetlands are found they are to be delineated, marked on the ground and mapped using GPS. Thinning shall occur in the non-wetland portions of the stand at a residual spacing of 20' O.C. to achieve a residual spacing of 100 trees per acre; whereby leave trees shall be large diameter, good form, good health and vigorous crowned native conifers and bigleaf maple. In wetland portions of the stand timber stand improvement shall occur whereby trees will be selected for cutting only if they are of poor form, poor health, or have a small non-vigorous crown. Cut trees shall be left lie in the stand and shall be cut to a residual density no less than 100 trees per acre and no greater than 170 trees per acre. This will maximize the health and function of the stand while also increasing the vitality and function of the potential wetlands in the area.

Any other stands not specifically addressed above will be considered eligible for pre-commercial thinning, timber stand improvement treatments, clearing and planting or any other silvicultural treatment that will enhance stocking and long term forest and tree productivity. In all forest areas, diseased trees shall be evaluated in context of area objectives and pathogen(s) present. Prescriptions will follow the silvicultural criteria and goals discussed for all other stands.

NAVAL BASE KITSAP, BANGOR, SOUTH, COMPARTMENT 3

Stand 1:
Stand 1 represents all roadways, parking lots, open areas, residential areas, and some small scale forested areas. All forested areas within one tree length from a naval facility, roadway, residential area, parking lot, or walkway shall be managed first and foremost for the abatement of hazard trees in order to protect the safety of installation patrons. Whereby, any tree that is either dead, leaning, or found to be unsound by a Navy Forester shall be removed. Stems can be pruned to a height of one third of the live crown height for security mandates but in order to remove trees for purposes other than as a hazard NEPA documentation is required. Open areas, non-native landscaping areas or areas with invasive species can have the ground vegetation cleared and disposed of off base followed by ripping of the soil surface using a 12" ripping shank in preparation of planting with seedlings of various native conifers. Any and all open areas can be planted with seedlings of various native conifers, the spacing of which will be determined by a Navy Forester prior to the commencement of planting activities. In the few areas with small tracts of standing timber, the timber will be managed concurrently with the adjacent stand or stands, unless unique circumstances arise for the site.

Stand 2 and 3:
Stand 2 is a moderate (21.5 acre) sized stand that is dominated by moderate diameter densely stocked Douglas-fir and western hemlock. Stand 3 is a smaller (4.8 acres) stand that is dominated by moderately sized and moderately stocked Douglas-fir, western hemlock, and western white pine. These stands lie to the northeast of the SWFPAC support area; thus, a distance of one full tree length from the boundary into the stand must be managed for the abatement of hazard trees. However, the rest of the stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with larger diameters, good form, good health and a robust vigorous crown. Bigleaf maple shall not be tallied as a leave tree but must not be removed. This thinning will allow the canopy of these stands to become more productive and vibrant with increased health and vigor which in turn will increase the wildlife habitat and ecosystem function of the stand.

Stand 4, 5 and 6:
Stand 4 is a moderately stocked stand that is dominated by moderate diameter Douglas-fir and western hemlock. Stand 5 is a partially stocked mainly open brushy stand that needs to be replanted and thinned. Stand 6 is a Douglas-fir dominated moderately stocked tract. These stands shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers that have larger diameters, good form, good health and a vibrant crown. Open areas shall have the brush cleared and disposed of offsite followed by ripping with a 12" ripping shank in preparation of planting. Planting and inter-planting shall occur with seedlings of various native conifers to increase the vertical and horizontal stratification of the stand. Increased biodiversity and stand health will improve the wildlife habitat and ecosystem function of the area. Management for the abatement of hazard trees shall occur in any portion of this tract which is within one tree length of a facility, roadway or parking lot.

Stand 7 and 8:
Stands 7 and 8 are small (3.1 and 2.3 acre) stands that are moderately stocked with smaller diameter Douglas-fir. These stands lie along Trigger Avenue, Flying Fish Road and a security road; thus, one tree length into the tract from the boundary of either stand must be managed for hazard tree abatement. These stands shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby leave trees shall be those stems with good form, good health, a vigorous crown and a high propensity for increased crown volume.

Stand 9 and 10:
These stands cover almost thirty acres and consist of heavily dense moderate sized Douglas-fir and western white pine. These stands shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume.

Stands 11, 12, and 13;
These stands cover a large (65.8 acre) area that is largely homogeneous moderately stocked moderately sized Douglas-fir and western white pine. However, there are patches of lower density and larger sized Douglas-fir and higher density and smaller sized red alder. In the portions of the stand that are homogenous moderate sized and moderate density Douglas-fir and western white pine thinning shall occur to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume in order to encourage the growth of pole quality timber. The portions of the stand with larger sized lower density Douglas-fir shall be thinned using single tree selection; whereby, trees are selected for removal based on their form, health and crown in order to obtain a more uniform residual density of 100 trees per acre and to increase the health and crown vigor of the residual timber. The last portion of the stand which is dominated by red alder shall be thinned to a residual spacing of 25' O.C. to achieve a residual stocking density of 70 trees per acre; whereby, space is generated for inter-planting with seedlings of various native conifers. Leave trees in the alder portion of the stand shall be moderate sized stems with good form, good health and a vigorous crown. Any and all areas bordering a naval facility, roadway, fence line or power line shall be managed within one tree length from the edge of the stand for the abatement of hazard trees.

Stand 14:
Stand 14 is a moderate (14.3 acre) sized stand that consists of moderate diameter Douglas-fir and western hemlock at a relatively moderate stocking density. Along the western boundary is a stream channel and a subsequent wetland that must be surveyed and flagged prior to forestry operations occurring in the area. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers and big leaf maple with good form, good health and a vigorous crown.

Stand 15:
Stand 15 is a moderate (12.2 acre) stand that follows a stream channel; thus, the stand is a long and narrow corridor of timber with extensive wetlands and waterways. The stand is dominated by larger diameter red alder that is fairly dense in terms of stocking. Single tree selection thinning shall occur on this stand; whereby, leave trees shall be selected at no set spacing to achieve a uniform residual

stocking density of approximately 140 trees per acre. Commercial thinning shall only occur to a maximum distance of one tree length into any wetland to prevent driving or other impacts from occurring within wetlands. All thinning that occurs deeper than one tree length into a wetland shall be TSI thinning; whereby, removed stems shall be cut and left in the stand so as to not drag, roll or drive within any wetland. Leave trees shall be those stems with good health, good form and a vigorous crown that cannot be easily removed without impacting wetlands. Removal trees shall be directionally felled away from any wetland toward a yarding corridor. All yarding shall be done using a sound strategy in order to diminish the amount of exposed bare mineral soil which in turn will decrease the amount of erosion and sedimentation that could impact the wetlands or streams. This thinning will open the canopy to allow light to penetrate to the forest floor; which in turn, will aide in the development of a diverse understory that will work to improve wetland function and increase wildlife habitat.

Stand 16 and 17:
Stands 16 and 17 are small stands which act as vegetative strips that run through or border installation housing facilities. Thus, first and foremost these stands shall be managed for the abatement of hazard trees. These stands consist of moderately dense larger diameter Douglas-fir, red alder and western hemlock. The close proximity to residential areas will prevent any non-critical harvesting to occur on these stands. However, TSI work to remove snags, small poor formed trees and other non-merchantable timber can occur to improve the aesthetics of the stands and to prevent over-densification of the stand from occurring. Over-densification will cause density dependent mortality to occur which in turn will generate hazard trees creating the potential of human harm or the destruction of government property; thus, the stand shall not be allowed to enter into the density dependent mortality stage of development.

Stand 18:
Stand 18 is a large (52 acre) tract that on all sides borders either an installation facility or roadway. The stand is dominated by moderate diameter moderately dense Douglas-fir and western redcedar. The first one tree length into the stand along all boundaries shall be managed for hazard tree abatement. The rest of the stand shall be commercially thinned to a residual spacing of 20’ O.C. to achieve a residual spacing of 100 trees per acre; whereby, leave trees shall be native conifers with good health, good form and a vigorous crown. Due to the close proximity of this stand to an installation residential area, all yarding operations shall be done using a sound strategy in order to decrease the auditory effects of harvesting in the area. Thinning the stand will increase the productivity of the residual stems by increasing crown volume and leaf area while also allowing light to penetrate the canopy and strike the forest floor; thus, fostering the development of a vigorous and diverse understory for improved wildlife habitat.

Stand 19:
Stand 19 is a smaller tract which borders a wetland to the east and an installation residential area to the west. Thus, the first one tree length into the stand form the western boundary shall be managed for hazard tree abatement in order to ensure the safety and structural integrity of installation patrons and property. The stand is dominated by larger diameter moderately dense Douglas-fir that is of pole quality. This stand shall be thinned to a residual spacing of 18’ O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with a straight bole, good health, good form, a low number of lower stem branches and a vigorous crown. The

tighter spacing will allow for the development of pole quality timber while still allowing light to penetrate the crown to help foster the development of a diverse and vigorous understory for wildlife habitat.

Stand 20:
Stand 20 is a lower density stand of larger diameter Douglas-fir and western redcedar that to the south borders an installation residential area. The first one tree length into the stand from the southern boundary shall be managed for hazard tree abatement to ensure the safety and structural integrity of installation patrons and property. The rest of the stand shall be single tree selection thinned; whereby, trees will be selected that detract from overall stand health and vigor or are of poor form or have a poor crown. The trees selected can either be commercially thinned out or cut and left in the stand by way of a TSI project. Any large open areas along with the entire stand shall be inter-planted with seedlings of various native conifers and if available various native hardwoods to encourage vertical and horizontal biodiversity.

Stand 21:
Stand 21 is a small stand that is dominated by moderate diameter highly dense Douglas-fir. This stand shall be thinned to a residual spacing of 20’ O.C. to achieve a residual spacing of 100 trees per acre; whereby, leave trees shall be stems with good form, good health and a vigorous crown. Red alder shall not be selected as a leave tree; however, any red alder stems that have a diameter less than 8” shall be retained but not tallied as leave trees. This thinning will improve stand health by increasing crown volume and leaf area of the residual stems which in turn will increase the rate of carbon sequestration and diameter growth.

Stand 23:
Stand 23 is a smaller sized swathe of timber that sits in the middle of multiple installation residential areas and installation roadways. Thus, the first one tree length into the stand along all boundaries shall be managed for hazard tree abatement to ensure the safety and structural integrity of installation patrons and property. The stand consists of highly dense moderate diameter Douglas-fir, western white pine and western hemlock. The interior of the stand shall be thinned to a residual spacing of 20’ O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good health, good form and a vigorous crown. No timber shall be removed within one tree length of any boundary to ensure the aesthetics and visual sensitivity of the residential area. Also, all yarding operations shall be conducted using a sound strategy to diminish the auditory effects of harvesting timber near a residential area.

Stand 24:
Stand 24 is a small (1.9 acre) tract that lies adjacent to both Thresher Avenue and a naval facility. Thus this stand shall be managed for hazard tree abatement and for the support of mission related projects.

Stand 25:
Stand 25 is a smaller tract that consists of highly dense smaller diameter Douglas-fir and western white pine. This stand shall be pre-commercially or pulp thinned to a residual spacing of 16’ O.C. to achieve a residual stocking density of 170 trees per acre. This thinning will allow the stand to

develop beyond the density dependent mortality stage of stand development thus increasing stand health, crown volume and leaf area.

Stand 26 and 27:
Both stands 26 and 27 are overly dense and have eastern borders that lie along naval facilities or roadways. Stand 26 is dominated by moderate diameter red alder whereas stand 27 is dominated by moderate diameter Douglas-fir with large contingents of western hemlock and western redcedar. The first one tree length into the stand from any boundary which lies along a roadway or facility shall be managed for hazard tree abatement. The rest of the stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be those stems with good health, good form and a vigorous crown. The tighter spacing will allow the residual stems to develop greater leaf area and crown vigor while preventing over exposure of the stems to sunlight which could cause sun shock or epicormic branching.

Stand 28:
Stand 28 is a very small tract that acts as an island of timber that is surrounded by either naval facilities, roadways or parking lots. Thus management of this stand shall be for hazard tree abatement and for the support of mission related projects.

Stand 29:
Stand 29 is a smaller tract of timber that borders the railroad to the south, Thresher Avenue to the north and naval facilities to the east. This stand shall be managed for the abatement of hazard trees and for the support of mission related projects. However, this stand has had some significant mortality due to application of herbicides along the railroad; thus, this stand shall be TSI thinned to remove all dead or dying stems within the stand whether they are hazards or not. Any opening that results from the removal of dead or dying stems shall be inter-planted with seedlings of various native conifers to encourage vertical and horizontal stratification.

Stand 30:
Stand 30 is a smaller tract of timber that borders the railroad to the southwest, Trigger Avenue to the east and naval facilities to the northwest. This stand shall be managed for the abatement of hazard trees and for the support of mission related projects. However, this stand has had some significant mortality due to application of herbicides along the railroad; thus, this stand shall be TSI thinned to remove all dead or dying stems within the stand whether they are hazards or not. Any opening that results from the removal of dead or dying stems shall be inter-planted with seedlings of various native conifers to encourage vertical and horizontal stratification.

Stand 31, 32, 33 and 36:
These stands are dominated by small to moderate diameter Douglas-fir that is either very dense or moderately dense throughout the tract. The entire northeastern and eastern boundary of the tract lies along the Navy railroad, while the entire northwestern boundary lies along Thresher Avenue with the remaining boundaries lying either along a roadway or a naval facility. Thus, the first one tree length into the stand shall be managed for hazard tree abatement. However, this stand has had some significant mortality in that first one tree length area due to application of herbicides along the railroad; thus, this stand shall be TSI thinned to remove all dead or dying stems within the stand whether they are hazards or not. Any opening that results from the removal of dead or dying stems

shall be inter-planted with seedlings of various native conifers to encourage vertical and horizontal stratification. The rest of the stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual uniform stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown. The thinning will develop a more vigorous crown with greater leaf area and rates of carbon sequestration while still allowing light to penetrate the crown and aide in the development of a vigorous and diverse understory for wildlife habitat.

Stand 34:
Stand 34 represents primarily a naval facility with an adjacent service road to another naval facility. Thus, all standing timber shall be managed for hazard tree abatement and in support of mission related projects. The timber present on parts of the stand is very small diameter Douglas-fir that could be thinned in conjunction with an adjacent thinning but cannot on its own provide sufficient volume or area to warrant a TSI thinning. There are some significant open areas from over sizing of construction clearing limits. The open areas shall have all non-native vegetation remove and disposed of offsite followed by ripping with a 12" ripping shank to churn the soils in preparation of planting with seedlings of various native conifers.

Stand 35 and 344:
Stands 35 and 344 form a moderately dense tract that is dominated by moderate diameter Douglas-fir that borders a naval facility to the northwest. Any boundary that lies along a naval facility shall be managed to the first one tree length into the stand for the abatement of hazard trees. The rest of the stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown.

Stand 37, 38, 39, 40 and 240:
These stands are small stands that lie in close proximity to installation residential areas, roadways and fence lines. Thus, the first one tree length into the stand along any boundary that faces a residence, roadway or fence line shall be managed for hazard tree abatement. All stands shall be managed for the support of mission related projects. However, the only stand that shall be thinned is stand 37 which is an overly dense stand of moderate diameter Douglas-fir. Stand 37 shall be thinned to a residual spacing of 18' O.C. to achieve a residual stand density of 134 trees per acre; whereby, leave trees shall be native conifers with good health, good form and a vigorous crown. Due to the proximity of this stand to a residential area, yarding shall be accomplished using a sound strategy in order to prevent noise complaints from developing from mechanized yarding. Stand 38, 39, 40 and 240 shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual spacing of 170 trees per acre.

Stand 41:
Stand 41 is a moderate (7.5 acre) sized stand located between Turtle Road and the navy railroad. The stand is moderately stocked with smaller diameter Douglas-fir. The first one tree length into the stand from the railroad or Turtle Road shall be managed for hazard tree abatement. The rest of the stand shall be thinned to a residual spacing of 20' O.C. to achieve a uniform residual stocking density of 100 trees per acre. The thinning will allow for the penetration of light through the canopy in order to develop a vigorous and diverse understory in order to improve wildlife habitat.

Stand 42:
Stand 42 is a larger (38 acre) sized stand that is dominated by moderately dense smaller diameter Douglas-fir, white pine and red alder. The stands western boundary lies along an installation residential complex. The first one tree length into the stand from the western boundary shall be managed for hazard tree abatement to ensure the safety and structural integrity of installation patrons and property. The rest of the stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual spacing of 134 trees per acre; whereby, leave trees shall be native conifers and bigleaf maple with good health, good form and a vigorous crown. No red alder greater than 12" in diameter shall be marked or tallied as leave trees and shall be removed. Any subsequent open areas resulting from the removal of larger stemmed red alder shall be inter-planted with seedlings of various native conifers with an emphasis on western redcedar.

Stand 43:
Stand 43 is a small (1.5 acre) stand that is primarily dominated by brush and red alder regeneration. In order to bring this stand back into productivity and into a native cover regime this stand shall have all vegetation that is non-native or greater than 3 inches in height removed and disposed of offsite. The site shall then be ripped using a 12" ripping shank to churn the soils in preparation of planting at 8' O.C. with seedlings of various native conifers in order to establish a true first cohort.

Stand 44:
Stand 44 is a smaller (3.5 acre) stand that is dominated by smaller diameter red alder and western white pine. The northeastern boundary of this stand lies along a naval facility; thus, the first one tree length into the stand from that boundary shall be managed for hazard tree abatement. The rest of the stand shall be TSI group thinned whereby patches of 5-10 stems shall be selected for removal in order to open space up for planting. The selected removal trees shall be those stems which are of poor form, poor health or are completely suppressed. The selected trees shall be cut and left in the stand to preserve nutrients and decrease cost. After removal, the group areas shall be planted with both seedlings of various native shade tolerant conifers and, if available, seedlings of various native hardwoods. The group thinning will allow for the release of residual stems while opening the stand up for the introduction of a new age class.

Stand 45:
Stand 45 is a moderately dense stand consisting of moderate diameter Douglas-fir and western hemlock. The entire eastern boundary of the stand runs along the Navy railroad and the pacific edge outfitters' storage lot. Thus, the first one tree length into the stand from the eastern boundary shall be managed for hazard tree abatement. The rest of the stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual spacing of 100 trees per acre; whereby leave trees shall be native conifers with good from, good health and a vigorous crown. Along the railroad, there are a significant number of dead stems that are the result of application of herbicides. The dead and dying stems shall be cut and removed of offsite to prevent the buildup of fuel material along the railroad. Any contiguous open areas resulting from this removal shall be inter-planted with seedlings of various native conifers to prevent the succession of the area into invasive species and to ensure the stability of the railroad embankment.

Stand 46 and 47:
Stand 46 is a large (54.3 acre) tract that is dominated by highly dense moderate diameter Douglas-fir; similarly, stand 47 is moderately stocked with smaller diameter Douglas-fir. The eastern and southern boundaries of stand 46 run along the Navy railroad; thus the first one tree length into the stand from the railroad shall be managed for hazard tree abatement. Along the railroad, the use of herbicides has lead to mortality of standing timber near or around the rail line; thus, any and all dead or dying stems standing in the area near the railroad shall be removed and disposed of offsite. The subsequent open areas from the removal of the herbicide trees shall be planted with seedlings of various native conifers. The rest of the tract shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good health, good form and a vigorous crown. No red alder shall be selected, marked or tallied as leave trees it shall be harvested. This thinning will work to increase the crown volume of the stand by increasing leaf area. The improved health of the stand will help prevent breakouts of insects and disease and in turn will encourage a diverse and vigorous understory which adds vertical and horizontal stratification.

Stand 48:
Stand 48 is a smaller (13.4 acre) tract that is dominated by moderately dense larger diameter Douglas-fir. The stands eastern and western boundaries run along either railroad or security roads; thus, the first one tree length into the stand on those two sides shall be managed for the abatement of hazard trees. The rest of the stand shall be single tree selection thinned to a residual spacing of 125 trees per acre; whereby, trees will be selected for retention at no set spacing. Any and all trees that are in direct competition to leave trees shall be removed. Leave trees shall be native conifers with good form, good health and a vigorous crown.

Stand 49:
Stand 49 is a smaller (6.9 acre) tract consisting of highly dense moderate diameter Douglas-fir and western hemlock. The southern and northern boundaries of this stand are either fully or partially set adjacent to naval housing or the railroad; thus, the first one tree length into the stand from those areas shall be managed for hazard tree abatement. The rest of the stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual spacing of 134 trees per acre; whereby, leave trees shall be those individuals with good form, good health, a vigorous crown and habitat value. Due to the close proximity of this stand to an installation residential area, all yarding operations must be accomplished using a sound strategy in order to prevent noise complaints from developing in the residential areas.

Stand 53:
Stand 53 is a small (6.6 acre) tract that is bordered on all sides by the navy railroad. This stand shall be managed for the abatement of hazard trees. Also, there are numerous dead or dying stems from the application of an herbicide along the railroad. These dead or dying stems shall be removed and disposed of offsite; the openings created by their removal shall be replanted with seedlings of various native conifers.

Stand 54 and 55:
Stands 54 and 55 are small (1.2 and 1 acre) stands that are dominated by moderately dense moderate diameter Douglas-fir. Both stands lie along the southern perimeter fence line, while stand 54 lies

partially along the western installation perimeter fence as well. Thus both stands shall be managed first and foremost for the abatement of hazard trees. The rest of the two stands shall be individual tree selection thinned to achieve a residual stand density of 100 trees per acre; whereby, selected trees shall be remove trees that are of poor form, poor health and poor structure that would have the potential to have a future detriment to the installation fence line. No hardwoods shall be left standing due to the short lifespan of native species in the area. Thus, any and all open areas resulting from thinning shall be inter-planted with seedlings of various native conifers.

Stand 57:
The southern quarter of this stand has been previously cleared and developed for the construction of a mission related facility. The western boundary of this tract lies along the Navy railroad and shall be managed for the first on tree length into the stand from that boundary for the abatement of hazard trees. Use of herbicides along the railroad has generated many dead and dying stems along the boundary; thus, all dead or dying stems shall be removed and disposed of offsite with any open areas resulting from the removal of dead stems replanted with seedlings of various native conifers. The remaining standing timber is a narrow strip of timber that consists of smaller diameter Douglas-fir. The remaining timber shall be pre-commercially thinned to a residual spacing of 16’ O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 58:
Stand 58 is a larger (45.5 acre) stand that partially borders the Navy railroad to the west and an active environmental restoration site to the east. Along the railroad the stand shall be managed for the abatement of hazard trees to a distance of one tree length into the stand. There are many dead and dying stems along the railroad that shall be removed and disposed of offsite with the subsequent open areas being replanted with seedlings of various native conifers. The rest of the stand is highly dense moderate diameter Douglas-firs and mixed conifers. The stand shall be thinned to a residual spacing of 25’ O.C. to achieve a residual stocking density of 70 trees per acre; whereby, leave trees shall be larger diameter native conifers with good form, good health and a vigorous crown. The larger spacing will be used as a means to regenerate the stand with western white pine. This spacing will act as a very tight irregular shelter wood cut whereby after the establishment cut the residual stems are left standing indefinitely. This thinning method will allow the regeneration to obtain immense amounts of light but will also protect and harbor their development as well.

Stand 59:
Stand 59 is an open area that is the remnant of an old shooting range. The site is currently undergoing environmental restoration operations to remove undesirable elements from the soils. Upon completion of environmental restoration operations the site shall be denuded of the invasive species presently on the site and ripped using a 12” ripping shank to churn the soils in preparation of planting at an 8’ O.C. spacing with seedlings of various native conifers with an emphasis on western white pine.

Stand 60:
Stand 60 is a larger (31.5 acre) tract that is moderately stocked with larger diameter Douglas-fir. This stand represents a significant recreation area on the installation with multiple trails and interpretive signs throughout the area. The entire eastern boundary of the stand lies along the trident lakes recreation area. Thus, the first one tree length into the stand along the entire eastern boundary and along any and all trails shall be managed for the abatement of hazard trees in order to ensure the safety and security of installation patrons. The rest of the stand shall be thinned using either single tree selection whereby single undesirable trees are selected for removal or a group thinning whereby a group of 5- 10 non-desirable trees are selected for removal. Either thinning method shall not result in a residual stocking density that is less than 100 trees per acre and will require the inter-planting with seedlings of shade tolerant native conifers. All yarding operations shall be accomplished using a sound strategy in order to: decrease the auditory symptoms of the yarding operations for the recreation area patrons and decrease the amount of exposed bare mineral soil to diminish erosion and sedimentation.

Stand 61:
Stand 61 is a small (2.9 acre) tract that is dominated by moderately dense moderate diameter red alder. The stand runs along Trigger Avenue to the north and the installation fence line to the south; thus, the entire stand shall be managed for the abatement of hazard trees. The stand shall also be thinned using the leave tree release method whereby stems of good form and good health are selected as leave trees with any and all stems whose crowns are either touching or above the crown of the leave tree shall be subject to removal. This shall be done at no set spacing and shall only be to the extent as to achieve a residual stocking density of 130 trees per acre.

Stand 62 and 66:
These stands are moderately stocked with smaller diameter Douglas-fir that borders Trigger Avenue to the east and the Trident Lakes recreation are to the west. Thus the first one tree length into the stands shall be managed for the abatement of hazard trees. The rest of the tract shall be either pre-commercially or commercially thinned (depending on the diameter of the stems) to a residual spacing of 18’ O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 63, 64 and 262:
These stands are primarily dominated by smaller diameter highly dense Douglas-fir that borders either a recreation area or a naval facility. The first on tree length into the stand from a boundary that lies either along the recreation area or the naval facility shall be managed for the abatement of hazard trees. The rest of the tract shall be pre-commercially or pulp thinned to a residual spacing of 16’ O.C. to achieve a residual stocking density of 170 trees per acre; whereby leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume. All yarding operations shall be accomplished using a sound strategy in order to: decrease the noise complaints of the yarding operations for the recreation area patrons.

Stand 69:
The northern half of stand 69 has been either cleared or thinned and pruned in support of the mission related railroad sighting project. The rest of the stand is highly dense larger diameter

Douglas-fir that sits on very steep inclines. The stand shall be either commercially or TSI thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good health, good form and a vigorous crown. The decrease in density will help to decrease the forest fire risk and spread rate along the railroad corridor. This will also retain sufficient stems to provide slope stability along the railroad while still developing a healthier and more vigorous stand.

Stand 70 and 71:
Stands 70 and 71 are visually sensitive stands that lie along Trident Boulevard directly after entering the installation from the main gate. Thus, the first one tree length into either stand shall be managed for the abatement of hazard trees. These two stands cover over twenty acres and consist of primarily moderately overstocked larger diameter Douglas-fir. The site shall be selectively thinned at no set spacing to a residual stocking density of 100 trees per acre; whereby, leave trees shall be those stems with the largest diameter, good health, good form and a vigorous crown. All yarding shall be accomplished using a sound strategy in order to provide an opportunity for education about forestry principles and to minimize site disturbances. There are a few areas along the Trident Boulevard boundary that have become fully stocked with invasive species, in these areas site conversion shall occur whereby all non-native vegetation shall be removed and replaced with seedlings of various native conifers. To ensure the survival of the native vegetation and the eradication of the non-native vegetation, installation approved herbicides shall be applied at the appropriate interval and season to keep the non-native vegetation from overtopping the native vegetation before it can shade the other out.

Stand 72:
Stand 72 is a small (3.1 acre) stand that surrounds an existing installation facility that rests outside of the main installation fence line. The small size and odd shape of the stand along with the close proximity of the stand to an existing facility will inhibit the forestry operations that can occur in the stand. Thus, this stand shall be managed for hazard tree abatement and for the support of mission related projects.

Stand 74 and 75:
These two stands are small (2.8 and 8.1 acre) tracts that surround an existing naval facility and lie along the installation fence line on the eastern boundary of the tract. The stands consist of moderately dense larger diameter Douglas-fir and red alder. The first one tree length into the stand along the entire boundary shall be managed for hazard tree abatement. The rest of the stand shall be thinned using single tree selection to a residual stocking density of 100 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. All yarding shall be accomplished with a sound strategy to prevent noise complaints from developing. Any and all open areas or lower density portions of the stand shall be planted with seedlings of various native conifers.

Stand 76:
Stand 76 is a small (3 acre) stand that consists of highly dense moderate diameter Douglas-fir. The stand borders an installation facility and a roadway; thus, the first one tree length into the stand shall be managed for hazard tree abatement. The rest of the stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be

those stems that enhance biodiversity and have good form, good health and a vigorous crown. All yarding operations shall be accomplished using a sound strategy to prevent noise complaints from developing and to diminish harvesting impacts. Any and all open areas or lower density portions of the stand shall be planted using seedlings of various native conifers.

Stand 77 and 78:
These stands consist of highly dense moderate diameter Douglas-fir that borders Trident Boulevard to the north and Sculpin Road to the south. Thus, this stand shall be managed for the first one tree length into the stand for hazard tree abatement. This stand is moderately to very steep making commercial thinning difficult especially for the small size of the tract. Thus, this tract shall be TSI thinned using single tree selection to a minimum residual stocking density of 100 trees per acre; whereby, trees will be selected with poor form, poor health and an unproductive crown. Selected trees shall be cut and left lie in the stand. This thinning will open the stand up to allow for increased crown volume and health, while supporting the development of a vigorous native understory. The areas directly adjacent to roadways have become populated with invasive species; thus, any and all areas containing invasive species shall have all non-native vegetation removed and have native vegetation planted in the location, preferably with seedlings of various native conifers.

Stand 79:
Stand 79 is a small clump of trees at the corner of Trident Boulevard and Scorpion Avenue that does not contain sufficient volume for a commercial thinning. The stand shall be managed for the abatement of hazard trees and for the support of mission related projects.

Stand 80:
Stand 80 is a smaller (9.5 acre) stand that consists of highly dense moderate diameter Douglas-fir. The northwestern and southwestern corners of the stand have been partially cleared and thinned in support of a mission related project. The stand borders Trident Boulevard to the north, Silversides Road to the south, the Navy railroad to the West and a naval facility to the east. Thus, the first one tree length into the stand on all sides shall be managed for hazard tree abatement. The rest of the stand shall be thinned to a residual spacing of 18’ O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. All yarding shall be accomplished using a sound strategy to prevent noise complaints from developing and to diminish the impacts of downstream habitat from sedimentation.

Stand 81:
Stand 81 is a small (1.8 acre) strip of timber that lies between Trigger Avenue and the Navy railroad. Most of the stand has already been either cleared or thinned in support of safety requirements for the railroad; thus, the stand will primarily be managed for hazard tree abatement. This stand shall be inter-planted with seedlings of various native conifers. This stand shall also be pruned at a consistent interval to ensure sight lines for Navy railroad safety.

Stand 82 and 83:
The northwestern corner of stand 82 has been both cleared and thinned in support of the mission related railroad sighting safety project. The rest of the tract covers a relatively small (6.9 acre) area that consists of highly dense moderate diameter Douglas-fir. The tract borders Silversides Road to

the north, a Navy rail line to the south and west with a naval facility to the east. Thus, the first one tree length into the stand shall be managed for hazard tree abatement. The rest of the stand shall be TSI thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. All other stems shall be cut and left lie in the stand. TSI is recommended because of the relatively high number of smaller sized stems and the topography of the site that would inhibit the commercial viability of harvesting the timber.

Stand 84:
Stand 84 is a small (1.8 acre) red alder dominated stand that has stems of moderate diameter at a high stocking density. This site is predominately wet and shall be surveyed for the presence of wetlands prior to any and all forestry operations occurring on the stand. Any and all wetlands found in the survey shall be flagged, marked and mapped using G.P.S. The stand shall be either commercially or TSI, depending on wetland extent, thinned using the leave tree release method; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. Any stem whose crown is either touching or above the crown of the leave tree shall be removed and decked or left lie in the stand depending on the thinning type chosen. If commercial thinning, all yarding shall be completed using a sound strategy to prevent noise complaints from developing. After either thinning, the stand shall be inter-planted with seedlings of various native conifers to aide in the production and functionality of any and all wetlands present in the stand.

Stand 86:
Stand 86 is a smaller (9.2 acre) oddly shaped stand that is bordered along most of the northern and western boundary by the Navy railroad and naval facilities to the south and east. Thus, the first one tree length into the stand shall be managed for hazard tree abatement. The rest of the stand is dominated by moderate density moderate diameter Douglas-fir that lies on variable steep to moderate topography. The stand shall be thinned using single tree selection to a residual stocking density of 100 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. All yarding shall be completed using a sound strategy to prevent noise complaints from developing.

Stand 89:
Stand 89 is a larger (14.9 acre) stand that forms a triangle with the western installation fence line, Grampus road and Scamp Road. The first one tree length into the stand from all boundaries shall be managed for hazard tree abatement to ensure installation security. The rest of the stand consists of moderately dense Douglas-fir and red alder that is of moderate diameters. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. No red alder greater than 10 inches in diameter shall be marked or selected as leave trees and must be removed from the stand. Any and all open areas resulting from the thinning and removal of larger diameter alder shall be inter-planted with seedlings of various native conifers and if available seedlings of various native hardwoods as well. However, no hardwoods shall be planted within one tree length of the stand boundary to prevent future hazards from developing.

Stand 91:
Stand 91 is a very small (1 acre) stand that separates a parking lot from Guardian Street and Barb Street. The close proximity of this stand to naval facilities, roadways and parking lots coupled with the small size of the stand will inhibit commercial thinning of the stand from occurring. Thus, the stand shall be managed for the abatement of hazard trees and for the support of mission related projects.

Stand 92:
Most (75%), of stand 92 has been cleared, graded and paved as a parking lot in support of a mission related project. The remaining standing timber shall primarily be managed for hazard tree abatement and for future mission related projects. However, the stand has multiple residual open areas that have become populated with invasive species. These open areas shall have all non-native vegetation removed from and disposed of offsite followed by ripping with a 12" ripping shank to churn the soil in preparation of planting with seedlings of various native conifers.

Stand 93:
Stand 93 is a small (1.5 acre) stand that consists of moderate diameter higher density Douglas-fir and red alder. The stand lies along Skate and Sculpin Streets and borders a large recreation and training area and the southern boundary lies along the southeastern installation fence line. The factors mentioned previously coupled with the small size of the stand leads to the primary management objective for the first on tree length into the stand of hazard tree abatement. However, the standing timber should be thinned to a residual stocking density of 100 trees per acre using single tree selection; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. No red alder shall be marked, tallied or retained as leave trees and shall be removed from the site. Any and all open areas resulting from the removal of the red alder shall be planted with seedlings of various native conifers and if possible native hardwoods excluding red alder in order to retain biodiversity.

Stand 94 and 95:
These two stands lie along the southeastern and eastern installation fence line to the south and east and borders Tautog circle and a naval facility to the north and west. The first one tree length into the stand from the boundary shall be managed for hazard tree abatement. The rest of the tract consists of moderately dense moderate diameter Douglas-fir and red alder. The stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health and a vigorous crown. All yarding shall be completed using a sound strategy to prevent noise complaints from developing. This tract does not have an even distribution of stems, thus any large areas devoid of larger (greater than 8" DBH) timber shall have the ground cover, including red alder regeneration, cut and mulched in the stand and shall be planted with seedlings of various native conifers.

Stand 96:
Stand 96 is a smaller (4.5 acre) stand of smaller diameter highly dense Douglas-fir. The area to the south of the stand has previously been cleared in support of a mission related project, leaving the smaller stems susceptible to windthrow in the future. The stand borders the installation fence line to the east and Scorpion Avenue to the west; thus, the first one tree length into the stand shall be

managed for hazard tree abatement. The rest of the stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health, a vigorous crown and will not be susceptible to sun shock or windthrow. All yarding shall be completed using a sound strategy to prevent noise complaints from developing.

Stand 97:
Much of stand 97 has been cleared and developed in support of a mission related project. However, long narrow strips of timber in the stand have been left standing. These strips consist of moderate diameter high density Douglas-fir. The remaining timber shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health, a vigorous crown and will not be susceptible to sun shock or windthrow. All yarding shall be completed using a sound strategy to prevent noise complaints from developing. Areas of this stand have unused open areas that are developing invasive species; thus, these areas shall be denuded of non-native vegetation and shall be ripped using a 12" ripping shank to churn the soil in preparation of planting with seedlings of various native conifers with higher drought resistance. Drip irrigation may be needed when planting seedlings on hill slopes greater than 15 % in grade to ensure seedling survival.

Stand 98:
All of stand 98 has been either cleared or thinned in support of the construction of a training course for mission related activities. Thus, any remaining standing timber in the area shall be managed for hazard tree abatement and for the support of mission related projects. If the facility falls derelict or is no longer in use, then the site shall be cleared of standing debris and ripped using a 12" ripping shank to churn the soils in preparation of planting with seedlings of various native conifers.

Stand 99:
Almost all of stand 99 has been previously cleared and developed for the expansion of the NEX on the installation. Any and all remaining timber shall be managed for hazard tree abatement and for the support of mission related projects.

Stand 100:
Stand 100 is an oddly shaped smaller size (7.2 acre) tract that borders Trigger Avenue to the west, Thresher Avenue to the north, a parking lot and the MWR recreation facility to the east and a naval facility to the south. Thus, the first one tree length into the stand shall be managed for hazard tree abatement. The stand consists of moderately dense moderate diameter Douglas-fir and western hemlock. The stand shall be thinned using single tree selection at no set spacing to achieve a residual stocking density of 134 trees per acre; whereby, leave trees will be selected that increase biodiversity and wildlife habitat while still presenting good form, health and crown vigor. No red alder stems whose diameter is larger than 10" shall be marked, tallied or retained as leave trees. All yarding shall be completed using a sound strategy to prevent noise complaints from developing. Any and all open areas that are the result of the thinning operations shall be inter-plated or replanted with seedlings of various native conifers.

Stand 101, 102, 103, 104, 105, 106, 107, 108 and 109:
These stands represent primarily vegetated strips that border or are within residential areas within the installation and the subsequent roadways and parking lots. The main focus for the management of these stands shall be the safety, security and structural stability of installation residents, patrons and property; thus, management shall primarily be for hazard tree abatement and for the support of mission related projects. However, these stands do represent a cumulatively large volume of standing timber in this portion of the installation and shall also be managed for wildlife habitat and stand health after safety concerns have been addressed. These stands are primarily moderate to highly stocked tracts of moderate diameter Douglas-fir and mixed conifers. These stands shall be thinned using single tree selection at no set spacing to achieve a minimum residual stocking density of 100 trees per acre; whereby, leave trees will be selected that increase biodiversity and wildlife habitat while still presenting good form, health and crown vigor. All yarding shall be completed using a sound strategy to prevent noise complaints from developing and to diminish impacts to soils including erosion and sedimentation. In stands that have smaller sized timber that should not be opened up to a residual stocking density of 100 trees per acre, shall be thinned to a higher density as determined by Navy foresters prior to operations occurring in the area. This will work to diminish the number of sun shocked or wind-thrown stems after thinning has been completed. No red alder shall be marked, tallied or retained in these stands in order to diminish the number of hazard trees that pose a significant safety hazard to installation residents, patrons and property. Any and all open areas or areas with invasive species shall have all non-native vegetative ground cover removed and disposed of offsite followed by ripping with a 12” ripping shank to churn the soils in preparation of planting with seedlings of various native conifers. Planting projects in these stands can be used as educational outreach events for installation residents and patrons to increase the knowledge of forestry and forest management on NBK lands.

Stand 110:
Stand 110 is a smaller (4.9 acre) long and narrow stand that runs on the eastern boundary along the Navy railroad adjacent to the installation patron gas station. The first one tree length into the eastern boundary of the stand shall be managed for hazard tree abatement. There are a considerable number of dead stems along the Navy railroad from use of herbicides; thus, any dead or dying stems shall be removed and disposed of offsite with any open areas replanted with seedlings of various native conifers to bring the area back into vegetative production and preventing the infestation of invasive species. The rest of the stand consists of moderately dense moderate diameter Douglas-fir and western hemlock. The stand shall be thinned to a residual spacing of 20’ O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown. Logistically, this stand shall be thinned in conjunction with either stand 35 or 36 and possibly both.

Stand 111:
Stand 111 is a small (1.8 acre) highly visible stand that rest to the north and west of the Trigger Avenue gate and the subsequent southern and eastern installation fence lines. This stand consists of primarily moderate diameter moderately dense red alder and Douglas-fir. The whole stand shall be managed for the abatement of hazard trees and in support of mission related projects, as well as for security and visibility requirements. This stand shall be thinned to a residual spacing of 25’ O.C. to achieve a residual stocking density of 70 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health, a vigorous crown and will not be

susceptible to sun shock or windthrow. This wide spacing will facilitate the inter-planting of this stand with seedlings of various native conifers to develop greater biodiversity both vertically and horizontally. All yarding operations shall be accomplished using a sound strategy in order to diminish soil impacts (including rates of erosion and sedimentation) and to provide an educational opportunity to the general public, installation residents and installation patrons. The entire stand shall be inter-planted with seedlings of various native conifers.

Stand 242:
Stand 242 is a smaller (7 acre) stand that borders an installation residential area along the extent of the eastern boundary of the stand. Thus, the first one tree length into the stand from the residential area shall be managed for hazard tree abatement to ensure the safety, security and structural stability of installation residents, patrons and property. The rest of the stand consists of variable density smaller diameter Douglas-fir that surrounds a mapped stream channel that runs through the western arm of the stand. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a uniform residual stocking density of 100 trees per acre; whereby, leave trees shall be those stems that enhance biodiversity and have good form, good health, a vigorous crown and will not be susceptible to sun shock or windthrow. Thinning in this fashion will eliminate the variability of densities within this stand and allow for uniform future management of the stand. Any and all areas that are either open or below 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 276:
Stand 276 is a small (1.2 acre) narrow strip of timber that rests between Hunley Road and an installation parking lot. This stand shall solely be managed for hazard tree abatement and for the support of mission related projects.

Stand 348:
Stand 348 is a smaller (5.8 acre) stand that has been previously harvested and replanted along Turtle Road and the southern installation fence line. The first one tree length from the fence line into the stand shall be managed for hazard tree abatement. The stand consists of smaller diameter highly dense Douglas-fir and western white pine that is in the density dependent mortality stage of stand development. This stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown. Decreasing the density of this over stocked stand will increase the individual crown volume of the stems thus increasing the overall ecosystem function and carbon sequestration of the stand.

Any other stands not specifically addressed above will be considered eligible for pre-commercial thinning, timber stand improvement treatments, clearing and planting or any other silvicultural treatment that will enhance stocking, habitat qualities and long term forest and tree productivity. In all forest areas, diseased trees may be appropriately addressed in accordance with the site objectives and the pathogen(s) present. Prescriptions will follow the silvicultural criteria and goals discussed for all other stands.

NAVAL BASE KITSAP, KEYPORT, BANGOR ANNEX, COMPARTMENT 4

Stand 1:
Stand 1 is a smaller (5.4 acre) tract that lies partially adjacent to both a naval facility and the Bangor annex fence line. Thus, any and all areas in the stand that lie within one tree length from a naval facility, roadway or fence line shall be managed for the abatement of hazard trees. The rest of the stand consists of non-uniform higher density moderate diameter Douglas-fir and mixed conifers. This stand shall be single tree selection thinned at no set residual spacing in order to achieve a minimum residual stocking density of 100 trees per acre; whereby leave trees shall be stems with a larger diameter, good health, good form and a vigorous crown. The thinning will allow for a uniform stocking density in order to facilitate the future management of the stand. Any and all portions of the stand that have a residual stocking density that is below the minimum of 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 2:
Stand 2 is a smaller (4.6 acre) tract with boundaries that follow along the top of a well defined stream channel. The northern boundary lies along Darter Road and the Bangor annex fence line; thus, the first one tree length into the stand from the north shall be managed for the abatement of hazard trees. The stand consists of moderately dense moderate diameter red alder. The stand shall be surveyed for the presence of wetlands prior to any and all forestry operations occurring. Any areas that are found to be wetlands are to be marked, flagged and mapped using GPS. Following the survey the stand shall be thinned to a residual spacing of 18’ O.C. to achieve a uniform residual stocking density of 134 trees per acre; whereby, leave trees shall be stems with a larger diameter, good health, good form and a vigorous crown.

Stand 3:
Stand 3 is a moderate sized (10.9 acre) tract that consists of moderately dense moderate diameter red alder. The northern boundary of the stand lies completely along Darter Road and is adjacent to the Bangor annex fence line; thus, the first one tree length into the stand from the northern boundary shall be managed for hazard tree abatement. The stand follows two pronounced drainages that need to be surveyed for the presence of wetlands. Any and all wetlands found during the survey shall be marked, flagged and mapped using GPS prior to any forestry operations occurring. Following surveying, the stand shall be single tree selection thinned at no set residual spacing to achieve a minimum stocking density of 100 trees per acre; whereby leave trees shall be stems with good health, good form and a vigorous crown. No red alder that is greater than 12” in diameter shall be marked, tallied or retained as leave trees. This thinning will allow for a uniform stocking density that will facilitate future management of the stand, while also opening the canopy to foster the development of a vigorous and thriving understory for wildlife habitat. Any and all portions of the stand that fall below the minimum stocking density of 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 4 and 5:
Stands 4 and 5 represent a large cumulative area (64.7 acre) that is primarily open and developed. The open areas are required for the eastern boundary road north of gate 12 and other openings directly linked to the eastern boundary road. Where possible, the open areas shall have non-native vegetation removed and disposed of offsite followed by ripping with a 12” ripping shank to churn

the soils in preparation of planting with seedlings of various native conifers. Within these stands there is some high density small diameter mixed conifer and red alder stems that shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health and a vigorous crown.

Stand 6, 12, 17 and 18:
This very large (150+ acre) tract consists of higher density moderate diameter Douglas-fir, mixed conifers and hardwoods. Portions along all boundaries of these stands lie near or adjacent to naval facilities, roadways or fence lines; thus, in those areas the primary objective shall be the abatement of hazard trees. The rest of the stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown. Any and all contiguous open areas shall be planted with seedlings of various native conifers and any portions of the stand which have a stocking density lower than 100 trees per acre shall be inter-planted with seedlings of various native conifers. This thinning will work to increase the individual crown volume of the residual stems which subsequently increases the rate of carbon sequestration and the overall health of the stand. The increased light hitting the forest floor will foster the development of a vigorous understory to improve wildlife habitat.

Stand 7:
Stand 7 is a smaller (5.7 acre) tract that consists of moderately dense moderate diameter red alder. The western boundary of the stand runs along Gurnard Road with the southern boundary being adjacent to a naval facility; thus one tree length into the stand from either of those boundaries shall be managed for the abatement of hazard trees. The whole stand shall be surveyed for the presence of wetlands that, if found, shall be marked, flagged and mapped using GPS prior to any forestry operations occurring. The stand shall be thinned using the leave tree release method; whereby, a stem with good form, good health and a vigorous crown is selected as a leave tree with all stems whose crowns are either touching or above the crown of the leave tree being subject to removal. There is no set spacing but there shall be a uniform minimum stocking density of 100 trees per acre. Any and all contiguous open areas shall be planted with seedlings of various native conifers and any portions of the stand which have a stocking density lower than 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 8 and 9:
Stands 8 and 9 are small (2.3 and 2.9 acre) narrow strips of small diameter lower quality red alder. Along the western and southern boundaries of the tract are naval facilities and given the small size of the stands, the primary management objective shall be the abatement of hazard trees and the support of mission related projects.

Stand 10:
Stand 10 is a smaller (7.5 acre) stand that consists of higher density moderate diameter Douglas-fir and mixed conifers. The eastern boundary of this stand runs along Gurnard Road and the western boundary is within a single tree length from naval facilities; thus, those areas shall be managed for the abatement of hazard trees. The stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native

conifers with good from, good health and a vigorous crown. No red alder greater than 12" in diameter shall be marked, tallied or retained as a leave trees. Any and all contiguous open areas shall be planted with seedlings of various native conifers and any portions of the stand which have a stocking density lower than 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 11:
Stand 11 is a very large (288.1 acre) open tract that has little to no standing timber. This stand represents all roads, facilities, parking lots and grass areas within the compartment that were not included in stand 4. The primary objective for this stand is the abatement of hazard trees that are within one tree length from any type of government property and for the support of mission related projects. Where possible, open areas shall have all non-native vegetation removed and disposed of offsite followed by ripping with a 12" ripping shank to churn the soil in preparation of planting with seedlings of various native conifers.

Stand 13 and 16:
These stands are smaller (3.8 and 1.6 acre) narrow strips of timber that surround storage magazines. The timber on these stands is primarily small diameter very low density red alder that is of poor form and generally poor health. The management of these stands shall be for the abatement of hazard trees and for the support of mission related projects and security requirements.

Stand 14:
Stand 14 is a smaller tract that consists of lower density moderate diameter Douglas-fir and western hemlock. The eastern boundary lies along Gurnard Road; thus, the first one tree length into the stand from that boundary shall be managed for hazard tree abatement. The rest of the stand shall be single tree selection thinned at no set spacing to a residual stocking density of 100 trees per acre; whereby, removal trees will be selected that are poor in form health and crown vigor. Removing poor formed and poor health trees will allow the residual stand to capture mortality by transferring growth from poor form suppressed stems to good from dominant and co-dominant stems.

Stand 15:
Stand 15 is a small (4.9 acre) odd shaped stand that surrounds storage magazines. Most of the boundary lines lie within one tree length of a storage bunker or roadway; thus, the entire stand shall be managed for the first one tree length for the abatement of hazard trees. The stand consists of smaller diameter higher density red alder. The stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be stems with high ecological value, good form, good health and a vigorous crown.

Stand 19:
Stand 19 is a smaller (2.7 acre) tract that borders a storage magazine to the west, Gurnard Road to the east and Seawolf Road to the south; thus, the first one tree length into the stand shall be managed for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderately dense moderate diameter Douglas-fir that shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown.

Stand 20:
Stand 20 is a moderate (17 acre) tract that consists of moderately dense moderate diameter Douglas-fir and mixed conifers. The northern boundary lies along Seawolf Road, the eastern boundary lies along the Eastern Boundary Road and the rest of the boundaries have portions that lie along roadways or facilities; thus, the first one tree length into the stand shall be managed for hazard tree abatement. The stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with good health, good form, a vigorous crown and a high propensity for increased crown volume and production.

Stand 21:
Stand 21 is a smaller (2.9 acre) tract that consists of small diameter moderately dense red alder. The stand lies along Seawolf Road to the north and storage bunkers to the west; thus, the first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees. This stand shall be selectively thinned at no set residual spacing to attain a residual stocking density of 70 trees per acre; whereby, leave trees shall be those individuals with the highest propensity to increase crown volume and health from a thinning. Any and all stems whose crowns are either touching or above the crown of the leave tree shall be removed. After thinning, this stand shall be inter-planted with seedlings of various native conifers to provide additional horizontal and vertical stratification.

Stand 22:
Stand 22 is a smaller (6.7 acre) tract that consists of small diameter lower density Douglas-fir, this structure has been driven by having the entire stand thinned in the last decade. The stand shall be managed for hazard tree abatement to a distance of one tree length into the stand. This stand shall be inter-planted with seedling of various native conifers in order to increase the site productivity and develop a strong vertically and horizontally stratified stand.

Stand 23:
Stand 23 is a smaller stand (5.1 acre) that consists of moderate density smaller diameter Douglas-fir and western redcedar. The stand is a narrow strip of timber which wraps around six storage magazines; thus, the stand shall be managed for the abatement of hazard trees and for the support of mission related projects and security requirements.

Stand 24:
Stand 24 is a moderate (10.3 acre) stand that lies along Gurnard Road to the south and surrounding storage magazines on Scorpion Avenue to the north. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderately dense moderate diameter Douglas-fir that shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with a larger diameter, good form, good health and a vigorous crown. The wider spacing will increase the individual crown volume of the standing timber and will allow light to hit the forest floor in order to develop a thriving understory to improve wildlife habitat.

Stand 25:
Stand 25 is a smaller (3.9 acre) tract that surrounds storage magazines to the east of Scorpion Road. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand

consists of smaller diameter moderate density red alder that shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health and a vigorous crown.

Stand 26:
Stand 26 is a small (2.6 acre) tract that lies to the west of Trepang Road surrounding storage magazines. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderately dense smaller diameter Douglas-fir that shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown.

Stand 27 and 28:
These two stands are open areas that lie completely within other stands and contain no standing timber. The tract shall have all non-native ground cover vegetation removed and disposed of offsite, followed by ripping with a 12" ripping shank to churn the soils in preparation of planting with seedlings of various native conifers.

Stand 29, 30 and 31:
These stands represent a section of standing timber that is moderate in size and that borders the Eastern Boundary Road to the east, Trepang Road to the west, Bullhead Road to the south and partially an open storage area to the north. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of predominately Douglas-fir at varying densities with a non-uniform distribution of timber. The tract shall be selection (1-2 trees) or group (3-8 trees) thinned at no set residual spacing to achieve a minimum residual density of 100 trees per acre; whereby, removal trees shall be selected that have poor form, poor health and if removed will have a large release capability. After thinning the tract shall be inter-planted with seedlings of various native conifers in any areas with residual stocking densities below 100 trees per acre.

Stand 32, 33, 34, 35, 36, 37 and 38:
These stands represent smaller long and narrow stands that surround storage magazines and lie along Scorpion Road, Gurnard Road or Trepang Road. The first one tree length into the tract shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. These stands all consist of smaller to moderate diameter Douglas-fir at moderate to high stocking densities. The tract shall be single tree selection thinned at no set spacing to achieve a uniform residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with a high propensity for increased crown volume and production, good from, good health and a vigorous crown. Any and all stems whose crowns are either touching or above the crown of a leave tree shall be removed. Inter-planting shall occur in any areas that have a residual stocking density below 100 trees per acre.

Stand 39:
Stand 39 is a smaller (6.1 acre) tract that was partially thinned in 2005 as a part of the east boundary thinning. The stand lies along the eastern side of Trepang Road and follows a considerable draw and stream channel. The first one tree length into the stand shall be managed first and foremost for the

abatement of hazard trees and for the support of mission related projects and security requirements. The rest of the stand has either been thinned or has topographical constraints which would prevent economical thinning from occurring; thus it shall be managed by inter-planting with seedlings of various native conifers in order to increase the vertical and horizontal stratification.

Stand 40, 41 and 42:
These stands form a larger (46.1 acre) tract that consists of moderate diameter relatively well stocked Douglas-fir. These stands were thinned in 2005 as a part of the east boundary thinning which resulted in a well formed canopy with a relatively good stocking density. The tract lies along Trepang road to the west, Bullhead Road to the north, East Boundary Road to the east and Palau Road to the south. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The rest of the stand shall be single tree selection thinned at no set spacing to achieve a stocking density that is greater than 70 trees per acre; whereby removal trees will be those that detract from the wildlife habitat and stand health of the tract and that are of poor form, poor health and have surpassed maturity.

Stand 43:
Stand 43 is a narrow strip of timber that is moderate (13.4 acre) in size. The stand lies along the Eastern boundary road to the east and Kete Road to the west. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderate to smaller diameter Douglas-fir that is very dense. The stand shall thinned to a residual spacing of 18’ O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good health, good form, a vigorous crown and a high propensity for increased crown volume and production.

Stand 44, 45, 46, 47 and 48:
This conglomeration of stands represents a larger (64.4 acre) area that has many boundaries along roadways and storage magazines. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The tract consists of moderate diameter moderate density Douglas-fir and red alder that shall be thinned using the leave tree release method. The thinning shall be at no set spacing to a minimum uniform residual stocking density of 130 trees per acre; whereby, leave trees shall be stems with a high propensity for increased crown volume and production, good health, good form and a vigorous crown. Any and all stems whose crowns are either touching or above the crown of a leave tree shall be removed. Any and all open areas or area with residual densities below the minimum 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 49:
Stand 49 is a moderate (20 acre) tract that surrounds storage magazines to the east of Scorpion Road and to the west of Aspro Road with boundaries that also lie along Pargo Road to the south and Puffer Road to the north. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderate diameter highly dense Douglas-fir and mixed conifers. The stand shall be thinned to a residual spacing of 20’ O.C. to achieve a residual spacing of 100

trees per acre; whereby, leave trees shall be native conifers with good form, good health and a vigorous crown.

Stand 50:
Stand 50 is a smaller (3.6 acre) area that borders the Eastern Boundary Road to the east, Pargo Road to the south and Kete Road to the west. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of lower density smaller diameter red alder. The stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 51 and 52:
Stand 51 and 52 create a rectangle of timber that lies between the annex security fence to the west and Scorpion Road to the east. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The tract consists of small to moderate diameter highly dense Douglas-fir and western redcedar. The tract shall be thinned to a residual stocking density of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas or areas with densities below 134 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 53 and 54:
Stand 53 and 54 are smaller (7.5 and 2.3 acre) stands that lies between the annex security fence to the west and Scorpion Avenue to the east. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of smaller to moderate diameter moderately dense Douglas-fir and red alder. The stand shall be single tree selection thinned at no set residual spacing to achieve a residual stocking density of 130 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas or areas where the residual stocking density is below 130 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 55:
Stand 55 is a small (3.4 acre) narrow strip of timber that lies along the Eastern Boundary Road and consists of small diameter moderately dense red alder. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 56:
Stand 56 is a smaller (5.4 acre) narrow strip of timber that runs along Kete Road that consists of highly dense moderate diameter Douglas-fir and western redcedar. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 57:
Stand 57 is a small (2.9 acre) tract that borders Pargo Road to the north, Haddo Road to the west and naval facilities to the east. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of smaller diameter moderately dense red alder. The stand shall be TSI thinned to a residual spacing of 25' O.C. to achieve a residual stocking density of 70 trees per acre; whereby leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. After thinning the stand shall be inter-planted with seedlings of various native conifers with a focus on western white pine in order to provide horizontal and vertical stratification.

Stand 58 and 61:
Stand 58 and 61 form a moderately (30.2 acre) large strip of timber that consists of moderate diameter moderately dense Douglas-fir and western redcedar. The tract borders Haddo Road to the west, Kete Road to the south and naval facilities to the east. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 59 and 70:
These stands represent a block of timber that lies along the Eastern Boundary Road to the east, the annex fence line to the south and Kete Road to the west. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderate diameter moderately dense Douglas-fir and red alder. The stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual spacing of 134 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas shall be planted with seedlings of various native conifers.

Stand 60:
Stand 60 is a smaller (3.7 acre) tract that has only one boundary that lies along a roadway, Haddo Road. The first one tree length into the stand from Haddo Road shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderately dense moderate diameter red alder and Douglas-fir. The stand shall be single tree selection thinned at no set spacing to achieve a residual stocking

density of 85 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. After thinning, the stand shall be inter-planted with seedlings of various native conifers to provide increased horizontal and vertical stratification.

Stand 62, 63 and 64:
These stands combine to create a smaller (7.2 acre) strip of timber that borders Dace Road to the west, Pargo Road to the north, and storage magazines along Haddo Road to the east. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. This tract consists of moderate diameter highly dense Douglas-fir, red alder and western redcedar. The tract shall be single tree selection thinned at no set residual spacing to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all areas where the residual stocking density is below 100 trees per acre shall be inter-planted with seedlings of various native conifers and if possible, big-leaf maple.

Stand 65 and 66:
Stands 65 and 66 surround storage magazines that lie along Dace Road to the east and Scorpion Avenue to the west. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The tract consists of moderately dense moderate diameter Douglas-fir and red alder. This stand shall be thinned to a residual spacing of 18’ O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 67:
Stand 67 is a moderate (11.9 acre) sized strip of timber that runs along the annex fence line to the west and Scorpion Avenue to the east. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of moderate diameter moderate density Douglas-fir that shall be thinned to a residual spacing of 20’ O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all areas that have residual stocking densities that are less than 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 68:
Stand 68 is a small (1.6 acre) tract that lies adjacent to naval facilities to the east, west and north of the stand. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. The stand consists of smaller diameter higher density Douglas-fir and red alder. The stand shall be pre-commercially thinned at no set residual spacing to obtain a minimum residual stocking density of 150 trees per acre using the leave tree release method. Leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any stem whose crown is either touching or above the crown of a leave tree shall be removed.

Stand 69:
Stand 69 is a small (1.3 acre) tract that lies along Kete Road to the south, Dace Road to the west and naval facilities to the east and north. The first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects and security requirements. This stand consists of smaller diameter higher density Douglas-fir and red alder. The stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Any other stands not specifically addressed above will be considered eligible for pre-commercial thinning, timber stand improvement treatments, clearing and planting or any other silvicultural treatment that will enhance stocking and long term forest and tree productivity. In all forest areas, diseased trees may be cut down. Prescriptions will follow the silvicultural criteria and goals discussed for all other stands.

NAVAL BASE KITSAP, KEYPORT, COMPARTMENT 5

Stand 1:
Stand 1 represents all roadways, parking lots, open areas, residential areas, and some small scale forested areas for the installation. All forested areas within one tree length from a naval facility, roadway, residential area, parking lot, or walkway shall be managed first and foremost for the abatement of hazard trees in order to protect the safety and structural stability of installation patrons and property; whereby, any tree that is either dead, leaning, or found to be unsound by a Navy Forester shall be removed. Stems can be pruned to a height which leaves one third of the total height of the tree in live crown for security mandates but in order to remove trees for purposes other than as a hazard NEPA documentation is required. Open areas, non-native landscaping areas or areas with invasive species can have the ground vegetation cleared and disposed of off base followed by ripping of the soil surface using a 12" ripping shank to churn the soil in preparation of planting with seedlings of various native conifers and/or if possible, various native hardwoods. Any and all open areas can be planted with seedlings of various native conifers, the spacing of which will be determined by a Navy Forester prior to the commencement of planting activities. In the few areas with small tracts of standing timber, the timber will be managed concurrently with the adjacent stand or stands, unless unique circumstances arise for the site.

Stand 3:
Stand 3 is a smaller (1.8 acre) tract that borders roadways and parking lots on all sides of the tract. Due to the close proximity to government property, the stand shall be first and foremost managed for hazard tree abatement and for the support of mission related projects and security requirements. The stand consists of lower density larger diameter Douglas-fir. This stand shall be timber stand improvement (TSI) thinned; whereby, a low thinning shall occur to cut all suppressed and intermediate stems that are taking nutrients and resources away from the dominant and co-dominant stems and leave them lie within the stand. No red alder regeneration or understory stems shall be retained in the TSI operation. The TSI will help to facilitate inter-planting with seedlings of various native conifers.

Stand 4:
Stand 4 is a small (1.4 acre) tract that borders the turn off for NBK, Keyport to the south and the naval undersea warfare museum to the east. Due to the close proximity to government property, the stand shall be first and foremost managed for hazard tree abatement and for the support of mission related projects and security requirements. The stand consists of lower density larger diameter Douglas-fir. The stand shall be single tree selection thinned at no set spacing to achieve a residual stocking density of 80 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. All yarding activities shall be conducted using a sound strategy in order to diminish the adverse soil impacts generated by mechanized yarding and to provide an educational opportunity for installation patrons and the general public. After thinning, the stand shall be inter-planted with seedlings of various native conifers.

Stand 6:
Stand 6 represents a moderately (21.8 acre) large water body in the middle of the Keyport installation. The water body is known as the Keyport Lagoon and is a fresh water impoundment drains into Puget Sound. This stand shall be managed for shoreline habitat both in terms of native vegetation regimes and in terms of fish and wildlife. The stand shall also be managed for the abatement of hazard trees and for the support of mission related projects and security requirements.

Stand 7:
Stand 7 is a small (1.1 acre) sparsely stocked stand that consists of small diameter red alder that borders a security road and a lay-down area to the south and east. The first one tree length into the stand shall be first and foremost managed for the abatement of hazard trees. This stand shall undergo timber stand improvement (TSI) to remove most understory vegetation and thin the scattered clumps of red alder that have formed in the area. The removal and mulching of the understory vegetation will open the forest floor up for inter-planting with seedlings of various native conifers. Since red alder grows in tightly spaced clumps, which can be seen on this site, pre-commercial thinning shall occur within each clump where the stem with goof form, good health, a vigorous crown and a high propensity for increased crown volume and production is selected at a spacing of 16’ O.C. to achieve a residual stocking density of 170 trees per acre. The thinning will open the overstory to facilitate inter-planting with seedlings of various shade tolerant native conifers.

Stand 8:
Stand 8 is a smaller (4.9 acre) tract that borders the installation fence line to the west, naval facilities to the north and east, a security road to the south and is within one tree length from the Brownsville Hwy. on the other side of the installation fence line. Thus, the first one tree length into the stand shall be managed first and foremost for hazard tree abatement. The stand consists of moderately dense moderate diameter red alder that shall be thinned using the leave tree release system at no set residual spacing in order to achieve a residual stocking density of 100 trees per acre; whereby leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any stem whose crown is either touching or above the crown of a leave tree shall be removed. All yarding shall be done using a sound strategy in order to diminish the adverse soil impacts that occur during mechanized yarding and to provide an educational opportunity for installation residents and patrons.

Stand 9:
Stand 9 is a small (2.8 acre) sparsely stocked stand that consists of small diameter red alder that borders a roadway to the west. The first one tree length into the stand from the roadway shall be managed for the abatement of hazard trees and for the support of mission related projects. This stand shall be pre-commercially thinned to a residual spacing of 16’ O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. All yarding operations shall be conducted using a sound strategy in order to alleviate the adverse soil impacts caused my mechanized yarding. Any and all parts of the stand with stocking levels below 170 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 10:
Stand 10 is a smaller (9.2 acre) stand that borders roadways, parking lots and naval facilities along the entire boundary; thus, the first one tree length into the stand shall be managed first and foremost for the abatement of hazard trees and for the support of mission related projects. The stand consists of lower density moderate diameter red alder and big-leaf maple with immense amounts of invasive species (primarily Japanese Knotweed) throughout the stand. The stand shall undergo timber stand improvement whereby all standing native vegetation that is less than 4 inches in diameter is to be cut and mulched on site with non-native vegetation removed and disposed of offsite. Any standing timber that is immersed with ivy or grapevine shall be removed and disposed of offsite. After the vegetation removal has occurred a TSI low thinning shall occur; whereby, all suppressed and intermediate hardwood stems are to be cut and left lie in the stand. Following the low thinning the entire stand is to be inter-planted with seedlings of various shade tolerant conifers; whereby, scalping will occur in planting sites so as to expose bare mineral soil to help ensure seedling survival. In areas where invasive species were removed and native conifers seedlings were planted, treatment shall occur annually either by mechanical means or with approved and appropriately applied herbicides for a length of time equal to five years or after complete shade establishment.

Stand 11:
Stand 11 is a smaller (5.0 acre) tract that lies along the southern installation boundary to the south, the western installation boundary to the west, a security road to the north and a roadway to the east. The first one tree length into the stand shall be first and foremost managed for hazard tree abatement. The stand consists of previously thinned well stocked larger diameter Douglas-fir and big-leaf maple. The stand shall be single tree selection thinned to achieve a uniform residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. All yarding shall be conducted using a sound strategy in order to diminish the adverse soil impacts associated with mechanized yarding. No red alder greater than 10” in diameter shall be marked, tallied or retained as leave trees. Any and all portions of the stand that have a residual stocking density below 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 12:
Stand 12 is a moderate (12.4 acre) sized tract that borders the southern installation fence line to the south and a roadway to the east and west. The first one tree length into the stand shall be managed for hazard tree abatement and for the support of mission related projects. The stand consists of larger diameter moderately dense Douglas-fir and Big-leaf maple that shall be thinned to a residual spacing of 21’ O.C. to achieve a residual stocking density of 98 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. All yarding shall be conducted a carefully crafted strategy to diminish the adverse soil impacts of mechanized yarding.

Stand 13 and 14:
These stands are smaller (6.0 and 0.9 acre) in size that lie to the south of the Keyport Lagoon and partially lie along the waterfront shoreline to the west with some areas of the tract bordering naval residencies or roadways. The first one tree length into the stand from a roadway or naval structure shall be managed for the abatement of hazard trees. The first one tree length into the stand from the Lagoon or shoreline shall be managed for shoreline habitat both in terms of native vegetation

regimes and in terms of fish and wildlife habitat. The tract consists of larger diameter well stocked Douglas-fir that shall be single tree selection thinned at no set residual spacing to achieve a uniform residual stocking density of 85 trees per acre; whereby, leave trees shall be native conifers and big-leaf maple with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. All yarding shall be conducted using a sound strategy in order to diminish the adverse soil and runoff conditions that can result from mechanized yarding. Any and all areas with stocking densities below 85 trees per acre shall be inter-planted with seedlings of various shade tolerant native conifers.

Stand 16:
Stand 16 is a smaller (3.8 acre) tract that borders naval residencies and roadways to the west, north and partially to the east. Some of the eastern boundary lies along the shoreline as well. The first one tree length into the stand from any roadway or naval residence shall be managed first and foremost for the abatement of hazard trees. Along the eastern boundary where the stand borders the shoreline the stand shall be managed for the first one tree length into the stand for shoreline habitat both in terms of vegetative regimes and in terms of fish and wildlife regimes. The stand consists of larger diameter moderate to lower density Douglas-fir and big-leaf maple. The stand shall be thinned to a residual spacing of 20’ O.C. to achieve a uniform residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. All yarding shall be conducted using a sound strategy in order to diminish the adverse soil and runoff conditions that can result from mechanized yarding.

Stand 18:
Stand 18 is a smaller (3.3 acre) stand that borders the shoreline to the east, the installation fence-line to the south and naval residences to the west. The first one tree length into the stand from any roadway or naval residence shall be managed first and foremost for the abatement of hazard trees. Along the eastern boundary where the stand borders the shoreline the stand shall be managed for the first one tree length into the stand for shoreline habitat both in terms of vegetative regimes and in terms of fish and wildlife regimes. The stand consists of larger diameter lower density big-leaf maple and red alder. The stand shall undergo a single tree selection leave tree release thinning at no set residual spacing to achieve a residual stocking density of 85 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any stem whose crown is either touching or above the crown of a leave tree shall be removed. All yarding shall be conducted using a sound strategy in order to diminish the adverse soil and runoff conditions that can result from mechanized yarding.

Any other stands not specifically addressed above will be considered eligible for pre-commercial thinning, timber stand improvement treatments, clearing and planting or any other silvicultural treatment that will enhance stocking and long term forest and tree productivity. In all forest areas, diseased trees may be cut down. Prescriptions will follow the silvicultural criteria and goals discussed for all other stands.

NAVAL BASE KITSAP, TOANDOS BUFFER ZONE, COMPARTMENT 8 AND ZELATCHED POINT

Stand 1:
Stand 1 is a moderate (13.3 acre) sized tract that consists of large diameter lower density Douglas-fir. This stand shall be single tree selection thinned at no set residual spacing to achieve a uniform residual stocking density of 75 trees per acre; whereby, leave trees shall be native conifers with larger diameters, good form, good health, a vigorous crown and a high propensity for increased crown volume and production. After thinning, the stand shall be inter-planted with seedlings of various native conifers in order to increase the vertical and horizontal stratification.

Stand 2:
Stand 1 is a moderate (14.2 acre) sized tract that consists of moderate diameter well stocked Douglas-fir. This stand shall be single tree selection thinned at no set residual spacing to achieve a uniform residual stocking density of 85 trees per acre; whereby, leave trees shall be native conifers with larger diameters, good form, good health, a vigorous crown and a high propensity for increased crown volume and production. No red alder shall be marked, tallied or retained as leave tree and shall be removed from or cut and left lie in the stand. After thinning, the stand shall be inter-planted with seedlings of various native conifers in order to increase the horizontal and vertical stratification.

Stand 3:
Stand 3 is a moderate (15.0 acre) area that consists primarily of brush and open areas with some scattered standing timber along the northern shoreline of the buffer zone. The standing timber shall be managed concurrently with the prescriptions provided for adjacent stands including thinning and inter-planting. The rest of the stand shall have all non-native vegetation removed and disposed of offsite followed by ripped with a 12” ripping shank to churn and expose the soils in preparation of planting with seedlings of various native conifers with an emphasis on western redcedar.

Stand 4:
Stand 4 is a smaller (5.4 acre) tract that consists of moderate diameter moderate density Douglas-fir. The stand shall be thinned to a residual spacing of 20’ O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with larger diameters, good health, good form, a vigorous crown and a high propensity for increased crown volume and production. No red alder greater than 8” in diameter shall not be marked, tallied or retained as leave trees and shall be removed from or cut and left lie in the stand. Any and all open areas or areas within the stand that are below the residual stocking density of 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 5:
Stand 5 is a small (2.8 acre) tract that consists of very small diameter highly dense red alder and Pacific madrone. This stand shall be pre-commercially thinned to a residual spacing of 16’ O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 6, 7 & 8:
Stands 6, 7 and 8 are smaller (1.8, 5.9 and7.0 acre) stands that have similar stand characteristics; in that, the stands consist of moderate to larger diameter moderate to lower density Douglas-fir and red alder. This tract shall be single tree selection thinned at no set residual spacing in order to achieve a uniform residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with larger diameters, good form, good health, vigorous crowns and high propensities for increased crown volume and production. Any and all areas that have residual stocking densities that are less than 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 9 & 10:
Stands 9 and 10 are smaller (3.1 and 4.1 acre) stands that consist of moderately dense moderate to large diameter Douglas-fir. This stand shall be thinned at a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. No red alder greater than 8" in diameter shall be marked, tallied or retained as a leave trees.

Stand 11:
Stand 11 is a smaller (7.8 acre) stand that consists of highly dense small diameter Douglas-fir. This stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 12, 13, 14, 17 and 18:
Stands 12, 13, 14, 17 and 18 vary in size from small (4.4 acre) to moderate (13.9, 23.1, 40.1 and 15.8 acre) with all five stands consisting of moderate to large diameter moderate density Douglas-fir and red alder. This tract shall be single tree selection, leave tree release thinned at no set residual spacing to achieve a minimum residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any stem whose crown is either touching or above the crown of a leave tree shall be removed. No red alder greater than 10" in diameter shall be marked, tallied or retained as leave trees. Any and all open areas or portions of the tract that have residual stocking densities lower than 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 15 and 16:
Stands 15 and 16 are moderate (13.4 and 31.7 acre) sized stands that consist of small diameter highly dense Douglas-fir and red alder. These stands shall be pre-commercially thinned using the leave tree release system at no set residual spacing to achieve a residual stocking density of 150 trees per acre; whereby, leave trees shall be stems with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. Any stem whose crown is touching or above the crown of a leave tree shall be cut and left lie in the stand.

Stand 19:
Stand 19 is a larger (45.6 acre) stand that consists of small diameter highly dense Douglas-fir regeneration. The stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. No red alder shall be marked, tallied or retained as leave trees and shall be cut and left lie in the stand.

Stand 20:
Stand 20 is a smaller (4.1 acre) tract that lies along the shoreline for the buffer zone. The stand consists of moderate diameter moderate density Douglas-fir. This stand shall be single tree selection thinned at no set residual spacing in order to achieve a residual stocking density of 130 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. No red alder shall be marked, tallied or retained as leave trees and shall be either removed from the stand or cut and left lie.

Stand 21, 22, 23, 24, 26, 28 and 29:
These multiple stands are of varying sizes and locations which together form one large (119.6 acre) tract. The stands have similar characteristics in that they all consist of moderate to large diameter lower to moderately dense Douglas-fir. This tract shall be single tree selection thinned at no set residual spacing in order to achieve a uniform residual stocking density of 85 trees per acre; whereby, leave trees shall be native conifers and with large diameters, good from, good health and a vigorous crown. No red alder shall be tallied, marked or retained as leave trees and shall be either removed or cut and left lie in the stand; however, any and all other hardwoods found in the tract may be retained within the stand but shall not be tallied as leave trees. After thinning, the stand shall be inter-planted with seedlings of various native conifers in order to improve the vertical and horizontal stratification.

Stand 25:
Stand 25 is a smaller (6.2 acre) tract that lies directly in the center of the previously prescribed tract. Thus, for logistical reasons, this stand shall be thinned in conjunction with stands 21, 22, 23, etc. The stand consists of moderate diameter moderately dense red alder that shall be thinned using the leave tree release method. The thinning will occur at no set residual spacing in order to achieve a residual stocking density of 85 trees per acre; whereby, leave trees shall be stems with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. Any stem whose crown is either touching or above the crown of a leave tree shall be subject to removal. After thinning, this stand shall be inter-planted, along with the previous tract, with seedlings of various native conifers.

Stand 27:
Stand 27 is a smaller (9.3 acre) tract that consists of smaller diameter moderately dense red alder. This stand lies to the north of a prominent drainage that could complicate any forestry operations in the area. However, the stand shall be either pre-commercially or commercially thinned (depending on the overall merchantability of the stems) using the leave tree release system. The thinning will be at no set residual spacing in order to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with good health, good form, a vigorous crown and a high

propensity for increased crown volume and production. Any stem whose crown is either touching or above the crown of a leave tree shall be removed. If the stand is pre-commercially thinned, the cut stems may be left lie in the stand.

Stand 30, 31 and 32:
Stands 30, 31 and 32 are smaller (2.2, 7.4 and 4.2 acre) tracts that consist of small to moderate diameter moderately dense red alder. This tract shall be thinned to a residual spacing of 25' O.C. to achieve a residual stocking density of 75 trees per acre; whereby, leave trees shall be stems with good form, good health and a vigorous crown. After thinning, the stand shall be inter-planted with seedlings of various shade tolerant native conifers.

Stand 33 and 34:
Stands 33 and 34 are smaller (4.7 and 11.4 acre) tracts that consist of moderate to larger diameter moderately dense Douglas-fir. The stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all portions of the tract that are either open or have stocking densities below 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 35:
Stand 35 is a moderate (15.1 acre) sized stand that has the shoreline of the buffer zone as the entire western stand boundary. The stand consists of moderately dense moderate diameter red alder and Douglas-fir. The stand shall be single tree selection, leave tree release thinned at no set spacing in order to achieve a residual stocking density of 100 trees per acre. Leave trees shall be stems with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. Any stem whose crown is either touching or above the crown of a leave tree shall be subject to removal. No red alder with a diameter greater than 12" shall be marked, tallied or retained as leave trees.

Stand 36, 37, 38 and 39:
These stands are all smaller (< 7.0 acre) sized tracts that consist of moderately dense moderate diameter Douglas-fir. This tract shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. No red alder shall be marked, tallied or retained as leave trees. After thinning, any and all open areas or portions of the stand with residual densities below 134 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 40:
Stand 40 is a moderate (41.2 acre) sized tract that follows a distinct and large drainage from the top of the ridgeline (western installation boundary) to the shoreline (eastern installation boundary). This stand consists of moderately dense moderate diameter red alder and Douglas-fir. This stand shall be surveyed for wetlands prior to any and all forestry operations occurring in the stand. If any wetlands are found during surveying, they are to be marked, flagged and mapped using GPS. The topography of the stand will limit the amount of forestry activities that can occur within the stand but should not completely prevent operations from achieving the following prescriptive goals. The stand shall be

single tree selection, leave tree release thinned at no set residual spacing to achieve a residual stocking density of 85 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. An emphasis should be placed on the selection of Douglas-fir as leave trees; however, there are no restrictions on the selection of red alder as leave trees. Any and all portions of the stand that are either open or have a residual stocking density that is less than 85 trees per acre shall be inter-planted with seedlings of various native conifers with an emphasis on western redcedar.

Stand 41:
Stand 41 is a smaller (2.9 acre) stand that lies at the outflow (eastern extent) of the large drainage basin that runs through the center of the installation. The stand has very little standing timber and is dominated primarily by brush and other ground cover types. The stand shall be surveyed for wetlands prior to forestry operation occurring. If any wetlands are found they must be marked, flagged and mapped using GPS. Following the wetland survey, the stand shall be cleared of all non-native vegetation and scarred on a 10' O.C. spacing in order to expose bare mineral soil for planting with seedlings of various native conifers with an emphasis on western redcedar.

Stand 42 and 43:
Stands 42 and 43 combine to form a moderately (42.8 acre) large tract that consists of small to moderate diameter moderately dense red alder with some Douglas-fir. This tract runs primarily along the southern boundary of the main drainage for the installation having some topographical issues that could potentially hinder forestry operations. The tract shall be surveyed for the presence of wetlands and if found they must be marked, flagged and mapped using GPS. The stand shall be thinned using the leave tree release method at no set residual spacing to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all stems whose crowns are either touching or above the crown of a leave tree shall be subject to removal.

Stand 44, 45, 51 and 52:
This large conglomeration of stands forms a large (98.1 acre) tract that consists of moderate diameter moderate to low density Douglas-fir, part of which was thinned within the last ten years. The tract shall be thinned to a residual spacing of 20' O.C. to achieve a uniform residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas within the stand or areas with residual stocking densities below 100 trees per acre shall be inter-planted with seedlings of various shade tolerant native conifers.

Stand 46:
Stand 46 is a smaller (6.1 acre) stand that consists of larger diameter moderately dense Douglas-fir. The stand lies along the prominent main drainage that runs through the center of the installation which will make forestry operations more complicated for the stand. However, this stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with a low number of lower stem branches, a straight well formed bole, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 47, 48 and 50:
These stands are smaller (<13.1 acre) sized tracts that consist of moderate to larger diameter moderately dense Douglas-fir. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. After thinning, any and all open areas or areas with stocking densities below 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 49:
Stand 49 is a smaller (8.1 acre) stand that lies along the southern extent of the installation shoreline and consists of moderate diameter moderately dense red alder with some Douglas-fir. The stand shall be single tree selection, leave tree released thinned at no set residual spacing to achieve a residual stocking density of 85 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and productivity. Any stem whose crown is either touching or above the crown of a leave tree shall be subject to removal. This stand shall be inter-planted with various shade tolerant native conifers with an emphasis on western redcedar.

Stand 53:
Stand 53 is a smaller (4.4 acre) tract that consists of large diameter lower density Douglas-fir and red alder. This stand shall be single tree selection thinned at no set residual spacing in order to achieve a uniform residual stocking density of 85 trees per acre; whereby, leave trees shall be stems with larger diameter, good form, good health, a vigorous crown and a high propensity for increased crown volume and production. No red alder greater than 12" in diameter shall be marked, tallied or retained as leave trees. The stand shall be inter-planted with various native conifers with an emphasis on western redcedar and Douglas-fir.

Stand 54:
Stand 54 is a smaller (4.6 acre) stand that consists of moderate diameter moderately dense red alder with some contingents of Douglas-fir. The stand shall be leave tree release thinned at no set residual spacing to achieve a residual stocking density of 130 trees per acre; whereby, leave trees shall be stems with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all stems whose crowns are either touching or above the crown of a leave tree shall be subject to removal. No red alder greater than 10" in diameter shall be marked, tallied or retained as leave trees and shall be removed or cut and left lie in the stand. Any and all open areas or areas within the stand with stocking densities less than 130 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 55:
Stand 55 is a smaller (7.8 acre) stand that consists of moderate diameter moderately dense Douglas-fir. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. No red alder shall be marked, tallied or retain as leave trees and shall be removed from or cut and left lie in the stand. Any and all open areas or areas within the stand with stocking densities less than 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 56:
Stand 56 is a small (3.8 acre) stand that runs along the ridgeline (western installation boundary) above a smaller stream channel near the southern tip of the installation. This stand has previously been a part of a timber sale that removed almost all larger sized timber from the stand leaving the stand with small diameter high density Douglas-fir. The stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 57:
Stand 57 is a moderate (17.6 acre) sized stand that incorporates the entire drainage of a stream that runs near the southern corner of the installation from the ridge top (western installation boundary) to the shoreline (eastern installation boundary). The topography and potential wet nature of this stand may prevent any significant forestry operation from occurring in this stand at all. The stand shall be surveyed for the presence of wetlands prior to any and all forestry operations occurring in the stand. If any wetlands are found, they are to be marked, flagged and mapped using GPS. The stand shall be leave tree release thinned at no set residual spacing to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas or areas within the stand that have a residual stocking density below 100 trees per acre shall be inter-planted with seedlings of various native conifers with an emphasis on western redcedar.

Stand 58 and 59:
Stands 58 and 59 are smaller (11.8 and 1.7 acre) stands that have been thinned within the last decade or so; the thinning has lead to the development of stand characteristics which are indicative of small diameter high density Douglas-fir. These stands shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 60 and 61:
Stands 60 and 61 are smaller (6.4 and 2.4 acre) sized long and narrow stands that snake through other stands in the southern portion of the installation. These stands are consistent with what appears to be derelict roadways that were used in the past to access harvesting units within the installation. At the present, these stands are primarily open (devoid of standing timber) with some portions covered with very small diameter trees and shrubs. These stands shall have all stems and shrubs cut and left lie in the stand followed by scarring at a spacing of 10' O.C. to expose bare mineral soil in preparation of planting with seedlings of various native conifers. However, if there are portions of these stands that have become populated by native conifer regeneration, then those stems are not to be cut but shall be retained and if needed inter-planted with seedlings of various native conifers.

Stand 214:
Stand 214 is a small (2.6 acre) stand that lies along the shoreline (eastern installation boundary) in the north-central portion of the installation. The stand consists of moderate diameter moderately dense red alder and Douglas-fir. The stand shall be leave tree release thinned at no set residual spacing to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be stems with good from, good health, a vigorous crown and a high propensity for increased crown volume and production.

Any other stands not specifically addressed above will be considered eligible for pre-commercial thinning, timber stand improvement treatments, clearing and planting or any other silvicultural treatment that will enhance stocking and long term forest and tree productivity. In all forest areas, diseased trees may be cut down. Prescriptions will follow the silvicultural criteria and goals discussed for all other stands.

Zelatched Point:
Zelatched Point is a small naval installation that is located on the western side of the Toandos peninsula. There are no defined stands for this installation; thus, a single overlying prescription shall be made that will apply to the entire installation cover area. Zelatched point has multiple cover types, which are represented primarily by moderate diameter moderate density Douglas-fir and red alder with proportions of the installation being open and devoid of standing timber which surrounds a naval facility and a heli-pad. Any and all standing timber shall be managed first and foremost for hazard tree abatement, retention of slope stability and for the support of mission related projects. However, the standing timber shall only be thinned using a single tree selection, leave tree release thinning at no set residual spacing to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas in the standing timber or areas within the standing timber with densities below 100 trees per acre shall be inter-planted with seedlings of various native conifers. Within the areas of Zelatched Point that are open and devoid of timber, the areas shall have all ground cover vegetation cut and disposed of offsite followed by ripping with a 12” ripping shank to churn the soils in preparation of planting with seedlings of various native conifers. This prescription applies to all areas except those with a direct link to the naval facility or to the heli-pad which will be managed strictly for hazard tree abatement and for the support of mission related projects.

NAVAL BASE KITSAP, CAMP WESLEY HARRIS, COMPARTMENT 9

Stand 1:
Stand 1 is a moderate (25.3 acre) sized tract that consists of small to moderate diameter moderately dense Douglas-fir and western hemlock. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. After thinning, this stand shall be inter-planted with seedlings of various shade tolerant native conifers.

Stand 2:
Stand 2 is a larger (40.5 acre) sized tract that consists of small diameter highly dense Douglas-fir and western hemlock. This stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 3:
Stand 3 is a smaller (3.8 acre) stand that represents an extensive wetland/bog that has scattered patches of shore pine and various hardwoods. This stand shall be managed for wetland function and vitality along with wildlife habitat. Due to large extent of this wetland, no harvesting shall occur within the area. Planting shall occur on the drier islands found in the wetland with seedlings of various native conifers and hardwoods, with an emphasis on western redcedar.

Stand 4 and 5:
Stands 4 and 5 are smaller (3.3 and 3.3 acre) tracts that consist of moderate diameter moderate to low density Douglas-fir. The stands shall be single tree selection thinned at no set residual spacing in order to achieve a residual stocking density of 85 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. The stands shall be inter-planted with seedlings of various native conifers following thinning.

Stand 6:
Stand 6 is a smaller (1.8 acre) stand that represents a small scale wetland that is occupied primarily by shrub species. There is no recorded standing timber in this stand and the primary management objective shall be for the improvement of wetland function and vitality. The stand shall be planted with seedlings of western redcedar in order to increase the productivity of the stand and increase wetland function.

Stand 7:
Stand 7 is a large (63.3 acre) tract that was almost completely thinned to a rather wide residual spacing, leaving primarily moderate to large diameter Douglas-fir, within the last decade. There is one area within the stand near the southern boundary of the installation that consists of moderately dense moderate diameter Douglas-fir. That portion of the stand shall be thinned to residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production. The entire stand shall be inter-planted with seedlings of various native conifers with an emphasis on Douglas-fir, after thinning is completed.

Stand 9:
Stand 9 is a small (0.5 acre) area that represents a small wetland/bog in the southeastern corner of the installation. The stand has no recorded standing timber and consists of primarily shrub and ground cover vegetation. This stand shall be planted with seedlings of western redcedar to provide increased habitat and wetland function.

Stand 10:
Stand 10 is a smaller (7.8 acre) tract that consists of small to moderate diameter moderately dense Douglas-fir and western redcedar. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 11:
Stand 11 is a moderate (23.6 acre) tract that was thinned, within the last decade, to a wide residual spacing which left moderate diameter Douglas-fir as the residual stand. The entire stand shall be inter-planted with seedlings of various native conifers in an attempt to bring the stand back into a productive stocking level. If inter-planting is unsuccessful, the stand shall have a regeneration harvest conducted; whereby, all standing timber with a diameter greater than 8" shall be removed from the stand to open up space and light to replant the site with seedlings of various native conifers.

Stand 12:
Stand 12 is a moderate (24.3 acre) sized tract that consists of large diameter moderately dense Douglas-fir and western hemlock. This stand shall be single tree selection, leave tree release thinned at no set residual spacing to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with the largest diameters, good form, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas or areas within the stand that have residual stocking densities below 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 13:
Stand 13 is a smaller (3.1 acre) stand that represents an open area with scattered small diameter shore pine stems. This stand is to be surveyed for the presence of wetlands; if any wetlands are found they are to be marked, flagged and mapped using GPS. If no wetlands are found, than the stand shall have all non-native vegetation removed and disposed of offsite followed by ripping with a 12" ripping shank in preparation of planting with seedlings of various native conifers. If wetlands are found within the stand, the site shall be scarred at a spacing of 12' O.C. in preparation of planting with seedlings of western redcedar.

Stand 14:
Stand 14 is a moderate (15.7 acre) sized stand that consists of small diameter highly dense Douglas-fir and shore pine. The stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good health, good from, a vigorous crown and a high propensity for increased crown volume and production.

Stand 15 and 17:
Stands 15 and 17 are small (1.7 and 1.6 acre) tracts that represent small wetlands that have primarily small regeneration as the overlying standing timber. The stands shall be planted and inter-planted with seedlings of western redcedar in order to develop a more stable ecosystem to improve wetland function and vitality.

Stand 16:
Stand 16 is a smaller (2.7 acre) stand that is adjacent to wetlands along most of the stand boundaries; thus, it would be beneficial to retain a cover of standing timber to maintain consistent water levels and sediment control for the surrounding wetlands. This stand consists of moderate diameter moderate density Douglas-fir. The stand shall be single tree selection thinned at no set residual spacing in order to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. All yarding operation shall be conducted using a sound strategy in order to minimize soil disturbances during logging operations. The stand shall be inter-planted with seedlings of western redcedar in order to develop a stable surrounding environment for the adjacent stands' wetlands.

Stand 18:
Stand 18 is a larger (58.1 acre) tract that consists of moderate diameter moderate to high density Douglas-fir with some western hemlock and shore pine. The stand shall be thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with a low number of lower stem branches, a straight good formed bole, good health, a vigorous crown and a high propensity for increased crown volume and production. There is an easement that runs through the southern extent of the stand for a county road. The first one tree length into the stand from the county road shall be managed first and foremost for the abatement of hazard trees. Portions of this stand along the northern boundary adjacent to the old firing range are at the moment (summer 2010) inundated with standing water pools from a plugged culvert downstream on the installation. Once the culvert has been unplugged and the water has been

drained, this portion of the stand shall have all dead or dying trees removed and shall be replanted with seedlings of various native conifers to restore habitat lost from chronic flood conditions.

Stand 19:
Stand 19 is a moderate (14.9 acre) sized stand that represents the entire extent of the derelict rifle range. Due to a plugged culvert downstream on the installation, a large proportion of this stand is under a significant amount of water (summer 2010). Once the culvert has been unplugged and the water has been drained, the site is to have all non-native vegetation removed and disposed of off base. Following vegetation removal the site shall be graded to return the area to the approximate original contour prior to the construction of the rifle range. Following the grading, the site shall be ripped using a 12" ripping shank to churn the soils in preparation of planting with seedlings of various native conifers with an emphasis on shore pine and Douglas-fir. The seedlings should have drip irrigation installed and utilized for the first two years or until the seedlings have become well established. After 5 years or complete seedlings establishment, the area shall be fertilized with an approved nitrogen providing fertilizer to enhance the growth and competitiveness of the planted stems. Approved herbicides may be required to keep invasive species from occupying the site prior to the establishment of a shade regime to control the non-native vegetation.

Stand 20:
Stand 20 is a smaller (6.1 acre) tract that consists of smaller to moderate diameter moderately dense shore pine. The stand is currently (summer 2010) inundated with immense amounts of water from a plugged downstream culvert within the installation. The chronic flood conditions have caused significant mortality and loss of crown vigor which will lead to more mortality in the coming year or two. Since the stand lies directly along Seabeck Hwy., the abatement of hazard trees is a top priority and shall be incorporated in the regeneration harvest prescribed herein. After the culvert is unplugged and the water is drained, this stand shall have a regeneration shelterwood harvest conducted to remove all dead and dying stems in the first entry by thinning to a residual spacing of 30' O.C. to achieve a residual stocking density of 48 trees per acre; whereby, leave trees shall be native conifers with a vigorous crown, with good seeding qualities and without any loss of vigor. After thinning, the stand shall be inter-planted with seedlings of various native conifers. After a period of five years or until the planted seedlings have become well established, the stand shall be harvested again to remove the residual standing timber in the regeneration cut to release the stand to complete regeneration.

Stand 21, 22, 23, 24, 25, 26 and 27:
These stands are smaller (<9.6 acre) in size with similar stand characteristics, in that, they consist of moderate diameter moderately dense Douglas-fir and shore pine. Some of these stands have boundaries that run along either roadways (Seabeck Hwy.) or naval facilities; thus, the first one tree length into any stand from a roadway or naval facility shall be managed for the abatement of hazard trees. The stands shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production. Any and all open areas or area within the stands that have residual stocking densities below 100 trees per acre shall be inter-planted with seedlings of various native conifers.

Stand 28:
Stand 28 is a small (3.5 acre) tract that consists of small diameter highly dense Douglas-fir and shore pine. The western boundary of this stand lies within one tree length of a roadway and thus, shall be managed for the first one tree length from the roadway into the stand for the abatement of hazard trees. The stand shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 29:
Stand 29 is a small (0.8 acre) stand that is primarily populated by shrubs with some scattered standing timber. The stand lies along a county road and thus the whole stand shall be managed for hazard tree abatement. Any and all open areas or areas with standing timber densities below 100 trees per acre shall have all non-native vegetation removed and disposed of off base followed by ripping with a 12" ripping shank to churn the soil in preparation of planting with seedlings of various native conifers.

Stand 30:
Stand 30 is a smaller (5.2 acre) tract that consists of small diameter highly dense Douglas-fir. There is a county road easement that runs through stand 30; thus, the first one tree length into the stand form the easement shall be managed first and foremost for the abatement of hazard trees. The rest of the stand shall be pre-commercially thinned to a residual spacing of 18' O.C. to achieve a residual stocking density of 134 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 31:
Stand 31 is a smaller (2.9 acre) tract that consists of moderate diameter moderately dense Douglas-fir and western hemlock. This stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 32 and 34:
Stands 32 and 34 are moderate (10.3 and 16.3 acre) sized tracts that have similar characteristics, in that they consist of small diameter highly dense Douglas-fir and shore pine. These stands shall be pre-commercially thinned to a residual spacing of 16' O.C. to achieve a residual stocking density of 170 trees per acre; whereby, leave trees shall be native conifers with good form, good health, a vigorous crown and a high propensity for increased crown volume and production.

Stand 33:
Stand 33 is a moderate (15.8 acre) sized stand that represents a contiguous open area that includes the sole remaining naval facility on the installation along with derelict shooting ranges and parking lots. The portion of this stand that is west of the Seabeck Hwy. is inundated with significant volumes of water from a plugged culvert that crosses Seabeck Hwy. within this stand. Once the culvert is unplugged and the water is drained, this portion of the stand along with the rest of the stand shall have all non-native vegetation removed from the site followed by ripping with a 12" ripping shank to churn the soil in preparation of planting with seedlings of various native conifers. Those operations previously outlined shall occur on any and all open areas that are not roadways, parking lots, drainage ditches, naval facilities or landscaping for a naval facility.

Stand 35:
Stand 35 is a small (2.6 acre) tract that consists of moderate diameter moderate to low density Douglas-fir and shore pine. The stand shall be thinned to a residual spacing of 20' O.C. to achieve a residual stocking density of 100 trees per acre; whereby, leave trees shall be native conifers with good from, good health, a vigorous crown and a high propensity for increased crown volume and production.

Any other stands not specifically addressed above will be considered eligible for pre-commercial thinning, timber stand improvement treatments, clearing and planting or any other silvicultural treatment that will enhance stocking and long term forest and tree productivity. In all forest areas, diseased trees may be cut down. Prescriptions will follow the silvicultural criteria and goals discussed for all other stands.

NAVAL BASE KITSAP: NAVY HOSPITAL, JACKSON PARK, BREMERTON NAVAL SHIPYARD AND NAVY RAILROAD RIGHT-OF-WAY

Navy Hospital:

Naval Hospital Bremerton is a stand alone installation that, just recently, has come under the jurisdiction of Naval Base Kitsap. The installation is small, in terms of overall acreage, with low volumes of standing timber; thus, there are no delineated stands within the installation. Any and all prescriptions found in this section shall be applied to the Navy Hospital as a whole. The installation primarily contains scattered small clumps of standing timber that are located between buildings and/or parking lots; however, there is one smaller sized contiguous block of timber within the installation. The close proximity of all standing timber within this installation to roadways, parking lots, naval facilities, walkways, etc. leads to the primary management objective of retention of aesthetic qualities, hazard tree abatement and support of mission related projects. The sole contiguous block of timber within this installation has a walking trail with associated picnic areas and resting benches throughout the stand. The contiguous block also has many areas with openings and areas with low stocking densities; thus, this area shall be inter-planted with seedlings of various native conifers. Any and all open areas outside of the contiguous block of timber may be either planted in the natural ground cover or planted by scarring the ground prior to planting; when planting, seedlings of various native conifers shall be used at all times.

Jackson Park:

Jackson Park as an installation is the primary housing/residence location for enlisted uniformed naval personnel and their families; thus, the entire installation is a residential community with many residents and patrons. All of the standing timber within Jackson Park is within one tree length of roadways, housing structures, walkways, playgrounds and/or parking lots; thus the primary management objective for the area is retention of aesthetic qualities, the abatement of hazard trees in order to ensure the safety and structural stability of installation residents, patrons and property. The installation shall also be managed for the support of mission related naval family support projects. Any and all open areas that are not directly associated to the landscaping of a residence or naval facility shall have all non-native vegetation removed and disposed of off base. Following vegetation removal, the areas are to be ripped with a 12” ripping shank in preparation of planting with seedlings of various native conifers. Following planting, drip irrigation shall be installed for the first two years and utilized during the dry season to ensure seedling survival. Mechanical and chemical control of invasive species may be required for a period of five years or until a full shade regime has been established to block invasive species growth.

Bremerton Naval Shipyard:
NBK, Bremerton is a moderate sized installation that houses the Puget Sound Naval Shipyard along with many support oriented facilities. Much of the installation does not contain standing timber; the standing timber that is present on the installation is primarily located within the residential hilltop area and is not in contiguous blocks. It serves primarily to provide aesthetic values to the residents and patrons of the installation. Thus, all timber on this installation shall be managed for aesthetics, historic values, abatement of hazards and for the support of mission related projects. Trees that contribute to the character of the historic district and the very large sequoia tree will be protected and retained as long as possible.

This installation has considerable invasive species and noxious weeds. Thus site conversions should occur; whereby, all non-native or noxious vegetation shall be removed and disposed of offsite followed by either ripping with a 12" ripping shank on large areas or scalping or using an auger for each seedling on small areas, in preparation of planting with seedlings of various native conifers with an emphasis on shore pine. In order to ensure seedling survival and full tree establishment, drip irrigation should be installed and utilized for the first two to five years after planting. The use of mechanical and chemical abatement techniques shall be considered on conversion sites to keep the invasive or noxious vegetation at bay for a period of five years or until a full shade regime has been established which will inhibit the growth of the non-desired vegetation.

Navy Railroad Right-Of-Way:
The Navy railroad right-of-way spans 44 miles from NBK Bangor in Silverdale, WA to Shelton, WA with a Spur track that connects the main line to NBK Bremerton. Much of the right-of-way consists of small strips of timber that range in width and in cover type on either side of the tracks. These stands shall be managed primarily with a reactionary philosophy in that trees will be removed or thinned in response to the presence of hazard trees, insect outbreaks, pathogen outbreaks, wind throw, adjacent landowner clearing or thinning along with any other emergent circumstances, conditions or requirements that may arise in the near future. The right-of-way shall also be managed for the support of mission related activities and projects and railroad safety objectives. Under no circumstance shall any Navy timber be felled in the vicinity of a salmon bearing stream without appropriate documentation and approvals for the operation. When applicable, the open areas resulting from tree removal or thinning shall be site prepped and planted with seedlings of various native conifers that are applicable to the site. In the event of timber trespass within the right-of-way, the navy shall have the right to salvage any and all merchantable timber that was removed or dropped from the right-of-way. Also, the trespass area shall be returned to its pre-disturbance condition; whereby the site shall be replanted with various native conifers that represent the previous cover type.

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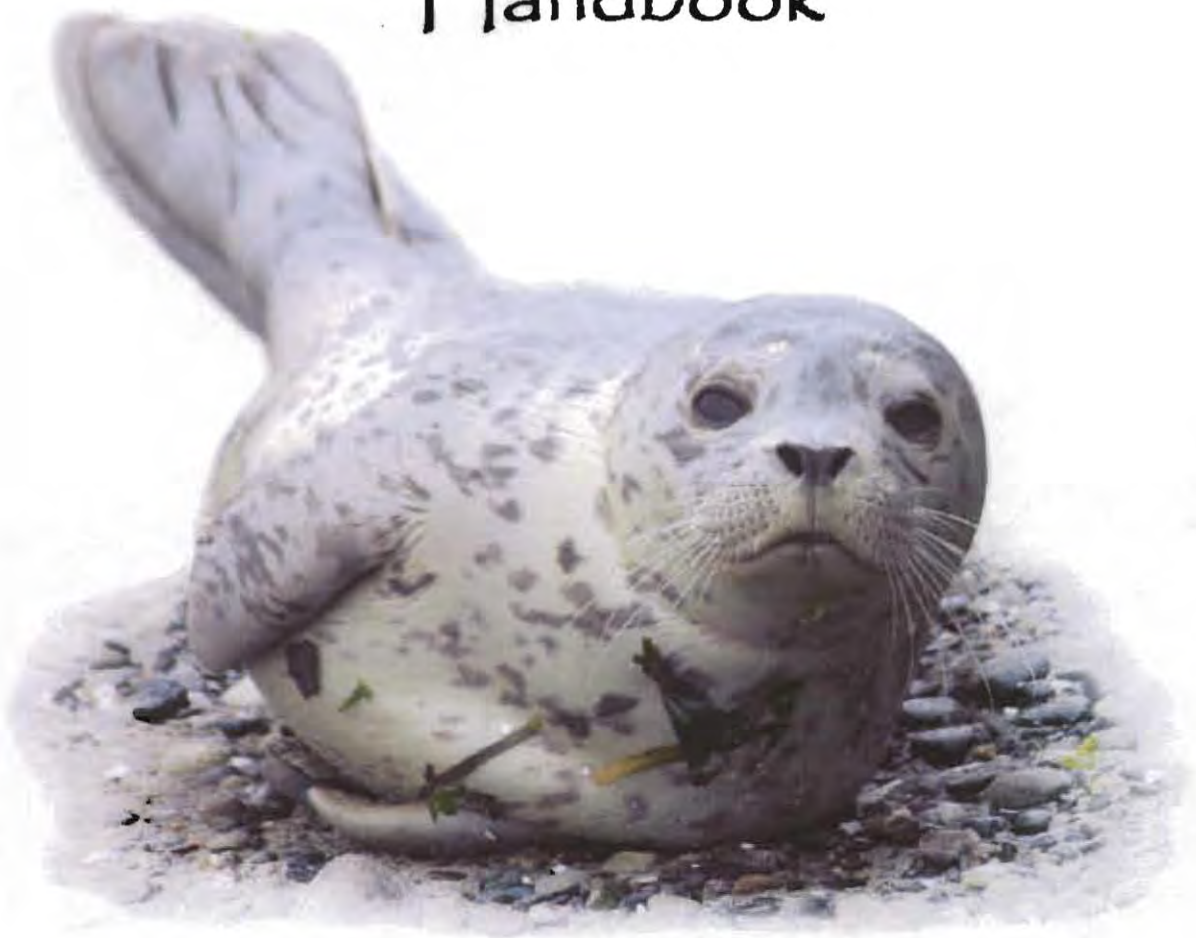
APPENDIX H: NORTHWEST MARINE MAMMAL STRANDING NETWORK HANDBOOK

Northwest Marine Mammal Stranding Network Handbook



2011

National Marine Fisheries Service
(NOAA Fisheries Service)
Protected Resources Division
7600 Sand Point Way NE
Seattle, WA 98115

Northwest Marine Mammal Stranding Network (NWMMSN) Handbook 2010-2011

1. Introduction
    a. Marine Mammals in Washington and Oregon
    b. What is the stranding network?
    c. Who is involved?
    d. Who has jurisdiction over certain marine mammal species?
    e. Why is the stranding network important?
    f. Marine Mammal Health and Stranding Response Program
2. Contacts
    a. Call List 2010-2011
    b. GIS Maps
3. Protocol
    a. Northwest Marine Mammal Stranding Network Protocol
    b. Guidelines for Handling Live Stranded Marine Mammals
    c. NMFS Decision Process for Responding to Live Marine Mammals that are Stranded or Otherwise in Distress
    d. NW MMSN Protocol Species Specific Response
    e. Sea Turtle Protocol
        i. Riverhead Foundation for Marine Research and Preservation: Cold-Stunning Care Procedures
        ii. Sea Turtle Rehabilitation Guidelines - Seattle Aquarium
    f. Bullet Recovery Protocol
    g. Chain of Custody Form
    h. Health Guidelines
        i. Working with Marine Mammals and Your Health
        ii. Health Advisory: Marine Mammal Diseases
        iii. Healthy Advisory: *Coxiella* 2009
        iv. Zoonotic Diseases
        v. Health risks for marine mammal workers
    i. Deterring Problem Seals and Seal Lions
    j. Seal and Sea Lion Facts of the Columbia River & Adjacent Nearshore Marine Areas
4. Level A
    a. Level A Form Guidance
    b. Level A Report Version 2007 (expires 10/31/2010)
    c. Guide to the MMSN Report, Level A Responder
    d. Definitions or Terms for the Level A Version 2007
5. Specimen Requests
    a. Species Requests
        i. Specimen Request Form
        ii. Specimen Request & Cooperating Researchers Contact Information
        iii. 2010-2011 Specimen Requests

b. Cooperating Researchers
    i. Cooperating Researchers Form
    ii. 2009 Cooperating Researchers
c. Marine Mammal Parts
    i. Marine Mammal parts possession and transfer guidance
    ii. Registration of Collected Marine Mammal Part

6. Education
    a. Sharing the Shore with Harbor Seal Pups in Washington State
    b. Protecting Marine Mammals
    c. Be Whale Wise!
    d. Seal and Sea Lion Posters (in the front pocket of your handbook)
    e. Educational Links!
    f. Share the Shore! Kids activity sheet
7. Species ID
    a. Marine Mammals in Washington and Oregon
    b. Age Class Length and Weight for Pinnipeds and Cetaceans
        i. Pinnipeds
            1. Morphology of Pinnipeds & Internal anatomy
            2. Phocidae vs. Otaridae
            3. Distinguishing between Steller & California sea lions
            4. Skull Identification
            5. Guide to Pinnipeds
            6. Species Information
                a. Harbor Seal
                    i. Harbor Seal Pupping Timeframes in WA
                b. Northern Fur Seal
                c. Guadalupe Fur Seal
                d. Northern Elephant Seal
                e. California Sea Lion
                f. Steller Sea Lion
            7. Pinniped Species ID Photo Page
        ii. Cetaceans
            1. Morphology of Cetaceans & Internal anatomy
            2. Mysticeti vs. Odontoceti & Dolphin vs. Porpoise
            3. Species Information
                a. Harbor Porpoise
                b. Dall's Porpoise
                c. Gray Whale
                    i. Gray Whale Examination Form
                d. Killer Whale Fact Sheet
                e. Cetacean Species ID Photo Page
        iii. Other Species
            1. Sea Otters and River Otters
                a. Sea Otter vs. River Otter
                b. Washington/Oregon Sea Otter Stranding Data Form
            2. Sea Turtle Guide

Introduction

Marine Mammals in Washington and Oregon

1. Cetaceans - Order Cetacea
    a. Mysticetes (Baleen Whales) - Suborder Mysticeti
        i. **Family Balaenidae**
            1. Northern Pacific Right Whale* - *Eubalaena glacialis*
        ii. **Family Balaenopteridae**
            1. Blue Whale * - *Balaenoptera musculus*
            2. Fin Whale * - *Balaenoptera physalus*
            3. Sei Whale * - *Balaenoptera borealis*
            4. Minke Whale - *Balaenoptera acutorostrata*
            5. Humpback Whale *- *Megaptera novaeangliae*
        iii. **Family Eschrichtiidae**
            1. Gray Whale - *Eschrichtius robustus*
    b. Odontocetes (Toothed Whales) - Suborder Odontoceti
        i. **Family Physeteridae**
            1. Sperm Whale * - *Physeter macrocephalus*
        ii. **Family Kogiidae**
            1. Dwarf Sperm Whale - *Kogia simus*
            2. Pgymy Sperm Whale - *Kogia breviceps*
        iii. **Family Ziphiidae (Beaked Whales)**
            1. Baird's Beaked Whale - *Berardius bairdii*
            2. Cuvier's Beaked Whale - *Ziphius cavirostris*
            3. Hubb's Beaked Whale - *Mesoplodon carlhubbsi*
            4. Stejneger's Beaked Whale - *Mesoplodon stejnegeri*
        iv. **Family Phocoenidae (Porpoises)**
            1. Harbor Porpoise - *Phocoena phocoena*
            2. Dall's Porpoise - *Phocoenoides dalli*
        v. **Family Delphinidae (Dolphins)**
            1. Striped Dolphin - *Stenella coeruleoalba*
            2. Common Dolphin - *Delphinus spp.*
            3. Pacific White-sided Dolphin - *Lagenorhynchus obliquidens*
            4. Risso's Dolphin - *Grampus griseus*
            5. False Killer Whale - *Pseudorca crassidens*
            6. Short-finned Pilot Whale - *Globicephala macrorhynchus*
            7. Northern Right Whale Dolphin - *Lissodelphis borealis*
            8. Killer Whale - *Orcinus orca*
                a. *Southern Resident Killer Whale* *

* Listed as Endangered under the Endangered Species Act
** Listed as Threatened under the Endangered Species Act

2. Pinnipeds - Order Pinnipedia
    a. Sea lions and Fur seals
        i. **Family Otariidae**
            1. California Sea Lion - *Zalophus californianus*
            2. Steller Sea Lion ** - *Eumetopias jubatus*
            3. Northern Fur Seal - *Callorhinus ursinus*
            4. Guadalupe Fur Seal** - *Arctocephalus townsendi*
    b. True seals
        i. **Family Phocidae**
            1. Harbor Seal - *Phoca vitulina*
            2. Northern Elephant Seal - *Mirounga angustirostris*
3. Other Marine Mammals
    a. Sea otters
        i. **Family Mustelidae**
            1. Sea Otter - *Enhydra lutris*

* Listed as Endangered under the Endangered Species Act
** Listed as Threatened under the Endangered Species Act

The Northwest Region Marine Mammal Stranding Network
Background Information

What is the Northwest Marine Mammal Stranding Network?

The National Oceanic and Atmospheric Administration (NOAA) Northwest Marine Mammal Stranding Network was established in the early 1980's under the Marine Mammal Protection Act (MMPA). Members of the network respond to marine mammal stranding events along the Washington and Oregon coasts and is part of a nationwide network.

Who is involved?

The network is composed of cooperating scientific investigators and institutions, volunteer networks and individuals. Other organizations also involved are wildlife and fisheries agencies and state and federal law enforcement. Participants are trained in systematic data collection and are experienced in handling a variety of marine mammal stranding related tasks. Data are collected for inclusion in a national database to establish baseline information on marine mammal communities and monitor their health. For more information on the National Marine Mammal Health & Stranding Response Program (MMHSRP) please visit the national website, http://www.nmfs.noaa.gov/pr/health/

Who has jurisdiction over marine mammals? Are marine mammals protected by law?

All marine mammals are protected by the Marine Mammal Protection Act (MMPA) of 1972. The MMPA prohibits, with certain exceptions, "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. The definition of "take" in the MMPA is "To harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal." Under the MMPA NOAA Fisheries is responsible the protection of whales, dolphins, porpoises, seals and sea lions. The U.S. Fish and Wildlife Service maintains jurisdiction over manatees, sea otters, polar bears and walrus. For more information about the MMPA please visit, http://www.nmfs.noaa.gov/pr/laws/mmpa/ Some marine mammals are also protected under the Endangered Species Act (ESA).

Are any marine mammals in Washington and Oregon listed under Endangered Species Act (ESA)?

Yes. Species listed as threatened or endangered under the ESA include Sei Whale, Fin Whale, Blue Whale, Humpback Whale, Northern Right Whale, Sperm Whale, Killer Whale, and the Steller Sea Lion. For more information please visit, http://www.nmfs.noaa.gov/pr/laws/esa/

Why is the stranding network important?

Every year there are hundreds of reports of stranded marine mammals throughout Washington and Oregon. Each case can hold important information about the species which can contribute to scientific research or public education. Public education can reduce negative interactions between marine mammals and the public and raise awareness of marine life in our communities.

MARINE MAMMAL HEALTH AND STRANDING RESPONSE PROGRAM

National Marine Mammal Stranding Network

The National Marine Mammal Stranding Network consists of volunteer stranding networks in all coastal states. These networks are authorized through Stranding Agreements with the National Marine Fisheries Service (NMFS) regional offices. Network member organizations respond to live and dead stranded marine mammals on the beach, take biological samples, transport animals, rehabilitate sick or injured marine mammals and potentially release them back to the wild. NMFS oversees, coordinates, and authorizes stranding network activities through one national and six regional stranding coordinators. NMFS also provides training to network members.

Marine Mammal Disentanglement Network

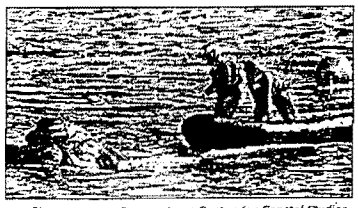


Photo courtesy Provincetown Center for Coastal Studies

The Disentanglement Network is a partnership between NMFS, the Provincetown Center for Coastal Studies, the U.S. Coast Guard, State agencies, National Marine Sanctuaries, and other entities. The Network is responsible for monitoring and documenting whales that have become entangled in gear as well as conducting rescue operations. The network established protocols for all aspects of response, including animal care and assessment, vessel and aircraft support, and media and public information. Multiple levels of training are required for animal welfare and human safety.

John H. Prescott Marine Mammal Rescue Assistance Grant Program

The Prescott Grant Program provides grants to eligible stranding network participants and researchers for:

- Recovery and treatment of stranded marine mammals;
- Data collection from living or dead stranded marine mammals; and
- Facility upgrades, operation costs, and staffing needs directly related to the recovery and treatment of stranded marine mammals and collection of data from living or dead stranded marine mammals.

Since the inception of the program in 2001, over $16,000,000 has been disbursed in 187 grant awards. There is an annual competitive program as well as funding made available throughout the year for emergency response.

Marine Mammal Unusual Mortality Event and Emergency Response Program

The Working Group on Marine Mammal Unusual Mortality Events made up of federal and non-federal experts from a variety of biological and biomedical disciplines, including federal agency representatives, and two international participants from Canada and Mexico. The Working Group advises NMFS with regards to marine mammal Unusual Mortality Events (UMEs). The Program coordinates emergency response, investigations into causes of mortality and morbidity, evaluates the environmental factors associated with UMEs, provides training and resources as possible, and oversees the Marine Mammal Unusual Mortality Event Fund.

MMHSRP Information Management Program

The MMHSRP Information Management Program is responsible for the development and maintenance of a variety of databases, websites and other tools for disseminating information within the program, Network, and to the public. A major recent accomplishment was the rollout of a web-accessible national Level A database for reporting and sharing near-real time stranding data to all regions. The Marine Mammal Tissue Bank inventory will become web-accessible to the public in 2006. Data access policies are being developed to codify protocols for data accuracy, quality assurance, and public access to stranding network data.

Marine Mammal Health Biomonitoring, Research, Development and Banking Programs

Photo courtesy NIST

The MMHSRP coordinates national biomonitoring, research and banking efforts to analyze the health and contaminant trends of wild marine mammal populations. The program collects information to determine anthropogenic impacts on marine mammals, marine food chains, and marine ecosystems. In addition, the program uses information to analyze the contribution of environmental parameters to wild marine mammal health trends. Finally, the program operates the National Marine Mammal Tissue Bank, a joint effort with the National Institute of Standards and Technology, as a long-term repository of samples for future retrospective evaluations.

http://www.nmfs.noaa.gov/pr/health/

Contacts

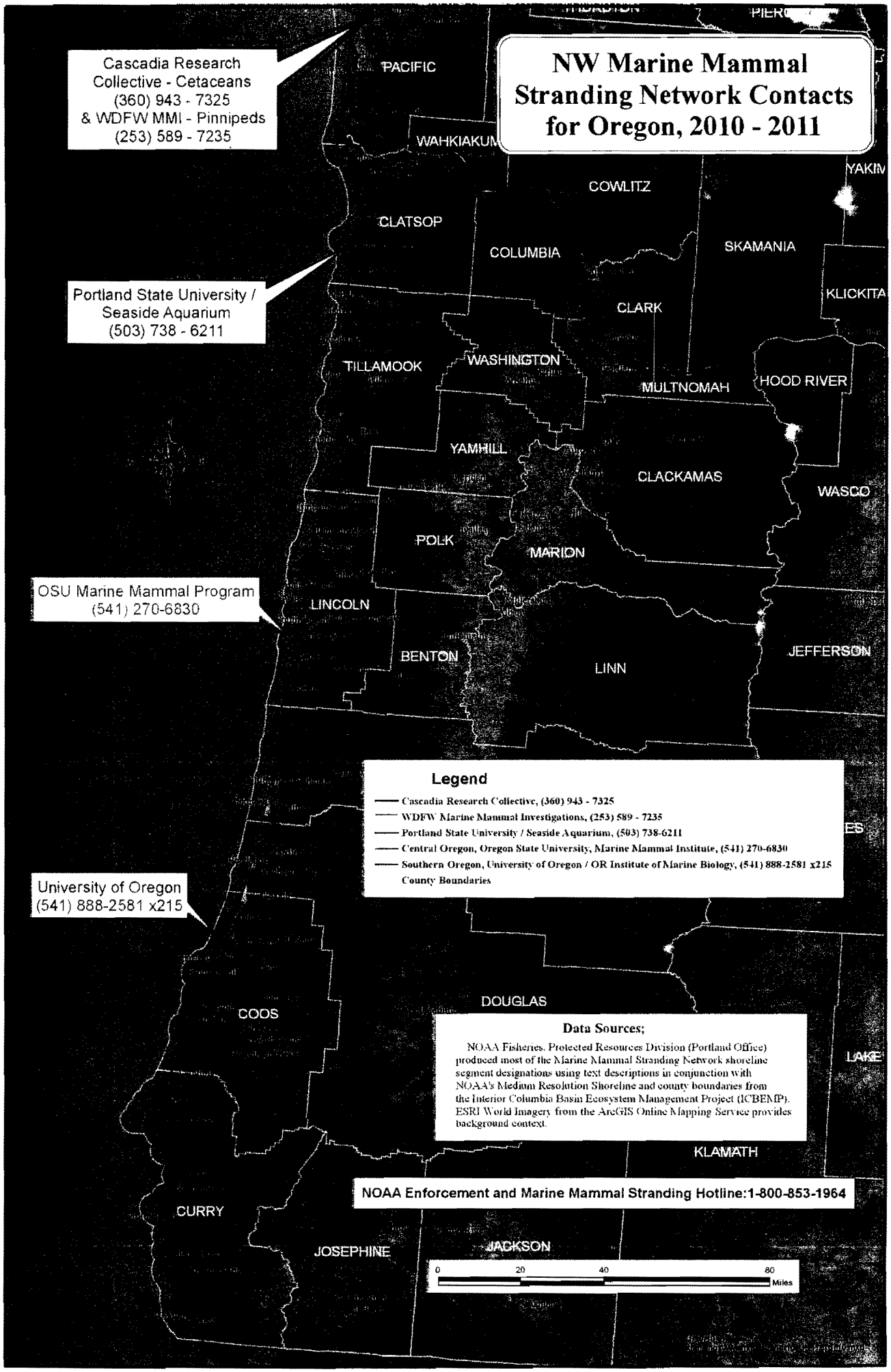
WA/OR Marine Mammal Stranding Call List 2010-2011

To report a stranded marine mammal please call your local stranding network. Please view WA and OR GIS maps for detailed response areas, numbers below correspond with GIS maps.

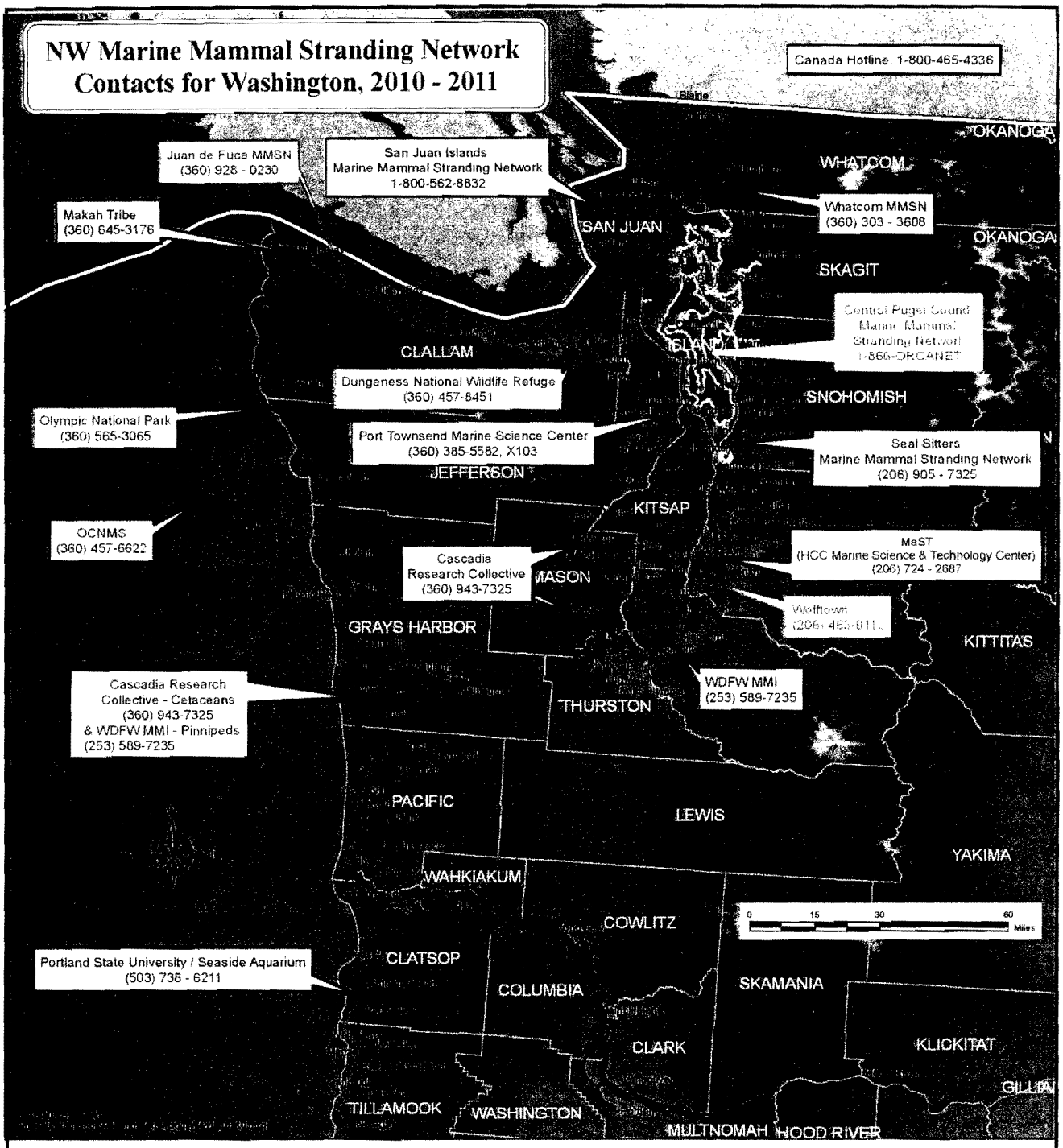
Organization and Response	Contact	Phone #
NOAA Fisheries Marine Mammal Hotline	Hotline (Checked 7 days/wk.)	206-526-6733
WA Department of Fish and Wildlife/ Marine Mammal Investigations #8	(If no answer Press #2,will page staff 7 days/wk)	253-589-7235
Kitsap, Pierce, S. King, E. Mason Co., *Outer Coast- Grays Harbor / N. Pacific Co.- Co faciliting response- Pinnipeds	State-wide live cetacean stranding, tagged seals and sea lions, out of habitat and unusual mortality events.	
Cascadia Research Collective #9 Thurston and W. Mason Co. *Outer Coast- Grays Harbor/N. Pacific- Co- facilting response- Ceteacans	Office # (Checked 7 days/wk.)	360-943-7325
	Response to large whales statewide.	
U.S. Fish and Wildlife	Toll Free Pager	1-877-326-8837 (1-87SeaOtter)
Olympia	Call this pager for sea otter cases only please.	
West Seattle Seal Sitters	Dispatch	206-905-7325
Sno-King MMSN	Rachel Mayer	206-526-4863
Central Puget Sound MMSN #3	Susan Berta	1-866-ORCANET (672-2638)
Whidbey Island, Camano Island, Skagit Co.. N.Snohomish Co.	Report all stranded marine mammals and whale sightings.	
Olympic Coast Marine Mammal Stranding Association #5 Port Angeles to Makah Reservation	Rich Osbourne	360-928-0230

WA/OR Marine Mammal Stranding Call List 2010-2011		
Organization and Location	Contact	Phone #
Whatcom Co. MMSN #1	Mariann Brown Carrasco	360-303-3608
N.Skagit, Whatcom Co.		
San Juan Co. MMSN #2	The Whale Museum	1-800-562-8832
San Juan Islands		
PTMSC/ East Jefferson Co. MMSN #6	Port Townsend MSC Hotline	360-385-5582 x103
Hood Canal, Quimper Peninsula	Chrissy McLean	360-385-5582 x109
Dungeness National Wildlife Refuge #4	Barbara VanderWert, Mary	360-457-8451
Dungeness Spit	Marsh, and Pamela Dick	
Olympic Coast NMS #12	Mary Sue Brancato	360-457-6622 x20
Port Angeles, Outer Coast	Ed Bowlby	360-457-6622 x17
Makah Tribe #10	Receptionist	360-645-3160
Clallam Bay to Cape Flattery, Outer Coast	Jon Scordino	360-645-3176
Olympic Coast National Park #11	Park Dispatch	360-565-3115
Wolftown -Vashon/ Maury Isl. #7	T Martino	206-463-9113
Portland State University- S. Pacific Co. #13	Keith Chandler	503-440-4040

Other important numbers...		
NOAA Enforcement	Weekdays	206-526-6133
Statewide	Weekends	1-800-853-1964
Dept. of Emergency Management	Hotline	1-800-258-5990
Derelict Fishing Gear	Hotline	1-800-477-6224
PAWS Wildlife - Lynnwood	Rehab Clinic	425-412-4040
Wolf Hollow - Friday Harbor	Rehab Clinic	360-378-5000
OREGON STATEWIDE	HOTLINE NUMBER	541-270-6830


NW Marine Mammal Stranding Network Contacts for Oregon, 2010 - 2011
Cascadia Research Collective - Cetaceans (360) 943 - 7325 & WDFW MMI - Pinnipeds (253) 589 - 7235
Portland State University / Seaside Aquarium (503) 738 - 6211
OSU Marine Mammal Program (541) 270-6830
University of Oregon (541) 888-2581 x215
PACIFIC
WAHKIAKUM
COWLITZ
CLATSOP
COLUMBIA
SKAMANIA
KLICKITA
CLARK
TILLAMOOK
WASHINGTON
MULTNOMAH
HOOD RIVER
YAMHILL
CLACKAMAS
WASCO
POLK
MARION
LINCOLN
BENTON
LINN
JEFFERSON
DOUGLAS
COOS
LAKE
KLAMATH
CURRY
JOSEPHINE
JACKSON
Legend
Cascadia Research Collective, (360) 943 - 7325
WDFW Marine Mammal Investigations, (253) 589 - 7235
Portland State University / Seaside Aquarium, (503) 738-6211
Central Oregon, Oregon State University, Marine Mammal Institute, (541) 270-6830
Southern Oregon, University of Oregon / OR Institute of Marine Biology, (541) 888-2581 x215
County Boundaries
Data Sources;
NOAA Fisheries, Protected Resources Division (Portland Office) produced most of the Marine Mammal Stranding Network shoreline segment designations using text descriptions in conjunction with NOAA's Medium Resolution Shoreline and county boundaries from the Interior Columbia Basin Ecosystem Management Project (ICBEMP). ESRI World Imagery from the ArcGIS Online Mapping Service provides background context.
NOAA Enforcement and Marine Mammal Stranding Hotline:1-800-853-1964
0
20
40
80
Miles

NW Marine Mammal Stranding Network Contacts for Washington, 2010 - 2011



NOAA Enforcement and Marine Mammal Stranding Hotline: 1-800-853-1964

Data Sources;

NOAA Fisheries, Protected Resources Division (Portland Office) produced most of the Marine Mammal Stranding Network shoreline segment designations using text descriptions in conjunction with NOAA's Medium Resolution Shorelines and county boundaries from the Interior Columbia Basin Ecosystem Management Project (ICBEMP).

Olympic Coast National Marine Sanctuary (2002):
Mineral Management Center, Mapping and Boundary Branch

Dungeness National Wildlife Refuge:
U.S. Fish and Wildlife Service, Division of Realty & Refuge Information

Olympic National Park (1995):
WA ownership data from ICBEMP WA Department of Natural Resources

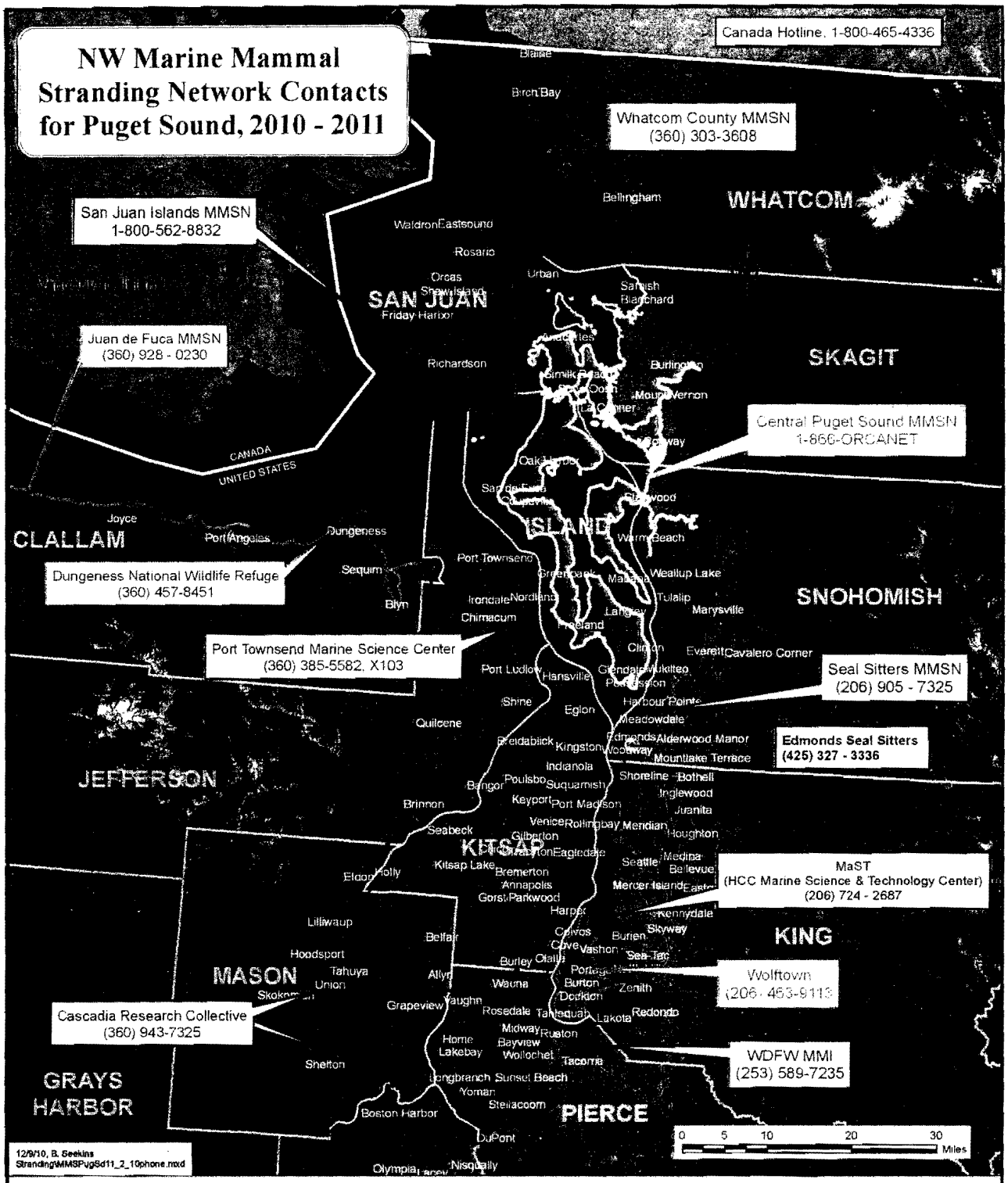
U.S. Exclusive Economic Zone (1995): NOAA, Special Projects Office

Canadian Shoreline:
Global Self-Consistent, Hierarchical, High-resolution Shoreline Database (1999).
P. Wessel & W.H.F.Smith

ESRI World Imagery from ArcGIS Online Mapping Service

Legend

- Edmonds Seal Sitters, (425) 327 - 3336
- Port Angeles, Olympic Coast National Marine Sanctuary, NOAA, (360) 457-6622
- Whatcom Marine Mammal Stranding Network, (360) 303 - 3608
- Seal Sitters Marine Mammal Stranding Network (206) 905 - 7325
- Juan de Fuca Marine Mammal Stranding Network, (360) 928 - 0230
- Sno-King MMSN, (206) 526-4863
- West Seattle Seal Sitters, (206) 905-7325
- MaST, HCC Marine Science & Technology Center, (206) 724 - 2687
- East Jefferson County, Port Townsend Marine Science Center, (360) 385-5582, X103
- Vashon & Maury Islands, Wolftown, (206) 463-9113
- Cascadia Research Collective, (360) 943-7325
- WDFW Marine Mammal Investigations, (253) 589-7235
- Northern OR & Long Beach, WA, Portland State University / Seaside Aquarium (503) 738 - 6211
- Dungeness National Wildlife Refuge & Protection Island, (360) 457 - 8451
- Makah Tribe, (360) 645-3176
- Central Puget Sound, Marine Mammal Stranding Network, 1-866-ORCANET
- Exclusive Economic Zone Boundary
- Olympic Coast National Marine Sanctuary Boundary, NOAA, (360) 457-6622
- San Juan Islands, The Whale Museum, 1-800-562-8832
- Olympic National Park, (360) 565-3065



NOAA Enforcement and Marine Mammal Stranding Hotline: 1-800-853-1964

Data Sources;

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Dungeness National Wildlife Refuge:
U.S. Fish and Wildlife Service, Division of Realty & Refuge Information

U.S. Exclusive Economic Zone (1995): NOAA, Special Projects Office

Canadian Shoreline:
Global Self-Consistent, Hierarchical, High-resolution Shoreline Database (1999). P. Wessel & W.H.F.Smith

Legend

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- Port Angeles, Olympic Coast National Marine Sanctuary Office (360) 457-6622
- Exclusive Economic Zone Boundary
- Whatcom Marine Mammal Stranding Network, (360) 303 - 3608
- Juan de Fuca Marine Mammal Stranding Network, (360) 928 - 0230
- Seal Sitters Marine Mammal Stranding Network, (206) 905 - 7325
- MaST, HCC Marine Science & Technology Center, (206) 724 - 2687
- East Jefferson County, Port Townsend Marine Science Center, (360) 385-5582, X103
- Vashon & Maury Islands, Wolftown, (206) 463-9113
- WDFW Marine Mammal Investigations, (253) 589-7235
- Cascadia Research Collective, (360) 943-7325
- Dungeness National Wildlife Refuge Protection Island, (360) 457-8451
- Central Puget Sound, Marine Mammal Stranding Network, 1-866-ORCANET
- San Juan Islands, The Whale Museum, 1-800-562-8832
- Canada
- County Boundaries

Contact information for Specimen Requests and Cooperating Researchers 2010-2011

Organization	Researcher	Contact Phone Number	Email
American Cetacean Society	Uko Gorter	206-781-4860	info@acspugetsound.org
Applied Osteology	Dr. Mike Etnier	360-738-8292	metnier@u.washington.edu
Bullards Beach State Park	Pamela Stevens	541-347-2209	Pamela.Stevens@state.or.us
Burke Museum	Jeff Bradley	206-685-7417	jebrad@u.washington.edu
Canadian Dept. of Agriculture	Dr. Stephen Raverty	604 556-3026	Stephen.Raverty@gov.bc.ca
Cascadia Research Collective	Gregg Schorr	206-931-4638 360-943-7325	GSchorr@cascadiaresearch.org
	John Calambokidis	360-943-7325 360-280-8349	calambokidis@cascadiaresearch.org
	Jessie Huggins	206-949-7924	jhuggins@cascadiaresearch.org
CPSMMSN	Matt Klope	360-257-1468	Matt.klope@navy.mil
	Sandy Dubpernell	360-678-3765	Sandradubpernell@yahoo.com
East Jefferson Co. MMSN	Chrissy McLean	360-301-3141 360-385-5582 x109	cmclean@ptmsc.org
Linn Benton Community College	Carolyn J. Lebsack	541-917-4999	lebsacc@linnbenton.edu
NMML	Pat Gearin	206-526-4034	pat.gearin@noaa.gov
NMML	Jim Thomason	206-526-6316	jim.thomason@noaa.gov
NMML	Bob DeLong	206-526-4038	Robert.Delong@noaa.gov
NWFSC	Brad Hanson	206-300-0282	brad.hanson@noaa.gov
NWFSC	Dr. Elizabeth Frame	206-302-2402	Elizabeth.Frame@noaa.gov
Makah Tribe	Jon Scordino	360-645-3176	mtcmmbiologist@centurytel.net
Oregon State University	Dr. Bruce Mate	541-867-0202	bruce.mate@oregonstate.edu
Oregon State University	Jim Rice	541-270-6830 541-567-0446	Jim.Rice@oregonstate.edu
PSU – Biology	Dr. Debbie Duffield	503-725-4078	duffieldd@pdx.edu
San Juan Co. MMSN	Amy Traxler	360-472-1852	amy@whalemuseum.org
	Dr. Joe Gaydos	360-914-1083	jkgaydos@ucdavis.edu
Skulls Unlimited International	Jay Villemarette	405-794-9300	jay@skullsunlimited.com
SWFSC	Dr. Susan J. Chivers	858-546-7093	Susan.chivers@noaa.gov
University of Oregon	Dr. Madonna Moss	541 346-6076	mmoss@uoregon.edu
WDFW MMI	Dyanna Lambourn	253-208-2427	Lambodml@dfw.wa.gov

Specimen Requests
Pinnipeds

Organization & Researcher	Species	Condition codes	Tissue type/sample requested	Sample container	Sample storage	Description of purpose
WDFW MMI Dyanna Lambourn	Harbor Seal (All age classes, please notify asap of all tagged or branded harbor seals)	Fresh Dead (Code 2)	Whole animal	Any	Keep animal cool or on ice	To conduct through necropsies for cause of mortality and to collect life history information
WDFW MMI Dyanna Lambourn	Other pinnipeds	Fresh Dead (Code 2)	Whole animal	Any	Keep animal cool or on ice	Same as above
Applied Osteology Dr. Mike Etnier	Harbor seal, California sea lion, Steller sea lion, and Guadalupe fur seals	Any	Single tooth, one hind limb including the pelvis, and one front limb including the scapula	Any	Frozen	Development of size-at-age curves
CPSMMSN Matt Klope	Northern Fur Seal	Any Adult	Skull, Baculum	Any	Fresh, frozen	Educational collection
CPSMMSN Matt Klope	Steller Sea Lion	Any Adult	Skull, Baculum	Any	Fresh, frozen	Educational collection
Univ. of OR Dr. Madonna Moss	Northern Fur Seal (adult male)	Carcass, skeletonized	Skeletal remains	Any	frozen	Comparative collection
Univ. of OR Dr. Madonna Moss	Steller sea lion (pup, juvenile, or adult female)	Carcass, skeletonized	Skeletal remains	Any	frozen	Comparative collection
NMML Pat Gearin Jim Thomason	Steller sea lion	N/A	Skulls and skeletal material, stomachs, skin for genetics, whiskers	Tissues in whirlpaks, stomachs in plastic bags	Tissues can be frozen	Research
NMML Pat Gearin Jim Thomason	California sea lion	N/A	Skulls from branded/tagged animals	Plastic bags	Frozen	Research
NMML Bob DeLong	Guadalupe Fur Seals	N/A	Skeletal remains	Any	Frozen	Research

Specimen Requests
Cetaceans

Contact Information	Species	Condition codes	Tissue type/sample requested	Sample container	Sample storage	Description of purpose
OSU Dr. Bruce Mate	Sperm Whale	2 and 3	Notification of stranding	No samples requested	N/A	Testing radio tag deployment and attachment methodology
OSU Dr. Bruce Mate	All Baleen whale species	2 and 3	Notification of stranding	No samples requested	N/A	Same as above
NMML Pat Gearin Jim Thomason	Killer whale	N/A	Skulls/skeletal material	Any	N/A	Research/education
NMML Pat Gearin Jim Thomason	Beaked whales Pilot whale	N/A N/A	Skulls and skeletal material Skulls	Any	N/A N/A	Research and education
NMML Pat Gearin Jim Thomason	Kogia sp. False killer whale	N/A N/A	Skulls and skeletal material Skulls and skeletal material	Any	N/A N/A	Research and education
NMML Pat Gearin Jim Thomason	Gray whale	N/A	Skulls/skeletal, skin and blubber	Tissues in whirlpacks	Tissues can be frozen	Research and education
NMML Pat Gearin Jim Thomason	Humpback whale	N/A	Skulls and skeletal material	Any	N/A	Research and education
NMML Pat Gearin Jim Thomason	Balaenopterid whales	N/A	Skulls and skeletal material	Any	N/A	Research and education
Makah Tribe Jon Scordino	Gray Whale Gray Whale	All Fresh Dead	Baleen plates (3-5) Notification of stranding	Any No sample requested	Fresh or Frozen	Research – stable isotopes and genetics, humane kill methods research

Specimen Requests
Cetaceans

Contact Information	Species	Condition codes	Tissue type/sample requested	Sample container	Sample storage	Description of purpose
Brad Hanson & Dr. Stephen Raverty	Killer Whale – all ecotypes	Any – contact for Killer Whale protocol	Please contact Brad Hanson or Dr. Stephen Raverty			Full health assessment
Brad Hanson & Dr. Stephen Raverty	Harbor porpoise	1,2,3	Blubber (dorsal, lateral, ventral), muscle, liver, kidney, skin, stomach, dorsal fin, lower jaw, milk, mammary gland,, thyroid, trachea., lung, pulmonary lymph node, blood from heart, spleen, adrenals, small intestine, large intestine, fecal sample, bladder, uterus, testes, urine	Whirlpak Aluminum foil Plastic container Vial (skin) Red top tubes (blood)	Frozen Frozen Formalin DMSO Frozen	Full health assessment
Brad Hanson & Dr. Stephen Raverty	Dall's porpoise	1,2,3	Same harbor porpoise request See above ↑	Same harbor porpoise request See above ↑	Same harbor porpoise request See above ↑	Same harbor porpoise request See above ↑
CPSMMSN Matt Klope	Dall's Porpoise	Any Adult	Skull	Any	Fresh, Frozen	Education collection
East Jefferson Co. MMSN	Dall's Porpoise	2,3	Skeletal remains	Any	Any	Educational programs
American Cetacean Society	All Cetaceans	Any	Baleen or Teeth	Any	Frozen baleen	Educational programs
Bullards Beach State Park	Gray Whale or Humpback Whale	Any	Vertebrae, Rib bones, Baleen	Any	Any	Educational programs
Gregg Schorr	All Mysticetes, All Odontocetes (except porpoises, common, spinner, or spotted dolphins)	2, or only slightly decomposed	Entire dorsal fin or measurements if dorsal fin cannot be collected	Please follow detailed protocol provided by the requestor	Frozen	Development of satellite tag attachment methods as part of a collaborative study.

Specimen Requests
All Species

Contact Information	Species	Condition codes	Tissue type/sample requested	Sample container	Sample storage	Description of purpose
PSU – Biology Dr. Duffield	All cetaceans	2-early 4	Whole stomachs & repro tracts - * if not being taken	Ziploc	Frozen (only -20)	Feeding ecology, fatty acids, stable isotopes; pending Prescott
PSU – Biology Dr. Duffield	All cetaceans & all pinnipeds	Code 1-early code 4	Blood (vial), muscle (2x2x2 inches), blubber (2x2x2 in.)	Ziploc	Frozen (only -20)	Molecular wt. forensic database, current Prescott
PSU – Biology Dr. Duffield	All cetaceans, Steller, fur seals	2-late 4	Skulls and skeletons - * if not being taken	Bags	Frozen or dry	For Vertebrate Biology Museum curation, PSU; research, current Prescott
Burke Museum	All cetaceans and pinnipeds	2,3	Any tissue, prefer fresh tissues of spleen, kidney, liver, heart, and muscle.	Whirlpak or your preference	Frozen or alcohol (NO FORMALIN)	Archival museum storage for later use by researchers. *All tissue archived will later be available to qualified researchers.
Burke Museum	All cetaceans and pinnipeds	Mummified or skeletal remains	Entire skeleton, or skull, and/or baculum	Any	Keep dry	Archival museum storage for later use by researchers.
CPSMMSN	All local cetaceans and pinnipeds	2-4 with unbroken bones	Skulls, small skeleton, baculum	Frozen	Frozen	Reconstruction, Education Note: Will accept any skulls suspected to have ballistics trauma for reconstruction/evidence.
Dr. Elizabeth Frame, NWFSC	All cetaceans and pinnipeds	1 @ 2, possibly 3	Feces, urine, blood, stomach contents, milk (if possible)	Whirlpak	Frozen	Research

Cascadia Research Collective John Calambokidis & Jessie Huggins	Any Cetacean **we will respond to and/or conduct examination if PR is unable to.	Any, except skeleton only.	Genetics (skin) and contaminants (blubber) **if these samples are already being sent to NMFS by the necropsy agency for analysis, we do not need a sample specifically for CRC.	Sterile (wrapped in foil or in sterile glass jar); Skin in cryovial.	Frozen	Research
Linn Benton Community College	Northern Elephant Seal, all Cetaceans	Any	Northern elephant seal skull, whale parts such as baleen, vertebrae, flipper bones, and teeth. Porpoise or dolphin skull or whole skeleton.	Any	Any	Educational Programs
SWFSC Dr. Susan J. Chivers	All cetacean species	1-5	Skin with blubber if code 1 or 2; Size: approx. 1 cm^2	Cryo-vial or whirlpak (We can supply & pay shipping.)	Frozen, and 20% DMSO or ethanol	Molecular genetics: research on phylogeny and stock structure
Skulls Unlimited International – Jay Villemarette	All Pinnipeds & Cetaceans	Any	Skeletal remains	Any	Any	Educational Programs

Cooperating Researchers

Please fill out this form if you have an interest in cooperating with stranding network members outside of your primary response area. This form is to identify specific stranding situations where you would be interested in assisting with response.

Requesting group/organization/researcher:

Stranding situations of interest

Species	Condition of animal (Live, dead, condition code)	Geographic area you can assist with response	Contact information (provide primary and alternate contacts and phone numbers)	Speed of response (will respond same day/24 hrs if able to assist)	Resources available (people, tow vessel, necropsy equip.)	Purpose (Prescott grant, research project)

Cooperating Researchers
Pinnipeds

Researcher	Species	Condition of animal	Geographic area you can assist with response	Contact information	Speed of response	Resources available	Purpose
NMML	Steller sea lion	Dead	Northern WA coast, Puget Sound	Pat Gearin 206-526-4034 Cell-206-498-5650	Will vary depending on field schedule	Vessels, people, and equipment	research
NMML	California sea lion	Dead	Northern WA coast, Puget Sound	Pat Gearin 206-526-4034 Cell-206-498-5650	Will vary depending on field schedule	Vessels, people and equipment	research
WDFW MMI	Harbor seals *Please notify asap of tagged or branded harbor seals, will collect for necropsy.	Fresh Dead	WA Statewide	Office 253-589-7235 Dyanna Lambourn 253-208-2427	Will try to respond within 24 hours if available	Necropsy experience	To conduct through necropsies for cause of mortality and to collect life history info
WDFW MMI	All other pinnipeds *Contact for strandings of Guadalupe Fur Seals	Live- Out of Habitat or Fresh Dead	WA Statewide	Office 253-589-7235 Dyanna Lambourn 253-208-2427	Will try to respond within 24 hours if available	Necropsy experience	To assist other network members.

Call the following researchers to assist with stranding response. Researchers may be able to provide support and resources to network members.

Cooperating Researchers
Cetaceans

Researcher	Species	Condition of animal	Geographic area you can assist with response	Contact information	Speed of response	Resources available	Purpose
NMML	Large cetaceans For collection of skulls or skeletal material	Dead	Northern WA coast, Puget Sound	Pat Gearin 206-526-4034 Cell-206-498-5650	Will vary depending on field schedule	Vessels, people and equipment	Research and education/display
Cascadia Research	All Cetaceans **we will respond to and/or conduct examination if PR is unable.	Any	Any	Office: 360-943-7325 JohnCalambokidis Cell: 360-280-8349 Jessie Huggins Cell: 206-949-7924	Same day	People, necropsy equipment and expertise, small boats	Research
CPSMMSN	Orcas, Sperm Whales, or Baleen Whales	Any	Island or Skagit Co.	Orca Network 360-678-3451	24 hours if able to assist	Researchers, necropsy equipment, boat	Research and Prescott Grant
East Jefferson Co. MMSN	Large Whale Porpoise or dolphin	Any Alive	North Olympic Peninsula, Whidbey Island, Hood Canal	Chrissy McLean 360-385-9745 or 360-301-3141	24 hours, depends on the time of year	People	Education
WDFW MMI	Any species	Live or Dead	WA Statewide	Office 253-589-7235 Dyanna Lambourn 253-208-2427	Will try to respond within 24 hours if available.	Necropsy experience and equipment to move animals.	To assist other network members.
San Juan Co. MMSN	Any species	Live or Dead	Whatcom & Skagit Co.	Amy Traxler 360-472-1852 Joe Gaydos 360-914-1083	Depends on situation or time of year	Munson landing craft; personnel; necropsy equipment, vet expertise	Interest in necropsy results

Call the following researchers to assist with stranding response. Researchers may be able to provide support and resources to network members.

Cooperating Researchers
All Species or Other

Researcher	Species	Condition of animal	Geographic area you can assist with response	Contact information	Speed of response	Resources available	Purpose
Oregon State University	Mass stranding or unusual mortality events which require additional support	N/A	Washington, Alaska, British Columbia, and California	Jim Rice 541-270-6830 Cell 541-867-0446	Depends on situation. At least one day for travel.	4x4 truck, necropsy equipment	Cooperation; work is Prescott supported
Stephanie Norman, DVM	Any species, cetaceans or pinnipeds	Any	Any	Hm: 425-398-4115 Cell:206-321-0249	Can respond same day/24 hrs depending on distance to stranding site	Minimal necropsy equipment; veterinary expertise	Prescott grant; assist with other researchers' projects

Call the following researchers to assist with stranding response. Researchers may be able to provide support and resources to network members.

Marine Mammal parts possession and transfer guidance for Stranding Network

From	To	Authorizations needed	Comments
Stranding Network	NMFS employee	No additional authorization needed for NMFS employee to receive non-ESA parts from stranding network (216.22) [collection and transfer of ESA listed species (216.37)]	All parts should be labeled with the Field ID # and/or NMFS ID # and transfers reported to NMFS Regional Stranding Coordinator within 30 days
	Other stranding network members	No additional authorization needed for other stranding network members to receive parts from stranding network (216.22) [collection and transfer of ESA listed species (216.37)]	All parts should be labeled with the Field ID # and/or NMFS ID #, transfer information should be included on Level A form
	Researchers (in the U.S.)	Researchers must have a letter from the RA (216.22) or for ESA listed (216.37) or researchers must have an MMPA and/or ESA scientific research permit as appropriate to receive parts of same species listed in permit (216.37)	All parts should be labeled with the Field ID # and/or NMFS ID # and transfers reported to NMFS Regional Stranding Coordinator within 30 days
	Labs for diagnostic tests (in the U.S.)	No additional authorization needed for laboratories to receive parts from stranding network (216.22 and 216.37)	All parts should be labeled with the Field ID # and/or NMFS ID #, ESA parts should be accompanied by copy of permit
	Labs for diagnostic tests-outside the U.S. or researchers working on studies – outside the U.S.	CITES export/import needed for species on CITES list Researchers outside the U.S. need to have scientific research permit as appropriate in their country to receive parts for research projects	All parts should be labeled with the Field ID # and/or NMFS ID # and should be accompanied by copies of the appropriate CITES and/or research permits for ESA parts
	Museum collections, scientific or educational institutions (in U.S.)	Museums, scientific and educational institutions need a letter from the RA authorizing them to receive parts from the stranding network (216.22)	All parts should be labeled with the Field ID # and/or NMFS ID # and notification or transfer of the parts must be submitted to the Regional Stranding Coordinator
	Museum collections, scientific or educational institutions (outside the U.S)	Museums, scientific and educational institutions need a letter from the AA authorizing them to receive parts from the stranding network (216.22) and CITES export as needed	
	Retained by stranding network for their own educational purposes	No additional authorization is needed for stranding network members to retain parts for educational purposes	All parts should be labeled with the Field ID # and/or NMFS ID # Level A form should include information on retention of parts

United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Office for Law Enforcement

Registration of Collected Marine Mammal Parts

"Any bones, teeth or ivory of any dead marine mammal may be collected from a beach or from land with in ¼ of a mile of the ocean. The term "ocean" includes bays and estuaries. Marine mammal parts so collected may be retained if registered within 30 days with an agent of the National Marine Fisheries Service. Title to any marine mammal parts collected under this section is not transferable unless consented to, in writing, by the Secretary." (50 C.F.R. 216.26)

NAME OF REGISTRANT: _____

ADDRESS: _____

_____

_____

DESCRIPTION
OF ARTICLE: _____

_____

_____

_____

LOCATION/DATE
OF COLLECTION: _____

_____

_____

I certify the above to be true and correct to the best of my knowledge

Signature _____ Date _____

(AGENCY USE ONLY)

Date of Registration _____ **Registration Number:** _____

Registering Agent _____ Agent Duty Station _____

Protocol

Northwest Marine Mammal Stranding Network Protocol

1. When you receive a phone call about a stranded marine mammal.
    a. Ask for the reporting parties name, phone number, record the date and time of the call, species, status (dead, alive, injured, ect.) and the location.
    b. Investigate the case and determine if it is appropriate to respond.
    c. Determine your course of action.
        i. If you are not going to respond to the case gather sufficient information and fill out a Level A form if appropriate.
        ii. If you decide not to respond to a case convey your decision to the reporting party and reasons to validate your response.
        iii. If the stranding is not in your response area, consult the Call List and Map and pass information on to the correct organization.

2. Responding to a case.
    a. Arrive at the site.
    b. Confirm the circumstances of the stranding. (Consult the protocol for Species Specific Response if necessary).
        i. Identify the species, condition, and location of the animal.
        ii. If the animal is alive, review the guidelines for handling live stranded marine mammals.
            1. Evaluate whether the animal is actually stranded (legal definition) and determine whether capture and relocation or transport to rehab is warranted.
            2. Considerations for relocation or rehabilitation include:
                a. The animal is sick or injured, and the injury or sickness is treatable,
                b. Negative interactions between the animal and the public, for example, harassment,
                c. Availability of space in rehabilitation facilities.
        iii. If the animal is dead, review the specimen request lists or contact your local stranding network coordinator to see if there are requests for samples.
            1. If you plan to leave the animal and it is on public property inform local authority about disposal options. These include, tow out into the water, burial, leave on the beach, or coordinate with local authorities.
    c. Take pictures of the animal if possible and fill out a Level A Data sheet.

i. If you need guidance on how to fill out the Level A consult "The Examiner's Guide to the Marine Mammal Stranding Report Level A Data" included in your stranding binder.
ii. Level A's should be submitted to NOAA Fisheries within 30 days of the date the Level A was filled out.

d. Please contact NOAA Enforcement at 1-800-853-1964 if...
i. You believe the case is a potential violation of the MMPA
ii. It is a live animal that needs to be removed for the protection of the public
iii. It is an endangered species that may need to be secured to prevent future enforcement problems
iv. The animal is shot
v. Is being harassed
1. When you contact NOAA Enforcement be sure to give information of where the case is, who is involved, when, and what the potential violation is. Please leave your contact information, this will allow NOAA Enforcement to contact you for additional information and will increase the chances that the case can be fully investigated.

3. Public Education
a. Sometimes when you respond to a case the only thing you will need to do is post signs or educate the reporting party.
b. Several documents in this stranding binder can help you educate the public. These documents include:
i. "Sharing the Shore with Harbor Seals"
ii. "Sharing the Sound with Killer Whales"
iii. "Be Whale Wise"

Guidelines for Handling Live Stranded Marine Mammals

1. The term "stranding" means an event in the wild which –
    a. A marine mammal is dead and is –
        i. On a beach or shore of the United States; or
        ii. In waters under the jurisdiction of the United States (including any navigable waters); or
    b. A marine mammal is alive and is –
        i. On a beach ore shore of the United States and is unable to return to the water;
        ii. On a beach or shore of the United States and, although able to return to the water, is need of apparent medical attention; or
        iii. In the waters under the jurisdiction of the United States (including any navigable waters), but is unable to return to its natural habitat under its own power or without assistance. 16 U.S.C. 1421g
    c. Important note: Seals and sea lions commonly use shoreline habitats for normal activities such as resting and thermoregulation.

2. Live seals and sea lions should be left on the beach undisturbed and observed for a minimum of 24-48 hours before any action is taken to remove the animal. This observation period is very important and can be used to determine if the animal can return to the water if it wants to.
    a. Note: Exceptions to this observation period may include aggressive animals that pose a threat to public safety or animals that are clearly suffering and may require rapid treatment or euthanasia.

3. It is very helpful to post signs near a live marine mammal to inform the public that the animal should not be approached, touched, or disturbed.
    a. Note: NOAA Fisheries guidelines recommend that people and pets not approach seals and sea lions closer than 100 yards.

4. If it is determined that a marine mammal needs to be removed from the beach and transported for medical treatment the following facilities are authorized to receive marine mammals.
    a. Wolf Hollow Wildlife Center 240 Boyce Rd. Friday Harbor, WA 360-378-5000
    b. PAWS Wildlife Center 15305 44th Ave. W Lynnwood, WA 425-787-2500

    * Leave a copy of the Level A with the rehabilitation facility so they have a record of the Field ID # and case history when completing their Rehabilitation Disposition Report.

5. If a marine mammal is entered into a rehabilitation facility a Level A data form must be filled out and needs to be sent to NOAA Fisheries within 30 days. The rehabilitation facility must fill out a final "Marine Mammal Rehabilitation Disposition Report" which gives details of the condition, treatment, and results of the case.

6. All live animals taken into rehabilitation are to be released back into the wild unless other arrangements have been made with the NOAA Fisheries stranding coordinator. All marine mammals that are released from rehab should be tagged, prior to release, for monitoring purposes. They should also be released in the vicinity of the site where the animal was originally taken.

7. Live marine mammals captured by private citizens or other unauthorized persons should be returned to the original beach and left undisturbed unless circumstances do not permit such action. The name and addresses of these persons should be reported to NOAA Enforcement at 206-526-6133 for enforcement action. There is also a 24 hour, toll free enforcement hotline to report violations at 1-800-853-1964.
   * When you call the hotline specify that this is a report of a violation and request to speak to the agent on call.

8. Safety measures
   a. Remember, safety comes first! Marine mammals are wild animals and will bite. They carry diseases which may be transmittable to humans. Use caution and wear gloves.
   b. For more information consult "Working with Marine Mammals and Your Health" in the Protocol section in your stranding binder.

NMFS Decision Process for Responding to Live Marine Mammals that are Stranded or Otherwise in Distress

February 2009

NOAA's National Marine Fisheries Service (NMFS) and the Marine Mammal Stranding Network have developed protocols and procedures for responding to live marine mammals that are stranded or otherwise in distress to ensure the health, welfare and safety of both the animals and the human responders. These protocols balance the need for standardized procedures while allowing flexibility to address specific needs of different situations for diverse species and habitats, as well as unforeseen circumstances. Protocols and procedures for cetaceans (whales, dolphins and porpoises) can be different than the ones for pinnipeds (seals and seal lions) since their biology is significantly different. Human and animal safety is the top priority for NMFS and the Network. NMFS and the Network evaluate several factors before intervening. Each event is different and requires consideration of the following factors by NMFS in consultation with the Network and outside experts:

What are the species and group composition involved in the event?

- Responses to small cetaceans or pinnipeds (*e.g.*, bottlenose dolphins or harbor seals, which are < 8 feet) are not the same as for large whales (*e.g.*, right whales, which are > 40 feet).
- Different species have specific group compositions and social behaviors (*e.g.*, bottlenose dolphins can occur singly or in groups of < 20 individuals, whereas Atlantic white-sided dolphins can occur in groups of > 100). The presence of mother-calf pairs is a consideration since young and naïve animals can be particularly vulnerable to disturbance.
- Pelagic (deep water) species like pilot whales, common dolphins, and Atlantic white-sided dolphins are out of habitat and at risk of stranding in shallow waters. In contrast, coastal species such as bottlenose dolphins are adept at navigating shallow river and estuarine systems, which are part of their normal habitat.
- Animals from species that are listed as endangered or threatened (*e.g.*, Hawaiian monk seals, right whales) may require extraordinary rescue efforts in order to support recovery of the population.

Is the situation caused by human activities or a natural event?

- Animals in distress as a result of human activities are prime candidates for response and intervention. This includes animals entangled in fishing gear or marine debris, injured from a vessel collision, or trapped in a habitat area by human activities (*e.g.*, physical barriers, oil spills, construction noise, etc.).
- Animals that are out of habitat or displaced by severe weather or oceanographic events (*e.g.*, hurricanes, tsunamis, El Niño, underwater earthquakes, etc.) can be candidates for intervention if they cannot leave the area on their own accord and/or their health is declining. For example, NMFS and the Network routinely rescue dolphins washed inland by hurricanes or ice seals that have ventured off course to temperate or tropical areas, especially when the animals are in habitats that can compromise their health. Animals are initially monitored prior to conducting an intervention to allow every opportunity for them to leave on their own.
- Animals that may be naturally expanding their range and exploring new habitats should be left alone. Intervention may be warranted, however, if animals become a "nuisance" and are having a negative effect on the environment, private property or public safety.

Are resources available to ensure the safety and welfare of both the animals and the responders?

- Intervention can be risky and dangerous for both the animals and human responders. The Network includes highly trained personnel with different expertise. NMFS helps coordinate rescue activities to ensure the appropriate people are deployed to a particular event with an adequate number of personnel and sufficient equipment or facility resources for the rescue operation and veterinary care. NMFS and the Network coordinate with local officials and interested parties during events.
- Rescue operations are only approved if all safeguards can be maintained for the animals, rescue team members, and the public. If safety cannot be maintained, then rescue operations must stand down until appropriate safeguards can be put into place.

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http://www.nefsc.noaa.gov/njdolphins/BIBLIOGRAPHY/touhey.pdf

Additional information available on the Internet:

NOAA/NMFS' Marine Mammal Health and Stranding Response Program
http://www.nmfs.noaa.gov/pr/health/

Marine Mammal Stranding Network Participants
http://www.nmfs.noaa.gov/pr/health/networks.htm

John H. Prescott Marine Mammal Rescue Assistance Grant Program
http://www.nmfs.noaa.gov/pr/health/prescott/

Documentary "Saving Springer: Orphan Orca"
http://sos.noaa.gov/datasets/extras/saving_springer.html

Northwest Marine Mammal Stranding Network Protocol
Specific Species Response

1. Pinnipeds
    a. Pinniped tags can be plastic, metal, neoprene, VHF, UHF or a brand.
        i. Otariids (sea lions and fur seals) are tagged on the fore flipper; Phocids (seals) are tagged on the rear flippers.
    b. Harbor Seals
        i. Look for tags, brands, record placement, tag color and the tag number if possible. If tags are present please call WDFW/Marine Mammal Investigations (MMI) at 253-589-7235.
        ii. Blue tag = Male/Yellow tag = Female
            1. Red tag = Rehab animal
        iii. Do you see any signs of human interaction?
            1. Entanglement? Shot?
    c. Harbor Seal pups
        i. Observe the pup for 48 hours before taking any action. If it is tagged call WDFW/MMI at 253-589-7235.
        ii. Post a sign and cordon off the area if possible.
            1. Keep people and dogs away.
            2. Harbor seal moms are very shy and will not come to shore if people or other animals are around.

Timing of Harbor Seal Pupping and Weaning in Washington & Oregon

Area	Pupping Months	Weaning Months (4-6 weeks after birth)
Columbia River, Willapa Bay, Grays Harbor	Early April - July	August
Olympic Peninsula Coast	May – June	August
San Juan Islands, Eastern bays of Puget Sound	June - August	October
Southern Puget Sound	July – September	October
Hood Canal	July – October	November

- This table was provided by the Washington Department of Fish and Wildlife, Marine Mammal Investigations.

    d. California sea lion
        i. Confirm species ID.
        ii. Look for tags, brands, record placement, tag color and number if possible.
        iii. Do you see any signs of human interaction?
            1. Entanglement? Shot?

e. Steller sea lion
    i. Confirm species ID.
    ii. Look for tags, brands, record placement, tag color and number if possible.
    iii. Do you see any signs of human interaction?
        1. Entanglement? Shot?
    iv. If the animal is to be removed from the wild or euthanized contact Brent Norberg or Lynne Barre at NOAA Fisheries, 206-526-6733 for authorization under the ESA.

f. Northern Elephant Seal
    i. Confirm species ID.
    ii. This species will haul out during molting season and may stay in the same area for weeks at a time.
    iii. When they are molting they look like they are in very poor shape, but this is normal.
    iv. If they are in a public area for days to weeks you can call WDFW/MMI at 253-589-7235.

g. Northern Fur Seal
    i. This species occasionally strands on the outer coast of Washington and Oregon.
    ii. May be entangled in fishing gear or debris.
    iii. CAUTION: may be extremely aggressive!

h. Guadalupe Fur Seal
    i. Confirm species ID, they can be easily confused with Northern Fur Seals. Look at the shape of the snout and the hairline on the foreflippers.
    ii. This species is rarely seen north of Central California. In 2007, 19 animals stranded in Washington and Oregon which was qualified as an Unusual Mortality Event (UME).
    iii. Please report any strandings to Kristin Wilkinson with NOAA Fisheries at 206-526-4747.

2. Cetaceans
    a. Killer Whales
        i. Photograph the animal if possible and contact NOAA Fisheries at 206-526-4745.

b. Gray Whales
    i. Photograph the animal if possible and contact Cascadia Research Collective at 360-943-7325.
    ii. If on tribal land, notify Brent Norberg or Lynne Barre at NOAA Fisheries at 206-526-6733 to coordinate response.

c. Humpback Whales
    i. Photograph the animal if possible and contact Cascadia Research Collective at 360-943-7325.

d. Minke, Sperm, Blue Whales
    i. Photograph the animal if possible and contact Cascadia Research Collective at 360-943-7325.

e. Harbor porpoise, Dall's porpoise, and Beaked whales
    i. Call the NOAA Fisheries hotline at 206-526-6733.

f. Northern Pacific Right Whale
    i. This species is very unlikely to be seen.
    ii. ALL SIGHTINGS, ALIVE OR DEAD should be reported to Brent Norberg at NOAA Fisheries immediately at 206-526-6733.
    iii. Photos are extremely important.

3. Other species
    a. Sea Turtles
        i. USFWS and NOAA Fisheries share jurisdiction.
        ii. Call the NOAA Fisheries hotline at 206-526-6733 before removing turtles from the beach.
        iii. Please review the Sea Turtle stranding protocol in the Protocol section of this handbook.
    b. Sea Otters
        i. USFWS has jurisdiction.
        ii. Contact Deanna Lynch at 360-753-9545 or page 1-87-SEAOTTER.

Sea Turtle Protocol*

*Marine Mammal Stranding Network responders are not authorized to pick up sea turtles due to their endangered species status (50 CFR 17.21). To respond to a sea turtle stranding you must coordinate and receive permission from the Northwest Regional Coordinator, Brent Norberg or stranding specialist, Kristin Wilkinson.

1. When you receive a phone call about a stranded sea turtle.
    a. Ask for the reporting parties name, phone number, record the time and the date of the call, species (or description, size, length, weight, etc.), status (alive, dead, injured, etc.) and the exact location. Ask if they have taken any photos and if they can email them to you for your review before responding.
    b. If you are unsure of the species of the turtle, utilize the sea turtle identification guide in the back of your Northwest Marine Mammal Stranding Network handbook. The sea turtle guide can be found under the Species ID tab, located under "Other Species".
    c. If you are confident a sea turtle stranding has taken place, call Kristin Wilkinson with NOAA Fisheries as soon as possible at 206-526-4747 (office) or 206-550-6208 (cell). Please keep in mind you need permission to respond to this stranding according to 50 CFR 17.21
2. Responding to a case.
    a. Arrive at the site.
    b. Confirm the circumstances of the stranding.
        i. Identify the species, condition, and location of the animal.
        ii. If the animal is alive, review the Cold-Stunning Care Procedures provided by the Riverhead Foundation for Marine Research and Preservation which can be found under the "Protocol" tab in your Northwest Marine Mammal Stranding Network handbook. The protocol details three procedures that you can conduct on the beach to determine if the animal is alive or dead. (Nose touch, Head lift, and Eye touch.)
            1. In some cases, the only way to know that a cold stunned turtle cannot be recovered is to do an ECG to determine if the animal has a heartbeat. In a cold stunned turtle the heart rate can go down to 1-2 beats per minute. The Riverhead Foundation has not had success hearing a heart beat using a stethoscope, the use of an ECG is best.
        iii. If you think the animal is alive…

1. Contact NOAA Fisheries immediately. Kristin Wilkinson can be contacted at 206-526-4747 (Office) or at 206-550-6208 (Cell).
2. NOAA Fisheries will contact the Seattle Aquarium, Shawn Larson at 206-386-4359 (Office) or at 206-618-3762 (Cell). Angela Smith is the alternate contact at the Seattle Aquarium and can be contacted at 206-386-4359 (Office). Shawn or Angela will determine if there is rehabilitation space for the animal. If Seattle Aquarium cannot accept the animal for rehabilitation, NOAA will contact Judy Tuttle at the Oregon Coast Aquarium, 541-867-3474 x5322.
3. Arrange transport for the animal to the rehabilitation facility.
    a. DO NOT place the animal in water or attempt to warm the animal during transport! Rapid warming may cause irreversible damage to a cold-stunned turtle. Instead, consider using a foam insert that has been soaked in water. The saturated foam allows the sea turtle to absorb water via the cloacae and ensures the animal is stable during transport. If possible, do not transport the animal in a heated vehicle; keep the turtle in an unheated trunk or in the back of a truck.

iv. If the animal is dead…
1. Collect the carcass of the animal and contact NOAA Fisheries. Kristin Wilkinson can be contacted at 206-526-4747 (Office) or at 206-550-6208 (Cell). We collect sea turtle stranding data and will need case details for our records. Photos of the animal are appreciated.
2. NOAA Fisheries will then contact the United States Fish and Wildlife Service, Linda Belluomini at 503-231-6283. According to 50 CFR 17.21 reports must be made to the USFWS within 5 days.

3. Determine your course of action.
    i. Live sea turtles need to be picked up as soon as possible. Sea turtles that strand in our region are usually "cold stunned", which is a process that causes sea turtles to become immobile due to the decrease in water temperature (usually below 50°F) making it impossible for them to escape the cold water and migrate to warmer water (Riverhead Foundation).

A cold stunned sea turtle may appear to be dead, but may be alive!

ii. Dead sea turtles should be collected if possible. **All 7 species of marine turtles are listed under the Endangered Species Act (ESA);** 6 of those species fall under the jurisdiction of the NOAA Fisheries Office of Protected Resources. For more information on sea turtles please visit: http://www.nmfs.noaa.gov/pr/species/turtles/

iii. If the stranding is not in your response area, consult the Call List and Map (located under the "Contacts" tab in the Northwest Marine Mammal Stranding Network handbook) and pass information on to the correct organization.

Riverhead Foundation For
MARINE
RESEARCH &
PRESERVATION

COLD-STUNNING CARE PROCEDURES

On initial assessment or admit to the facility please make a determination of the Health Class Assessment (HCA) before **ALL** other procedures. Determination of the appropriate HCA should be correlated with cloacal temperature (C°). All level (A) data fields should be filled out immediately with information regarding field number, species, stranding/recovery location, date and time. Measurements, weight, physical description and photo and video documentation should be recorded in as short of time as possible. The procedures taken with an animal are generally dependent on the HCA number assigned to the animal upon admittance. (i.e, Class 4 cold-stunned animals are assessed as critical and subsequently all medical treatments must not be interfered with or delayed for the purposes of acquiring level A data). All animals coming to the facility must have individual health records.

DEFINITION OF TERMS

Nose-Touch.... The distal portion of the nose in sea turtles is soft. This tissue is moderately innervated and most live healthy turtles produce a strong to moderate flinch response when touched. Most cold-stunned animals exhibit a response to the touching of this area. However, it is not 100% reliable and is clearly subject to over-use. Therefore, when doing this please watch carefully to avoid having to repeat the procedure too soon. The method is a moderate to slight tap, but with not so much force that you move the head.

Head-Lift.... When sea turtles breathe they lift their head at a much higher angle to the horizontal line of the body. In many live healthy animals lying on a floor this appears to be near 45% or possibly greater. In cold-stunned animals this is often missing or greatly reduced.

Eye-Touch.... Most animals do not like anything touching their eyes or eyelids. Sea turtles are no different and will respond to having an upper eyelid touched. On cold-stunned animals the upper eyelid should be lightly touched and then carefully monitored for as subsequent flinch response (menance).

HEALTH CLASS ASSESSMENTS (HCA)

CLASS I

A. Strong swimming attempts or actual swimming attempts.
B. Responses to all touch tests including nose, eye (menance, pupillary light reflex), and manual contact with extremities (nociception)
C. Body not limp when lifted off floor.
D. Reverse pressure against attempts at forced movement of extremities and or head and neck. Tone and flexor reflex characterized as strong
E. Some crawl attempts when placed on floor. This may or may not be present.
F. Strong inspiratory head-lift (45 ° degree or greater)

CLASS II

A. Moderate to strong movements of animal, movements are slowed but not jerky. Swim-like movements are present but characterized as weak.
B. Nose or eye-touch produces a localized, flinch response (menance and pupillary light reflex).
C. Nose or eye-touch produces some slight generalized extremity response but is decreased distally.
D. Limited reversed pressure to forced movement may be present but clearly fatigues almost immediately (Flexor reflex present although tone is weakened).
E. Crawl attempts either absent or produce no net movement.
F. Body posture is limp or the ability to hold up the extremities is present but very weakly and generally only for a limited length of time. This effect dissipates with time and the extremities will gradually go limp.
G. Inspiratory head lift present but may appear weak (< 45° degree).

CLASS III

A. Animal either does not move or movements clearly not under CNS control, as they are jerky and relatively uncontrolled. Swim-like movements are absent.
B. Nose or eye-touch (menance or pupillary light reflex) absent or very weak in response. Response may be jerky.
C. Body posture is limp when lifted off the floor. The head and neck may support themselves slightly. Length of time may be a very short duration CNS jerk may be observed
D. No reverse pressure against forced movements, but when released sometimes a slow jerky CNS movement of front flippers. Little to no flexor reflex or tone noted in flippers.
E. No crawl attempts.
F. Head-lift either absent or very slight.
G. There may be partial freezing of extremities.

CLASS IV

A. No movement by animal on own without touching.
B. Nose nociception or eye-touch (menance or pupillary light relflex) absent or very slight.
C. Body completely limp.
D. No response to forced movement. No flexor reflexes noted
E. No crawl attempts.
F. Animal's posture is completely limp including neck and head.
G. No head-lift or apparent breathing (Dead?)
H. Extremities may be partially frozen.

TREATMENT PROTOCOLS BASED ON CLASS ASSESSMENTS

Please take note that no protocol can take the place of direct and constant observation. It is very important to check on ALL animals every hour and more often if the condition warrants. Although in the past a 24-hour watch has been maintained on initially critical animals it is not necessary most of the time. Water quality for these animals is important. Particularly at times of stress such as cold-stunning as these animal's immune systems are often compromised.

CLASS I ANIMALS:

Class I turtles are characterized as fairly alert and mobile. Although these animals do not present as critically ill all efforts should be made to conduct a complete and thorough medical evaluation upon admittance to the facility.

Initial Medical Evaluation of Class I Cold Stunned Sea Turtles

1. Staff member is to perform a complete physical examination
    a. All information is to be recorded onto the ***Cold Stunned Sea Turtle Health Assessment Form (HAF)***(Appendix 1.0)
        i. Complete admission data sheet (standard morphs.)
        ii. Weigh the animal (kgs)
        iii. Record the initial cloacal temperature taken en situ on the (HAF) sheet and insert the cloacal probe and document the core body temperature, ambient and water temperatures onto the individual animal's ***Cold Stunned Initial Assessment/Triage Form.*** (Appendix 2.0)
        iv. Assess and photograph the carapace and plastron, flippers, tail, and head, noting any lesions or epibiotic growth.
        v. Subjectively assess nutritional status and body condition
        vi. Conduct a neurologic examination and record all findings onto the (HAF). Video tape the examination.
        vii. Evaluate heart rate with Doppler (Normal heart rate is 30-35 bpm).

viii. Evaluate respiratory rate. Take note of angle of inspiratory head-lift and record onto sheet.

b. Perform oral examination and debridement of the oral cavity if necessary.
c. Use fluorescent corneal stain to detect corneal damage or ulceration.
d. Assess hydration status both subjectively and objectively.

2. Conduct hematology and plasma biochemical assessment
   a. Collect blood for the following parameters
      i. Hematocrit (Take sample directly from syringe)
      ii. Electrolytes
      iii. Blood glucose
      iv. Blood gas status (metabolic and respiratory acidosis)
         1. Use IDEXX VetStat analyzer
      v. Submit blood to Antech for a complete blood count and plasma chemistry profile (***AE160 Comp. Reptilian Profile***)
      vi. Archive plasma for future study (Indicate the number of plasma and RBC samples on blood form).
3. Obtain a cloacal lavage, fecal sample, or cloacal swab for parasitology, cytology, and microbiology
4. Develop a treatment plan on the basis of physical examination, blood glucose, electrolyte, and blood gas status.

These turtles can often be placed in seawater directly. The water in which they are placed should not however be warm. It should be a few degrees (2-4°C) above the ambient water temperatures (i.e., water temperature from stranding location). Also please be aware of pH when mixing fresh warm water with the salt water. Usually it is best to put the turtles into one of the small tanks at first with up to a 16 to 30 cm water depth. Then monitor the animal for up to 3 minutes. If it is swimming strongly raise the water and watch again. If it continues to swim strongly put a heater in the water and let it warm the water over the next 4 to 6 hours. If the animal is assessed as doing well move it to a main-line tank and watch for the presence of positive buoyancy (floats). If the animal does not have the rear floats then it's doing well. If positive buoyancy is observed continue to monitor animal hourly. If at any stage in the process there is either no improvement or a decrease in one of the class definition characteristics then back up one step and take it slower. These animals generally respond very well to initial treatment and overall to rehabilitation.

CLASS II ANIMALS:

Class II turtles are characterized as alert although sluggish. These turtles will generally respond well to all neurologic evaluations but these findings may diminish with time.

Initial Medical Evaluation of Class II Cold Stunned Sea Turtles

1. Staff member is to perform a complete physical examination
   a. All information is to be recorded onto the ***Cold Stunned Sea Turtle Health Assessment Form (HAF)***(Appendix 1.0)
      i. Complete admission data sheet (standard morphs.)

ii. Weigh the animal (kgs)
iii. Record the initial cloacal temperature taken en situ on the (HAF) sheet and insert the cloacal probe and document the core body temperature, ambient and water temperature onto the individual animal's ***Cold Stunned Initial Assessment/Triage Form..*** (Appendix 2.0)
iv. Assess and photograph the carapace and plastron, flippers, tail, and head, noting any lesions or epibiotic growth.
v. Subjectively assess nutritional status and body condition
vi. Conduct a neurologic examination and record all findings onto the HAF. Video tape the examination.
vii. Evaluate heart rate with Doppler. (Normal heart rate is 30-35 bpm)
viii. Evaluate respiratory rate. Take note of angle of inspiratory head lift and record onto sheet.

b. Perform oral examination and debridement of the oral cavity if necessary.
c. Use fluorescent corneal stain to detect corneal damage or ulceration.
d. Assess hydration status both subjectively and objectively.

2. Conduct hematology and plasma biochemical assessment
   a. Collect blood for the following parameters
      i. Hematocrit (Take sample directly from syringe)
      ii. Electrolytes
      iii. Blood glucose
      iv. Blood gas status (metabolic and respiratory acidosis)
         1. Use IDEXX VetStat analyzer
      v. Submit blood to Antech for a complete blood count and plasma chemistry profile (***AE160 Comp. Reptilian Profile***)
      vi. Archive plasma/RBC for future study (Indicate the number of plasma and RBC samples on blood form).
3. Obtain a cloacal lavage, fecal sample, or cloacal swab for parasitology, cytology, and microbiology
4. Develop a treatment plan on the basis of physical examination, blood glucose, electrolyte, and blood gas status.

These turtles can also often be placed into water almost immediately, particularly if the head-lift is strong. However, they should not be placed in a full level of water initially. Place them in water that is 3-4 cm in depth and up to 6-7 cm if the head-lift is good. If they are dry or dehydrated make the water mixture 50% fresh water. Sometimes the weaker animals can be placed on foam to raise the mid-body up. This enables the flippers to angle down slightly and promote a little easier movement for them. Manual movement of flippers is important in Class II for the weaker animals to stimulate circulation if they do not do this on their own. Flipper movement is important due to shock and possible concurrent cardiovascular collapse. Cardiovascular collapse occurs due to decreased circulation during shock. The important effort for these animals is to increase vessel flow through increased movements. Due to their anatomical design the movement of front flippers aid in circulation.

Initial water temperatures should be 2-3°C above ambient water temperatures. DO NOT increase water temperature for 2-4 hours except passively (i.e. sunlight). If the turtle becomes more active within 2-4 hours begin raising the water temperature but do not raise the water level. If the temperature reaches 13-15°C and the animal is walking/swimming and more Class I features appear raise the water level approximately 10 cm every 30-60 minutes. Observe the animal for stronger and stronger activities. They will still float but begin to show interest or attempts at diving. At this point, provided the temperatures are similar, within 3°C, move the animal into a main-line tank.

If during the above process any lack of forward progress or slipping backwards is noted, back up to the previous point and proceed more slowly.

CLASS III ANIMALS:

Class III turtles generally present as compromised animals which generate a poor neurologic assessment. Respiratory and cardiovascular parameters are often impaired.

Initial Medical Evaluation of Class III Cold Stunned Sea Turtles

1. Staff member is to perform a complete physical examination
   a. All information is to be recorded onto the ***Cold Stunned Sea Turtle Health Assessment Form (HAF)***(Appendix 1.0)
      i. Complete admission data sheet (standard morphs.)
      ii. Weigh the animal (kgs)
      iii. Record the initial cloacal temperature taken en situ on the (HAF) sheet and insert the cloacal probe to document the core body temperature, ambient and water temperatures onto the individual animal's ***Cold Stunned Initial Assessment/Triage Form.***(Appendix 2.0)
      iv. Assess and photograph the carapace and plastron, flippers, tail, and head, noting any lesions or epibiotic growth.
      v. Subjectively assess nutritional status and body condition
      vi. Conduct a neurologic examination and record all findings onto the (HAF). Video tape the examination.
      vii. Evaluate heart rate with Doppler. If no cardiac sounds are detected with Doppler, use echocardiography (if available). (Normal heart rate is 30-35 bpm) Bradycardia is common, with the heart rate at admission generally 1 to 12 bpm
         1. **If cardiac activity is weak, depressed or irregular administer epinephrine (1cc,IT,IC) and atropine sulfate (.04-1.0 mg/kg IM).**
      viii. Evaluate respiratory rate.
         2. If turtle is non-responsive and no inspiratory head lift is noted proceed with resuscitation attempts.
         3. Establish a patent airway via orotracheal intubation and deliver 100% oxygen at a rate of 2-3 breaths per minute. Take care to debride the oral cavity to prevent any introduction of aspirate into the lungs.

a. Endotracheal tube size 2.0 – 3.0 for small Lk and Cm
b. Secure endotracheal tube with tape and protect tube from the mouth closing down on it.
c. If respirations are weak, or not present administer **Dopram (5-10 mg/kg IM, IV).**
d. Once respirations are visible and turtle is moving around remove endotracheal tube and monitor respirations every ½ hr with cardiac activity.

2. Assess hydration status both subjectively and objectively.
    a. Establish intravenous catheterization via the dorsal cervical sinus or jugular vein.
        i. Collect blood for evaluation of hematocrit, total protein, osmolality, glucose, sodium, potassium, chloride and blood urea nitrogen.
        ii. Collect blood for blood gas analysis (VetStat)
        iii. Total amount of blood to be taken will be 3-5% of the body weight.
            a. Hematocrit (Take sample directly from syringe)
            b. Electrolytes
            c. Blood glucose
            d. Blood gas status (metabolic and respiratory acidosis)
                a. Use IDEXX VetStat analyzer
        iv. Submit blood to Antech for a complete blood count and plasma chemistry profile **(AE160 Comp. Reptilian Profile)**
        v. Archive plasma/RBC for future study (Indicate the number of plasma and RBC samples on blood form).
    b. Use fluorescent corneal stain to detect corneal damage or ulceration.
    c. Obtain a cloacal lavage, fecal sample, or cloacal swab for parasitology, cytology, and microbiology
    d. Develop a treatment plan on the basis of physical examination, blood glucose, electrolyte, and blood gas status.
    e. Fluid therapy should be directed by blood parameters and clinical response. If hypoglycemia is detected administer 50% dextrose solution IV or iCe. Rate of administration will usually range from 1% to 3% body weight per 24 hours.

These animals are critical. The successful care of these animals involves far less flexibility and far more attention. Initially, these animals are in greater need of gradual thermal increase with concurrent circulatory increase then they are of water. Dehydration is important here but the means to control that have to be approached differently. Many of these turtles should not be placed in any water unless severely dehydrated. When

placed in water these animals should be placed in no more water than necessary to bring the surface of the water in contact with the cloacae. These animals are best moistened with a sponge periodically. When moistening the animal be sure to moisten the eyes, head, neck and cloacae.

Warm these turtles very slowly and passively with very indirect light. Temperature rise should not increase beyond .5°C per hour. Pump front flippers every half-hour at first and then after 2-4 hours of this increase to every two hours. Look for any positive responses. During this time the animals often get "stuck" in a plateau. If head-lift becomes more defined or controlled and/or flipper movement is also more controlled raise the water level to just below the nares. These animals also sometimes benefit from placing them on a foam pad so that the flippers lower and make self-movement easier. If the head-lift becomes stronger then proceed to the steps in Class II.

CLASS IV ANIMALS:

Class IV turtles are the most critical animals. In general these animals will present a moribund with poor to nonexistent neurologic assessments. Respiratory and cardiovascular parameters are severely compromised.

Initial Medical Evaluation of Class IV Cold Stunned Sea Turtles

1. Staff member is to perform a complete physical examination
    a. All information is to be recorded onto the ***Cold Stunned Sea Turtle Health Assessment Form (HAF)***(Appendix 1.0)

    Complete admission data sheet (standard morphs.)
    i. Weigh the animal (kgs)
    ii. Record the initial cloacal temperature taken en situ on the sheet on the (HAF) sheet and insert the cloacal probe to document the core body temperature, ambient and water temperatures onto the individual animal's ***Cold Stunned Initial Assessment/Triage Form.*** (Appendix 2.0)
    iii. Assess and photograph the carapace and plastron, flippers, tail, and head, noting any lesions or epibiotic growth.
    iv. Subjectively assess nutritional status and body condition
    v. Conduct a neurologic examination and record all findings onto the (HAF). Video tape the examination.
    vi. Evaluate heart rate with Doppler. If no cardiac sounds are detected with Doppler, use echocardiography (if available). (Normal heart rate is 30-35 bpm). Bradycardia is common, with the heart rate at admission generally 1 to 12 bpm.
        1. **If cardiac activity is weak, depressed or irregular administer epinephrine (1cc,IT,IC) and atropine sulfate (.04-1.0 mg/kg IM).**
    vii. Evaluate respiratory rate.
        1. If turtle is non-responsive and no inspiratory head lift is noted resuscitation attempts should be initiated.

2. Establish a patent airway via orotracheal intubation and deliver 100% oxygen at a rate of 2-3 breaths per minute
    a. Endotracheal tube size 2.0 – 3.0 for small Lk and Cm
    b. Secure endotracheal tube with tape and protect tube from the mouth closing down on it.
    c. If respirations are weak, or not present administer **Dopram (5-10 mg/kg IM, IV).**
    d. Once respirations are visible and turtle is moving around remove endotracheal tube and monitor respirations every ½ hr with cardiac activity.
3. Assess hydration status both subjectively and objectively.
    1. Establish intravenous catheterization via the dorsal cervical sinus or jugular vein.
        i. Collect blood for evaluation of hematocrit, total protein, osmolality, glucose, sodium, potassium, chloride and blood urea nitrogen.
        ii. Collect blood for blood gas analysis (VetStat)
        iii. Total amount of blood to be taken will be 3-5% of the body weight.
            a. Hematocrit
            b. Electrolytes
            c. Blood glucose
            d. Blood gas status (metabolic and respiratory acidosis)
            e. Use IDEXX VetStat analyzer
        iv. Submit blood to Antech for a complete blood count and plasma chemistry profile **(AE160 Comp. Reptilian Profile)**
        v. Archive plasma/RBC for future study (Indicate the number of plasma and RBC samples on blood form).
    a. Obtain a cloacal lavage, fecal sample, or cloacal swab for parasitology, cytology, and microbiology
    c. Perform oral examination and cleaning of the oral cavity.
    d. Develop a treatment plan on the basis of physical examination, blood glucose, electrolyte, and blood gas status.
b. Fluid therapy should be directed by blood parameters and clinical response. If hypoglycemia is detected administer 50% dextrose solution IV or iCe. Rate of administration will usually range from 1% to 3% body weight per 24 hours.

- Fluid therapy should be directed by blood parameters and clinical response. If hypoglycemia is detected administer 50% dextrose solution IV or iCe. Rate of administration will usually range from 1% to 3% body weight per 24 hours.

These animals are the most critical and often don't make it. It is also unclear if they do survive what their real vitality and viability is. However, that question is not germane to the treatment process. Therefore, they should be treated with critical emergency care toward recovery. These animals are amazingly resilient. These animals must be treated as in the previous class but a 24-hour watch is essential. Frequent (10-15 minute intervals) movement of the flippers is essential. Lifting of animal should be minimized. Animals should also not be kept in bright lights.

As is evident from the progressing we have done each class treatment is a step built upon the previous. All above treatment scenarios apply to this group.

Cold Stun Medical Protocol

A. Exam, Weight (kg), Body Temperature (Celsius)
B. Health Class Assessment (HCA)
    a. Correlate with Body Temperature (°C)
    b. Document HCA with digital photography and video
C. Minimum Database
    a. Heart rate (Doppler bpm)
    b. Respiration rate
    c. Bloods
        i. In-house Glucose, Hct, TP and electrolytes
        ii. Comprehensive Reptilian Profile (AE160 Antech)
        iii. Blood gas analysis (VetStat)
D. Increase Body Temperature
    a. Water Blanket
    b. Heat Lamp (Red bulb)
    c. Enema
    d. Warm compresses (i.e., wash towels and/or water filled latex gloves)
E. Class III and IV
    a. Respiratory Dyspnea/Apnea
        i. Intubate
        ii. Oxygen via ventilator or ambu bag
            1. 2-3 breaths per minute
        iii. Catheter
            1. If no breathing or heart beat detected
            2. Dopram 5-10 mg/kg, IM, IV
    b. Cardiac (If No Detectable Heart Beat)
        i. Epinephrine 1cc, IT, IC
        ii. Atropine .04-1.0 mg/kg, IM
        iii. Calcium Gluconate 100 mg/kg, IM
    c. Shock
        iv. IV catheter
            1. Warm IV fluids 10-30 ml/kg/d^{-1}
               or (1-3 % Body Weight/d^{-1})
            2. Corticosteroid (SoluDelta 5mg/kg, IV)
            3. Hetastarch 5 ml/kg, IV, BID
            4. 50 % Dextrose 1 ml/kg, IV

F. Monitor Body Temperature every two hours
G. Vitamins Supplementation
    a. AD_3 0.05 ml /kg IM
    b. B-Complex 0.25 ml/kg SC
    c. Vitamin K .5 mg /kg IM
H. Nutritional Support
    a. Cisapride

Type	Therapeutic	Dosage	Route	Frequency	Duration
Emergency (respiratory)	Dopram	5-10 mg/kg	IM, IV		
Emergency	Epinephrine	1cc	IT, IC		
	Atropine	.04 - 1.0 mg/kg	IM, IV, IT, IC		
	Calicum Gluconate	100 mg/ml	IM		
Emergency (Shock)	SoluDelta	5mg/kg	IV		
	Hetastarch	5 ml/kg	IV	BID	
	50% Dextrose	1 ml/kg	IV		
Fluid Therapy	Lactated Ringers	1-3% TBW/d^{-1}	IV, PO		
	Reptilian Ringers				
Nutritional	AD_3	0.05 ml/kg	IM		
	B-Complex	0.25 ml/kg	SC		
	Vitamin K	.5 mg//kg	IM		

Reptilian Lactated Ringer's Solution	
1 part	Lactated Ringer's
2 parts	2.5 Dextrose/.45 NaCL

Literature Cited and Additional Resources

Wyneken, Jeanette, Mader, Douglas R., Weber, Scott E and Merigo Constance. Medical Care of Sea Turtles. In Mader, DR, editor: *Reptile Medicine and Surgery*. Philadelphia, 2006. WB Saunders.

Whitaker, B.R., and Krum H. 1999. Medical management of sea turtles in aquaria. Pages 217-231 in Flowler, M.E., and Miller, E.R., eds. Zoo and Wild Animal Medicine. W.B. Saunders Company, Philadelphia, PA.

The Seattle Aquarium (SA) is one of two sea turtle rehabilitation facilities in the Pacific Northwest. Oregon Coast Aquarium (OCA) can also accept stranded sea turtles based on available space, but SA is usually contacted first. During the winter, cold-shocked turtles often become stranded on beaches. Stranding reports usually begin in mid-October. Essentially, the sea turtles are swimming in a warm current that suddenly dissipates. The sea turtle may then find itself caught in much colder water (temperatures <50 °F). There are other scenarios in which a turtle may be injured by human activities, such as boating. Boat propellers can do a great deal of damage to the carapace of a sea turtle. Also, during storm events on the coast of the Pacific Northwest, a sea turtle may find itself pummeled against a rocky coastline.

Sea turtles requiring rehabilitation are typically brought to the Seattle Aquarium within 24 hours from an initial report to Washington State Patrol. Of the five sea turtle species known to occur in the waters of the eastern north Pacific Ocean, the Seattle Aquarium has received and successfully rehabilitated Pacific Green (*Chelonia Mydas*), Loggerhead (*Coretta Coretta*), Pacific Ridley (*Lepidochelys Olivacea*), and Hawksbill (*Eretmochelys Imbricata*) turtles.

Although sea turtles are not exhibited at the Seattle Aquarium, a rehabilitation procedure is necessary in order for staff to mobilize when a request for rehabilitation is received by National Marine Fisheries Service.

Preparing to receive the sea turtle

Seattle Aquarium first points of contact are Dr. Shawn Larson and CJ Casson. These Curators will coordinate staff responsible for receiving a stranded sea turtle. Also, Shawn Larson possesses the rehabilitation license for Seattle Aquarium. The National Marine Fisheries Service (NMFS) should be contacted immediately. Transport to SA is coordinated through Washington State Patrol. Woodland Park Zoo should be contacted for veterinary assistance.

Receiving the sea turtle

Upon arrival, the turtle is brought to a treatment space where the turtle is quarantined from birds and bird biologists. The turtle should be checked and monitored for vitals, such as breathing, pulse and consciousness. The turtle should then be checked for dehydration, sunken eyes, skin elasticity, wounds, cuts, plaque, and lethargy.

After initial, physical checking of the turtle, the turtle should be weighed upon a top-loading scale and carapace length and width measured. The turtle's temperature should be taken with the thermometer probe located in the [work-in-progress] turtle stranding kit. Tail length has been used as a secondary physical characteristic for sexing an adult sea turtle (Longer tail = male). However, some of the turtles that strand are juveniles.

A heat lamp should be attached to either the side of the turtle tub or to one of the overhanging pipes. In addition, a thermometer should be placed inside the turtle tub to monitor air temperature. The foam pad, located in the storage area (turtle stranding kit), should be centered at the bottom of the turtle tub. The turtle should then be gently lifted by two or more people and placed upon the foam pad. A cloacal swab sample should be collected and submitted to Phoenix Central Laboratory for culture.

With access to a dosage calculator and/or scripts from the attending veterinarian, SQ (SQ=subcutaneous) reptile ringers should be administered to the turtle at 10ml/kg. The skin between

the rear legs/flippers and torso is a good location to check for hydration and to administer the SQ ringers. The reptile ringer solution is primarily for re-hydration (electrolytes) but also contains Dextrose (temporary supplemental energy source in lieu of actual food). Due to concerns related to potential secondary infection arising from a turtle's compromised state, Baytril (5mg/kg), Itraconazole (5mg/kg) and Tagamet (5mg/kg) should also be administered.

For the first 24 hours after the turtle's arrival, hourly measurements of the tub's air temperature, the turtle's temperature, and its breaths per minutes should be recorded. The air temperature is measured with the temperature readout from the thermometer in the tub. The turtle's temperature should be taken with the thermometer probe located in the turtle stranding kit, and the breaths per minute should be counted using a stopwatch. Additional, vital information should be recorded. The heat lamp should be adjusted so that the air temperature in the tub is raised 1° F every 3-5 hours until the temperature reaches mid to high 70s ° F when the heat lamp is then adjusted to maintain that temperature.

During the veterinary exam, a sample of the turtle's blood is collected for a complete blood chemistry analysis (sample sent to Phoenix Laboratory). After results of the test are received, the turtle will be administered treatments or supplements, as needed. Typical veterinary scripts are calculated as follows:

Vitamin K : 2-2.5 mg/kg
Vitamin E : 2.5ml/kg
Calcium Gluconate : 10mg/kg
Potassium Chloride : 0.735mEq/kg
Calcium Carbonate : 10mg/kg
Vitamin A : 5.0 IU/g
Vitamin D : 0.6IU/g.

There are some cases that may require specific treatments. For example, if the turtle is anemic, Epoetin Alfa (50IU/kg) and Ferric Hydroxide (7.35mg/kg) should be administered. If the turtle has septicemia, Gentocin (8mg/kg), Amoxi-Inject (100mg/ml), and Amikacin (1mh/lb) should be administered.

Next, the turtle tub should be filled so that the waterline does not reach the top of the foam pad. The tub should be filled with salt water from valve 1 (fast fill), and valve 9 should be opened to allow water transport directly into the heating system, through the UV sterilizers, and to the tub. Once the desired level is reached, the system can be set to re-circulate. For the first week, the turtle should be closely monitored while the water level is maintained just below to top edge of the foam pad. If the turtle is responsive and feeding on its own within 3 days, the tub can be filled to its highest level. However, most of the sea turtles that arrive at SA have required some level of force-feeding. The water level is kept low but can be adjusted higher for "swim time" in the early stages of force-feeding. Once the turtle starts to feed well on its own, the turtle tub can be filled with water all the time.

<u>Attempting to feed the sea turtle</u>

Feeding the sea turtle should be attempted only when the turtle is already on SQ lactated ringers. Proteins the turtle should receive may include squid, herring, smelt, capelin, krill and clams. The turtle

may need to be started off on force-feeding. Because sea turtles have powerful bites, caution should be taken when attempting to force-feed. Force feeding requires 2 or more people. The turtle's jaw should be propped open using a short PVC pipe, while cut-up proteins should be placed into the turtle's mouth using metal forceps. Then, the turtle's throat should be gently massaged to induce swallowing.

Once the turtle starts feeding on its own, the water level may be fully raised in the turtle tub. Additionally, feeding should take place twice a day, and feeding records should be taken. The records should include how much of which foods were fed, supplements fed, and how much the turtle consumed. When feces are found, the net should be used to collect it and the sample should be prepared to be sent into the lab.

Cleaning the tank

Sea turtles are messy animals, and the tub should be cleaned often. Once the turtle starts feeding on its own, the tub should be scooped of debris with the net at least 2 times per day and after each feeding. Failure to do so could result in the filters clogging. In addition, the tub should be drained, scrubbed and refilled daily to ensure a clean tub.

To drain the tub, the pump to the turtle tub should first be turned off. Next, valves 8, 11 and 12 should be opened. The filter knob should be switched to the "waste" position, and UV sterilizers and the heater should be unplugged. Following this, the pump should be turned onto "high". The water level should start to lower, and the tub should start to drain. When the tub is drained, valve 8 should be closed the pump turned off. Using the brush and mop located next to the turtle tub, the bottom and sides of the tub should be scrubbed and mopped to remove any debris and residue.

After the tub is scrubbed down and mopped, the tub should be refilled with water. To do so, first the filter should be switched back to the "filter" position. Next, the tub should be refilled with water from the green hose and valves 1 and 9. Warm water flows through the green hose while salt water in valves 1 and 9. Once the water level reaches the desired height, the salinity should be checked with the refractometer. The salinity should be within 28-30 parts per thousand.

If the turtle is not swimming on its own and is still on the pad, clean, dry towels should be replaced daily between the turtle and the foam pad. Otherwise, if the turtle is active, the pad is no longer needed and can be removed; the turtle should swim on its own.

Treating shell and flipper abrasions and lesions

During stranding, a sea turtle can receive lesions and abrasions to the plastron, carapace, head and flippers. These types of wound should be treated daily. With veterinary scripts, the turtle should be given oral tablets of Sulfamethoxazole/Trimethoprim(5:1) at 30mg/kg to help shell wounds. If the turtle has a soft shell, the turtle should be fed a calcium to phosphorus ration of 1.5:1. All wounds should be cleaned out daily. Shell and flipper wounds, along with grayish areas of skin, should first be scrubbed with Betdaine solution. The affected areas should dry for approximately 10 minutes. Next, Amphoderm should be applied to the wounds and let to dry, followed by wiping away the residue. Finally, the

wounds should be scrubbed with Novalsan disinfectant solution. Also, if plaque is found, it should be scrubbed off the turtle. Records of this treatment should be documented.

Treating a fractured shell

Sea turtles can receive shell fractures from boating accidents or sharp rocks during the stranding. WPZ should be contacted for regular help with this kind of injury. If the turtle has a shell fracture, the water level should be lowered so that the fractured shell is kept dry and clean. An x-ray should be done of the turtle to check for other fractures associated with the fractured carapace. To first treat the fracture, the fracture should be cleaned out using Novalsan disinfectant. Next, with veterinary help, the fracture should be covered with Duoderm patches. The patch should be replaced daily. After the patch is removed, the water level should be raised to allow the turtle to swim around. Later, the water level should be lowered to treat the wound, where the fracture is cleaned out with Novalsan and a new Duoderm patch applied. The WPZ veterinarian should be consulted for debriding the wound. With approval from the veterinarian, the Duoderm patch treatment should be stopped.

The new, daily treatment should be started. The fracture should first be flushed with dilate Novalsan to clean the wound. The holes should be packed with Duoderm granule paste, and a Duoderm patch should be applied to cover the wound. Every other day during this treatment, the wound should be debrided.

When the wound has significantly healed over, the Duoderm granule paste treatment should stop. ILEX ointment, white petroleum product, should be applied to the wound instead. Gradually, the water level can be raised and shell treatment reduced.

Treating sunken eyes

After being stranded, a sea turtle's eyes may be sunken into their head. To treat this, a veterinarian should be consulted for help and chloroamphenical should be applied to the eyes daily.

Tagging the sea turtle

A sea turtle is tagged for possible monitoring of the sea turtle following release. Dr. Shawn Larson should tag the sea turtle with a NMFS pit tag a few days before shipping the turtle. Te tag is placed on one of the turtle's front flippers. This is done before the shipping date to watch for any possible infections caused by the tag.

Shipping the sea turtle

Following treatment at SA, the turtle needs to be released in warm waters. The primary institution that released SA rehabilitated sea turtles is Hubbs SeaWorld Reseach Institute. The marketing department at SA is responsible for contacting and coordinating the shipping and airline details. Historically, Alaska Airlines has been donating transportation. Hubbs should be contacted to organize shipping times and confirm space for reception of the turtle.

During this time, the turtle should continue to be fed and the tub cleaned. A wooden crate should be designed to fit he dimensions of the turtle and packing materials. On the day of the shipment, an ext physical should be performed by a veterinarian. Multiple people should help lift and place the turtle into the turtle bag. The bag both physically restrains the turtle and calms the turtle down by covering the turtle's eyes. The turtle should be snuggly fit into the foam padding and crate to ensure a secure flight. A final crate check should be performed prior to leaving SA. The main precaution is to make sure the turtle will not move during shipping.

SA transports the turtle to SeaTac airport. Upon arrival, the crate and turtle should be checked for the last time. The package is placed on the plane and shipped Hubbs. When the turtle arrives to SeaWorld, a notification from Hubbs should be received.

The sea turtle release

After the sea turtle is received by Hubbs, it is kept in one of many tubs and monitored by the institute's staff. The turtle is fed on a regular basis. The turtle should be released from Hubbs in San Diego when the waters off the coast of California reach the mid 70s °F. Upon successful release, a notification should be sent from Hubbs to SA.

Definitions

Tribrissen and Itraconazole

Sample Log

Time (Hours since arrival)	Breaths per Minute	Air Temp (°F)	Body Temp (F)	Additional Comments	Initials
0.00					
1.00					
2.00					
3.00					
4.00					
5.00					
6.00					
7.00					
8.00					
9.00					

10.00					
11.00					
12.00					
13.00					
14.00					
15.00					
16.00					
17.00					
18.00					
19.00					
20.00					
21.00					
22.00					
23.00					
24.00					

Figure 1: Log template for initial 24 hours following arrival

Bullet Recovery Protocol

If a bullet is recovered at a marine mammal case that you are responding to, please follow the below protocol.

1. Determination
    a. Bullets can be analyzed to determine caliber.
    b. Striations on the bullet are similar to fingerprints; they can indicate a single firearm.

2. How to remove the bullet
    a. Be very careful and do not use a hard instrument such as forceps.
    b. Do not try to clean the bullet, a water wash is encouraged (do not scrub or rub) to remove excess organic material unless genetic examinations are to be performed on the organic material.
    c. If the organic material is to be kept on the bullet, allow the blood or tissue to air dry and then package the bullet in paper wrap (NOT PLASTIC). Bullets must be dry before packaging.
    d. If possible pack each bullet separately in a box of cotton so it will not move during transportation. If it is fragmented try to separate the pieces so they do not rub during shipment. Label the container with the number of fragments.
    e. If the carcass has multiple wounds try to recover all of the bullets. Take a photo of each wound and document it so we can cross reference it with a recovered bullet.
    f. Take a tissue sample if possible.

3. Carefully document how the bullet is recovered. For example, photos or video is great.
    a. Documentation is very important because an attorney may question the method used for the retrieval of the bullet.
    b. NOTE: Chain of custody is extremely important. The chain of custody form is provided in this stranding binder. Document whoever is in contact with the bullet and limit the access to the bullet by securing it is a locked container, room, etc.

4. Call the Office for Law Enforcement
    a. All cases involving shootings should be reported to 1-800-853-1964

NOAA Fisheries Office for Law Enforcement

Evidence Chain of Custody Form

CASE NUMBER _____ **ITEM NUMBER** _____

DATE ACQUIRED _____ ○ **SEIZED** ○ **COLLECTED**

SEIZURE TAG # _____ **EVIDENCE BAG #** *(if used)* _____ **COLLECTED BY** _____

EVIDENCE TYPE _____ **QUANTITY** _____ **DESCRIPTION OF ITEM** _____

EVIDENCE TYPES: (if handwriting)

1. Fishing Gear	2. Fish/Seafood
3. Blood/Tissue	4. Photographs
5. Video	6. Audio
7. Firearm	8. Documents
9. Other	***SELECT ONLY ONE***

Select either YES OR NO from each section	CAFRA	GRAND JURY	ABANDONED
	○ YES	○ YES	○ YES
	○ NO	○ NO	○ NO

OWNERSHIP INFORMATION (If applicable)

ACQUIRED FROM _____ **OWNER'S NAME** _____

DESCRIPTION OF LOCATION FOUND _____

RESPONSIBLE SA/EO _____ **DIVISION** _____ **FIELD OFFICE** _____

Chain of Custody Tracking Information

(Use Continuation Sheet if needed)

			DELIVERY METHOD
TRANSFERRED FROM	**RELEASE SIGNATURE**	**RELEASE DATE**	○ US MAIL ○ FEDEX ○ IN PERSON ○ OTHER
TRANSFERRED TO	**RECEIPT SIGNATURE**	**RECEIPT DATE**	○ US MAIL ○ FEDEX ○ IN PERSON ○ OTHER

COMMENTS _____

Chain of Custody Tracking Information
CONTINUATION SHEET

CASE NUMBER ____ **ITEM NUMBER** ____

RESPONSIBLE SA/EO ____ **DIVISION** ____ **FIELD OFFICE** ____

TRANSFERRED FROM ____ **RELEASE SIGNATURE** ____ **RELEASE DATE** ____

DELIVERY METHOD
- ◯ US MAIL ◯ FEDEX
- ◯ IN PERSON ◯ OTHER

TRANSFERRED TO ____ **RECEIPT SIGNATURE** ____ **RECEIPT DATE** ____

- ◯ US MAIL ◯ FEDEX
- ◯ IN PERSON ◯ OTHER

COMMENTS ____

TRANSFERRED FROM ____ **RELEASE SIGNATURE** ____ **RELEASE DATE** ____

DELIVERY METHOD
- ◯ US MAIL ◯ FEDEX
- ◯ IN PERSON ◯ OTHER

TRANSFERRED TO ____ **RECEIPT SIGNATURE** ____ **RECEIPT DATE** ____

- ◯ US MAIL ◯ FEDEX
- ◯ IN PERSON ◯ OTHER

COMMENTS ____

TRANSFERRED FROM ____ **RELEASE SIGNATURE** ____ **RELEASE DATE** ____

DELIVERY METHOD
- ◯ US MAIL ◯ FEDEX
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Photo by Jonna Mazet

Safety measures to prevent injury and infections:

Obtain the recommended training, and follow all of your institution's safety procedures for safe animal handling

♦

Wear gloves and other protective gear when handling animals and specimens

♦

Avoid contact with animals if you are ill

♦

Use additional safety equipment when risks of acquiring an infection are high

♦

Use necropsy, husbandry and laboratory procedures that minimize the risk of cuts and injuries

♦

Consult your physician before working with marine mammals if you are pregnant or have other health concerns

♦

Wash hands thoroughly after animal and specimen contact

Knowledge and careful work practices are your best defense!

What you can do:

Care must be taken to **avoid all possible routes of exposure to marine mammal infections**. Although bites and contact with existing wounds are the most common routes, infections can occur through your mouth, eyes, respiratory system and skin.

Report any animal bite, scratch, or other significant exposure to marine animal blood, saliva, or other excretions to the appropriate supervisor.

If you develop an illness or other condition that could be caused by exposure, be sure to **tell your physician that you work with marine mammals**.

Resources for more information:

1. Full report available from the UC Davis Wildlife Health Center at www.wildlifehealthcenter.org

2. "Public Health" by Cowan et al. in L.A. Dierauf and F.M.D. Gulland, *CRC Handbook of marine mammal medicine 2nd ed.* 2001, Boca Raton, FL: CRC Press

3. The Centers for Disease Control and Prevention www.cdc.gov

4. National Institute of Environmental Health Science: Biological Safety http://www.niehs.nih.gov/odhsb/home.htm

Working with Marine Mammals and Your Health

Photo by Deborah Gabris

A guide for marine mammal workers and rehabilitation volunteers

Important information to keep you aware, safe, and healthy

Provided by:

U.S. Marine Mammal Commission
National Marine Fisheries Service
Wildlife Health Center, UC Davis

Important information about marine mammals

Like most animals, marine mammals can carry microbes (bacteria, viruses, fungi) that can cause illness in humans. Many marine mammals that appear healthy and normal can carry organisms that are dangerous to humans.

Marine mammals have been shown to carry many of the pathogens we associate with food poisoning, such as *E. coli*, *Salmonella*, and *Listeria*. Like other wildlife, seals and sea lions can shed the protozoan, *Giardia* in their feces. *Giardia* can cause diarrhea and other symptoms in humans. In rare cases, marine mammals may be infected with very dangerous pathogens, like the rabies virus and the organism that causes tuberculosis.

Pathogens known to be transmitted from marine mammals to people

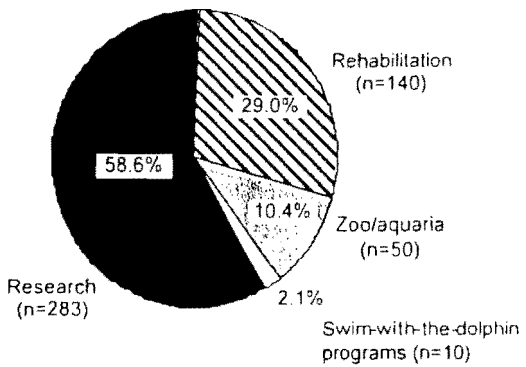
Mycoplasma found in seals can cause "seal finger" in humans. This painful and potentially serious disease can result from a seal bite or the infection of a pre-existing wound. Diligent hand washing is the best defense with infections often responding to tetracycline treatment.

Seal pox is a disease of stranded seals and can be encountered in rehabilitation centers. It can cause pox sores in humans that may persist for up to a year. There is no known effective treatment.

Leptospirosis contracted from seals and sea lions can cause serious disease in humans.

Reported injuries and illnesses in people who work with marine mammals

A total of 483 marine mammal workers responded to a recent survey about their health. The majority of respondents identified research as their primary type of marine mammal contact.



The survey showed that injuries and work-related illnesses are common.

In fact, **over half (54%) of workers reported having at least one injury or illness** that they believed directly resulted from contact with marine mammals. Most were cuts, scrapes, bites, and rashes. About 1 in 10 (11%) marine mammal workers reported developing **seal finger**.

Injury occurred in over half (52%) of workers while handling marine mammals or tissues. Of those injuries, over a third (36%) were severe (e.g. deep wound or fractured bone).

Several dangerous infections were reported by marine mammals workers, including **tuberculosis**, **leptospirosis**, and **brucellosis**.

Photo by Erica Dold

Regardless of experience and training, marine mammal workers are at risk of injury and infection.

Exposure to marine mammals can mean exposure to the infections they carry.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

NOAA Fisheries Guidelines for Handling Marine Mammals
October, 2006

Health Advisory: Marine Mammal Diseases

Like most animals, marine mammals can carry microbes that can cause illness in humans. Several diseases have possible transmission to humans; these include Brucella, Mycobacterium marinum, Mycoplasma, and Erysipelothrix. Other diseases are documented having public health significance such as the pox virus found in California seal lions and Harbor Seals. The parapox viruses of pinnipeds can cause isolated lesions on the hands of humans that have come in contact with infected marine mammals. This is not a life threatening virus, but an example that when working with marine mammals to use caution.

Recent findings of harbor porpoise strandings in the summer of 2006 bring to our attention a respiratory infection caused by the fungal organism *Cryptococcus gattii. C.gattii* was discovered at the southeastern end of Vancouver Island in 1999 and cases have been present in Dall's porpoise and Harbor porpoises since then. This disease is a recent discovery; human cases were first noted in 1999. However, animal cases were identified prior to 1999 in our region and concern is being raised over its potential to move from species to species. In light of this new finding it is a good time to review a few precautionary measures that will help prevent transmission of marine mammal diseases to humans. They are also applicable to other communicable diseases.

Please follow the below safety measures to prevent injury and illness:

- Obtain the recommended training, and follow all of your institution's safety procedures for safe animal handling.
- Wear gloves and other protective gear when handling animals and specimens.
- Use additional safety equipment when risks of acquiring an infection are high.
- Use necropsy, husbandry, and laboratory procedures that minimize the risk of cuts and injuries.
- Consult your physician before working with marine mammals and advise them of your work with, or any recent exposure to marine mammals if you are pregnant or have other health concerns.
- Wash hands thoroughly after animal and specimen contact.
- If you are bitten, cut, or injured while handling an animal or tissues, seek professional medical attention. Do not rely on first aid alone. Some of the diseases that could be transmitted are rarely encountered and may not be correctly diagnosed if a physician is not provided with an adequate history.

For more information please visit, http://www.vetmed.ucdavis.edu/whc/mmz/

UNITED STATES DEPARTMENT OF COMMERCE
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NATIONAL MARINE FISHERIES SERVICE
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7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

NOAA Fisheries Guidelines for Handling Marine Mammals
May 4, 2009

Health Advisory: *Coxiella burnetii*

Marine mammals can be infected with microbes that can also cause illness in humans. A recent finding in a harbor seal *(Phoca vitulina)* stranding in May 2008 in Westport, WA showed that the pregnant animal was dying of protozoal encephalitis and the placenta was suspected to be infected with an intracellular bacterium, known as *Coxiella burnetti.* A second suspect case of *C. burnetii* was identified from a pregnant female Steller sea lion *(Eumetopia jubatus)* that stranded fresh dead in Westport, WA. Cattle, sheep, and goats are the primary reservoirs of *C. burnetii.* Infection has been noted in a wide variety of other animals, including other species of livestock and in domesticated pets. *Coxiella burnetii* does not usually cause clinical disease in these animals, although abortion in goats and sheep has been linked to *C. burnetii* infection. Organisms are excreted in milk, urine, and feces of infected animals. Most importantly, during birthing the organisms are shed in high numbers within the amniotic fluids and the placenta. The organisms are resistant to heat, drying, and many common disinfectants. These features enable the bacteria to survive for long periods in the environment.

Humans are very susceptible to the disease, and very few organisms may be required to cause infection. Infection of humans usually occurs by inhalation of these organisms from air that contains airborne dust contaminated by dried placental material, birth fluids, and excreta of infected herd animals or by direct contact with these fluids. Veterinarians, farmers and others with occupational or recreational exposure to animals and their tissues are most likely to be affected.

In humans, infection is known as Q fever. Most acute cases of Q fever begin with sudden onset of one or more of the following: high fevers (up to 104-105° F), severe headache, general malaise, myalgia, confusion, sore throat, chills, sweats, non-productive cough, nausea, vomiting, diarrhea, abdominal pain, and chest pain. The disease can cause pneumonia, hepatitis and persistent weight loss. Most patients recover within several months; only 1%-2% of people with acute Q fever die of the disease.

Over the course of the last 8 years a number of pregnant harbor seals and post partum placentas have been evaluated microscopically and this is believed to be the first recognized case of *Coxiella* infection in a marine mammal in the Pacific Northwest. A previous case was reported in a harbor seal taken to rehabilitation and electively euthanized due to protozoal encephalitis at Marin County, California. Efforts to enhance collection and evaluation of reproductive tissues from harbor seals in the Pacific Northwest may be considered to further define the extent of infection and possible contribution to impaired reproductive performance.

In light of this new finding it is a good time to review a few precautionary measures that will help prevent transmission of marine mammal diseases to humans. They are also applicable to other communicable diseases.

Please follow the below safety measures to prevent injury and illness:

- Obtain the recommended training, and follow all of your institution's safety procedures for safe animal handling.
- Wear gloves and other protective gear when handling animals and specimens.
- When handling, collecting or moving aborted tissues, placentas, amniotic fluid, or fetal tissues from a pregnant animal, use special precautions such as a face mask.
- Use additional safety equipment when risks of acquiring an infection are high.
- Use necropsy, husbandry, and laboratory procedures that minimize risk of cuts and injuries.
- Consult your physician before working with marine mammals and advise them of your work with, or any recent exposure to marine mammals if you are pregnant or have other health concerns.
- Wash hands thoroughly after animal and specimen contact.
- If you are bitten, cut, or injured while handling an animal or tissues, seek professional medical attention. Do not rely on first aid alone. Some of the diseases that could be transmitted are rarely encountered and may not be correctly diagnosed if a physician is not provided with an adequate history.

For more information on Q fever please visit:
http://www.cdc.gov/ncidod/dvrd/qfever/index.htm.

Zoonotic Diseases

Zoonotic diseases are diseases that can be transmitted from animals to humans. There are known zoonotic diseases that come from marine mammals and have been transmitted to people working with them. A table is provided that contains examples of some of these diseases. This information is meant to educate volunteers on the importance of taking precautionary measures while working with marine mammals.

Use common sense and follow the guidelines put forth in the "Working with Marine Mammals and your Health".

Pathogens	**Symptoms**
Brucella spp.	Flu-like symptoms, bone pain
Calicivirus	Skin blisters / skin lesions
Coxiella burnetti	Q-Fever, headache, confusion, sore throat, chills, sweats.
Erysipelothrix sp.	
Leptospira sp.	Chills, headaches, myalgia, eye pain. Mild symptoms.
Mycoplasma spp. (Seal Finger)	Typically occurs after a pinniped bite and can cause swelling and severe pain in the joint of hands.
Seal poxvirus	Skin lesions

*Information in the above table is provided by the Programmatic Environmental Impact Statement for the Marine Mammal Health and Stranding Response Program and Marine Mammals Ashore: A Field Guide for Strandings.

For more information please visit:
http://www.vetmed.ucdavis.edu/whc/MMZ/dz_index.htm

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DISEASES OF AQUATIC ORGANISMS
Dis Aquat Org

Published August 19

Contribution to DAO Special 3: 'Marine vertebrate zoonoses'

OPEN ACCESS

Health risks for marine mammal workers

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ABSTRACT: Marine mammals can be infected with zoonotic pathogens and show clinical signs of disease, or be asymptomatic carriers of such disease agents. While isolated cases of human disease from contact with marine mammals have been reported, no evaluation of the risks associated with marine mammal work has been attempted. Therefore, we designed a survey to estimate the risk of work-related injuries and illnesses in marine mammal workers and volunteers. The 17-question survey asked respondents to describe their contact with marine mammals, injuries sustained, and/or illnesses acquired during their period of marine mammal exposure. Most respondents, 88% (423/483), were researchers and rehabilitators. Of all respondents, 50% (243/483) reported suffering an injury caused by a marine mammal, and 23% (110/483) reported having a skin rash or reaction. Marine mammal work-related illnesses commonly reported included: 'seal finger' (*Mycoplasma* spp. or *Erysipelothrix rhusiopathiae*), conjunctivitis, viral dermatitis, bacterial dermatitis, and non-specific contact dermatitis. Although specific diagnoses could not be confirmed by a physician through this study, severe illnesses were reported and included tuberculosis, leptospirosis, brucellosis, and serious sequelae to seal finger. Risk factors associated with increased odds of injury and illness included prolonged and frequent exposure to marine mammals; direct contact with live marine mammals; and contact with tissue, blood, and excretions. Diagnosis of zoonotic disease was often aided by veterinarians; therefore, workers at risk should be encouraged to consult with a marine mammal veterinarian as well as a physician, especially if obtaining a definitive diagnosis for an illness becomes problematic.

KEY WORDS: Marine mammal · Disease · Zoonoses · Occupational hazards · Seal finger

INTRODUCTION

Despite the fact that marine mammals can become sick due to infection with, or be healthy carriers of, viral, bacterial, fungal, and protozoal zoonotic pathogens (disease agents transmissible between animals and humans), the risk of acquiring disease by scientists, wildlife rehabilitators, and animal trainers handling marine mammals is not well understood (Buck & Schroeder 1990, Geraci & Ridgway 1991, Cowan et al. 2001). An example of a commonly seen marine mammal zoonotic disease includes 'seal finger,' a common skin infection reported in whalers and sealers caused by a mycoplasmal organism carried in the mouth and on the skin of marine mammals (Baker et al. 1998, Hartley & Pitcher 2002). Epidemics of food-borne illnesses, such as salmonellosis, trichinellosis, and toxoplasmosis, have also been reported in the native peoples of Arctic and Australasian regions who harvest marine mammals as part of a traditional diet (Cawthorn 1997, Tryland 2000). For example, botulism Type E, characterized by symmetric flaccid paralysis, was reported in western Alaska in people who had eaten a beached whale (McLaughlin et al. 2004).

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Zoonotic disease transmission as a result of occupational contact between marine mammals and humans has been reported, and these include infections of marine mammals with zoonotic agents, such as *Staphylococcus aureus* and *Vibrio parahemolyticus* (Palmer et al. 1991, Cowan et al. 2001), as well as gastritis and localized skin infections in attending veterinarians (P. Schroeder pers. comm.). Although hundreds of seal finger or seal finger-like cases have been reported in fishermen and sealers, only 8 cases in scientists or rehabilitators have been described in the scientific literature (Rodahl 1953, Markham & Polk 1979, Sargent 1980, Eadie et al. 1990, Cawthorn 1994, Baker et al. 1998, Hartley & Pitcher 2002). Cases of seal finger-like diseases in fishermen are more likely to be caused by *Erysipelothrix rhusiopathiae* acquired from fish (thereby more aptly named 'fish-handlers disease'), whereas cases acquired from marine mammals are presumably mostly caused by *Mycoplasma* spp. (Robson et al. 1998, Cowan et al. 2001). Other reports of marine mammal workers acquiring skin diseases include: 1 case of *Mycobacterium marinum* from a bottlenose dolphin *Tursiops truncatus* (Flowers 1970); 4 cases of *Erysipelothrix rhusiopathiae* from a beached pilot whale *Globicephala melaena* (Chastel et al. 1975); 1 case of a calicivirus, San Miguel sea lion virus, from northern fur seals *Callorhinus ursinus* (Smith et al. 1998); and 3 cases of sealpox from grey seals *Halichoerus grypus* (Hicks & Worthy 1987, Clark et al. 2005). Infections with *M. marinum* and *E. rhusiopathiae* caused painful dermal abscesses at the site of contamination, while the viral infections (sealpox and San Miguel sea lion virus) resulted in edematous nodules or vesicles.

In addition to skin infections, generalized zoonotic infections have been observed in marine mammal workers. One case of *Blastomyces dermatitidis* acquired from a bottlenose dolphin has been reported; a veterinarian treating the affected animal experienced a pustular dermatitis with lymphangitis and lymphadenitis (Cates et al. 1986). Similarly, transmission of *Mycobacterium bovis* from a New Zealand fur seal *Arctocephalus forsteri* to an oceanarium worker has been documented (Thompson et al. 1993), with the seal trainer experiencing a tuberculous pneumonia and severe airway obstruction. Lobo's disease (keloidal blastomycosis), caused by the fungus *Lacazia loboi* (formerly *Loboa loboi*), has also been transmitted from a captive bottlenose dolphin to a handler (Symmers 1983). Three researchers acquired leptospirosis from California sea lion *Zalophus californianus* carcasses and experienced acute nephritis and clinical signs consistent with acute renal failure (Baker et al. 1998). One laboratory worker developed brucellosis after handling tissues from an infected seal (Brew et al. 1999). Finally, 4 aquarium workers suffered severe purulent conjunctivitis caused by influenza A virus acquired from harbor seals *Phoca vitulina* (Webster et al. 1981).

These case reports document the potential for organisms in marine mammals to infect humans. However, they do not provide information on risk factors associated with humans acquiring such infections. Animal trainers, veterinarians, and volunteers who staff wildlife rehabilitation centers treating sick and injured marine mammals, as well as field researchers and workers at aquaria and oceanaria that exhibit marine mammals to the public, are likely to be at risk. During certain recreational activities, the public may also be at risk of transmitting diseases to and contracting diseases from marine mammals. Thousands of people visit oceanaria where contact with marine mammals (or the water in which they swim) is common. Many also participate in 'swim-with-the-dolphin' programs. In 1989, over 8000 people participated in these 'swim-with' programs in the USA alone (National Marine Fisheries Service 1990). While information on the injurious attacks made by dolphins on humans is available, less attention has been paid to the potential for transmission of infectious diseases (exceptions include Johnston & Fung 1969, Myers 1970, Streitfeld & Chapman 1976, Polley 2005). In addition, the interaction between diseased marine mammals and humans in these occupational contexts may increase the flow of pathogens between marine mammals and humans and contribute to the emergence of infectious disease.

The purpose of this study was to evaluate the risk of human injury and illness associated with marine mammal rehabilitation, captive management, and research activities by surveying a sample of people involved in these activities. While the results help to identify risk factors for marine mammal workers, the survey instrument was designed to protect the anonymity of the respondents; therefore, all injuries and illness were self-reported, and corroboration of specific diagnoses by physicians was not possible.

MATERIALS AND METHODS

Survey administration and participants. A 17-item questionnaire (Appendix 1) was formulated to evaluate risk of injury and illness associated with occupational contact with marine mammal species. After piloting the questionnaire with a small group of marine mammal workers and obtaining reviews by experts in the field, it was made available via the internet to over 5000 potential responders from 72 countries. Participants were sought primarily by email notices posted on the MARMAM listserv.[1] A paper-based version of the same questionnaire was also

made available to participants at both the Biennial Conference on the Biology of Marine Mammals (November 28 to December 3, 2001, Vancouver, British Columbia, Canada) and the International Association for Aquatic Animal Medicine (May 4 to 8, 2002, Albufeira, Portugal), as well as to individuals upon request. Postcards containing the questionnaire's web address were also provided at the conferences. Respondents participated in the survey in complete anonymity. Responses originating from the web-based questionnaire were collected electronically; the paper-based responses were received by mail at the Wildlife Health Center, University of California, Davis, California, USA.

Questionnaire content. The 17 questions (Appendix 1) allowed for evaluation of the respondents' interactions with marine mammals and the description of injuries and illnesses suffered by respondents during the time in which they were exposed to marine mammals. Questions regarding respondents' association with marine mammals addressed the primary nature of occupational contact (research, rehabilitation, zoo and aquaria employment, and 'swim-with-the-dolphin' programs), the duration and frequency of contact, the type of marine mammal-specific occupational training received, and specific modes of contact (direct contact with live marine mammals while out of water or while in the water with them, contact with water in which a marine mammal swam, contact with marine mammal excretions and/or vomitus, contact with tissue or blood samples from marine mammals, cleaning or repairing enclosures or equipment used in the care of marine mammals, and contact with dead marine mammals). Participants could select only one primary type of occupational contact but were allowed to indicate more than one type of training and specific modes of contact. Questions regarding respondents' injuries and illnesses were designed to explore the nature and duration of the injuries and associations with marine mammal contact. Note that injuries and illnesses were attributed by the respondents to their marine mammal contact; confirmation of each diagnosis by a physician was not possible using only the survey instrument. Additional questions concerned the demographics and health of the respondents and allowed respondents to describe any specific diagnoses and treatments received for their reported illnesses and injuries, including the success of those treatments.

[1]MARMAM is an edited e-mail discussion list which focuses on marine mammal research and conservation, run through the University of Victoria; publishers: Robin Baird & Megan Ferguson (marmamed@uvic.ca); http://whitelab.biology.dal.ca/marmam.htm

Data analysis. The prevalence of 4 health outcomes (trauma, skin rash/reaction, respiratory illness, and prolonged malaise) were calculated from the total number of respondents. The outcomes were further examined for severity and occurrence subsequent to or as a result of marine mammal contact.

Logistic regression was used to evaluate potential risk factors associated with the 4 outcomes using the backward stepwise likelihood ratio method (Daniel 1999). Odds ratios and 95% confidence intervals (CIs) were calculated in order to assess the magnitude of associations (SPSS, v. 11.0.1). Where appropriate, interaction terms among contact types, and duration and frequency of contact were included in the model.

RESULTS

Survey response and respondent characteristics

A total of 483 responses were received (45% male and 55% female respondents), 413 of which were collected via the internet. Respondents most frequently reported research as their primary type of occupational marine mammal contact (n = 283) (Fig. 1). Nearly 80% (386) of respondents reported receiving training in animal restraint and handling, 76% in tissue and blood sampling, 44% in infectious disease prevention protocols, and 49% in occupational safety. Most respondents (392) had substantial exposure to marine mammals with >5 yr of experience and/or >50 d yr^{-1} of contact (Figs. 2 & 3).

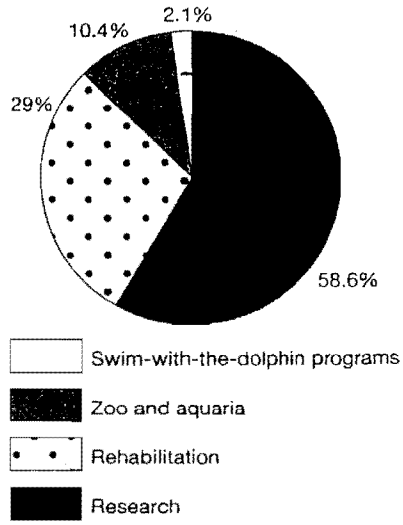

Fig. 1. Primary type of marine mammal contact reported by marine mammal workers (n = 483)

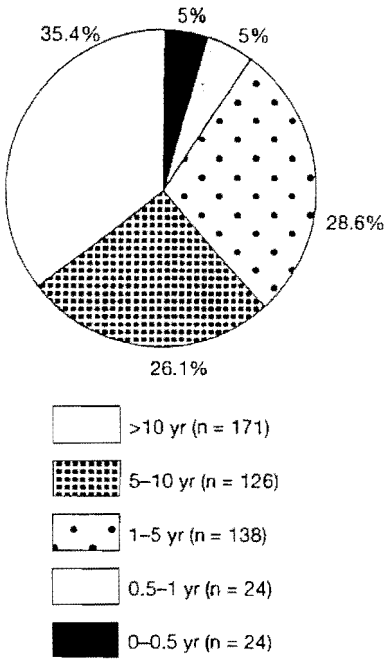

Fig. 2. Duration (yr) of marine mammal contact reported by marine mammal workers (n = 483)

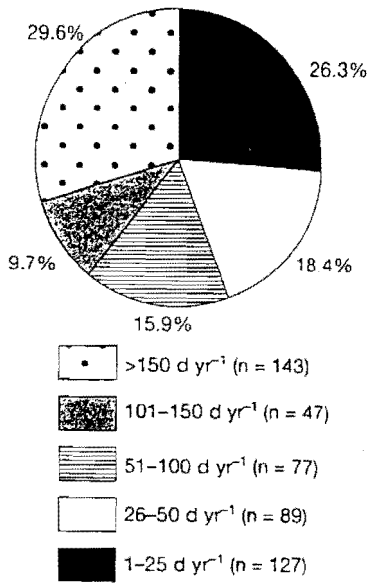

Fig. 3. Frequency (d yr^{-1}) of marine mammal contact reported by marine mammal workers (n = 483)

Of all 483 respondents, 64% (308) reported having had an injury or illness during the time they were in contact with marine mammals and 54% (261) believed they had contracted an illness or injury as a direct result of marine mammal contact. Types of injuries and illnesses are shown in Table 1.

Trauma

A total of 251 (52%) respondents suffered a traumatic injury as a result of working with marine mammals. Injuries were primarily located on the extremities (n = 218; 89%) but were also incurred on the torso or abdomen (20; 8%) and on the face (11; 4%). Ninety (36%) of those reporting trauma suffered 1 or more severe injuries, including: a deep wound (77), a deep wound requiring stitches (26), or a fractured bone (10). Other severe injuries described included a dislocated shoulder and an amputation. Also, 38 (15%) reported having been bitten. Of the total number of reported injuries, 5 were self-inflicted traumas, including needle sticks and necropsy knife cuts.

The results of a multivariate logistic regression analysis showed that statistically significant risk factors ($p < 0.05$) associated with traumatic injuries included marine mammal contact duration of >5 yr; contact frequency of >50 d yr^{-1}; and having contact specifically with live animals, excretions and/or vomi-

Table 1. Self-reported health problems attributed to marine mammal contact by marine mammal workers (n = 483). Number of commonly reported health problems are detailed in sub-categories

Health problem	Total
Trauma	**251**
Deep wounds	77
Bites	38
Wounds requiring stitches	26
Fractures	10
Skin reactions	**72**
Erysipelothrix rhusiopathae[a]	4
Erysipeloid infections[b]	3
Mycoplasma spp.[b]	2
Other bacterial infections[a]	5
Sealpox	2
Inflammation post necropsy	4
Contact dermatitis	4
Non-specific rashes	10
Respiratory illness	**18**
Tuberculosis pneumonia	2
Bronchitis	2
Non-specific irritation	12
Generalized symptoms & prolonged illness	**14**
Brucellosis[b]	2
Leptospirosis[a, b]	2
Erysipelothricosis[a]	1
Tuberculosis pneumonia[a]	1
Conjunctivitis	3
Systemic effects after traumatic injury (no specific etiology given)	5

[a]Agent was cultured from patient
[b]Agent was suspected in diagnosis

tus, or blood and tissue samples. The factors related to time carried the highest risk, with those exposed most frequently having 23 times (95% CI 5.3–99.3) greater odds of experiencing a traumatic injury and those exposed for the longest duration having 19 times (95% CI 3.9–87.4) greater odds of experiencing a traumatic injury than workers with less exposure. Having both exposure to enclosures and equipment and a contact duration of >5 yr also quadrupled the odds of injury (95% CI 1.3–10.5) above workers who primarily had contact with marine mammal carcasses and a shorter contact duration. Conversely, having worked with tissue or blood samples combined with >5 yr of marine mammal experience decreased odds for injury. Interacting with live marine mammals combined with a contact frequency of >50 d yr^{-1} was similarly protective for trauma (Table 2).

Table 2. Risk factors for injury of marine mammal workers. Adjusted odds ratios calculated using multivariate logistic regression; reference category for each estimate includes respondents not reporting exposure to the specific risk factor of interest (95% CI: confidence interval). EF: exposure frequency; ED: exposure duration

Risk factors	Number at risk (n = 483)	Adjusted odds ratio (95% CI)
ED >5 yr	297	18.5 (3.93–87.40)
EF >50 d yr^{-1}	267	23.0 (5.32–99.28)
Contact with live marine mammals	385	7.1 (2.10–23.901)
Contact with tissue/blood samples	407	3.0 (1.33–6.78)
Contact with marine mammal excretions/vomitus	365	3.3 (1.72–6.53)
Cleaning or repairing enclosure/equipment	259	1.3 (0.73–2.28)
Cleaning or repairing enclosure/equipment & ED >5 yr	159	3.7 (1.33–10.50)
Contact with tissue/blood samples & ED >5 yr	266	0.1[a] (0.22–0.58)
Contact with live marine mammals & EF >50 d yr^{-1}	236	0.1[a] (0.22–0.50)

[a]Protective

Table 3. Risk factors for skin rash/reaction in marine mammal workers. Adjusted odds ratios calculated using multivariate logistic regression; reference category for each estimate includes respondents not reporting exposure to the specific risk factor of interest (95% CI: confidence interval)

Risk factors	Number at risk (n = 483)	Adjusted odds ratio (95% CI)
Exposure duration >5 yr	297	1.8 (1.15–2.79)
Exposure frequency >50 d yr^{-1}	267	1.7 (1.10–2.72)
Contact with marine mammal excretions/vomitus	365	2.2 (1.08–4.27)
Cleaning or repairing enclosures/equipment	259	1.9 (1.12–3.14)

Skin conditions

From the total number of respondents, 113 (23%) reported having a skin rash or reaction during the time they worked with marine mammals; 73 of these (64%) reported that their skin rash or reaction occurred after direct contact with a marine mammal, while 36 (32%) reported that the ailment appeared after a bite from a marine mammal. The odds of workers acquiring a skin rash or reaction were doubled by having marine mammal contact for >5 yr (95% CI 1.2–2.8) or >50 d yr^{-1} (95% CI 1.1–2.7); by having contact with marine mammal excretions and/or vomitus (95% CI 1.1–4.3); and by cleaning or repairing enclosures or equipment (95% CI 1.1–3.1; Table 3).

Illnesses commonly reported by survey participants included seal finger (*Mycoplasma* spp. or *Erysipelothrix rhusiopathiae*); viral dermatitis (poxvirus or herpesvirus); bacterial infections (including *Clostridium perfringens*, *Staphylococcus aureus*, *Mycobacterium marinum*, *Corynebacter* spp., *Pseudomonas* spp., *Vibrio* spp., *Pseudomona* spp.); and non-specific contact dermatitis. The number of respondents that reported seal finger was 55 (11%); however, no statistically significant risk factors specifically associated with acquiring seal finger were identified.

Respiratory illness

Out of all of respondents, 18% (n = 89) reported experiencing respiratory illness during the time they worked with marine mammals. Of these, only 20% (18) believed their ailment to be the result of marine mammal contact. Seven of these worked in a rehabilitation setting, 8 in research, and 3 in an oceanarium. Increased frequency of contact was associated with a higher risk of respiratory illness, with workers exposed >50 d yr^{-1} being 3 times more likely to have a respiratory illness than workers with less annual exposure (95% CI 1.9–5.4).

Generalized symptoms and prolonged malaise

Of all respondents, 6% (n = 30) reported having suffered prolonged malaise while they worked with marine mammals. Of these, 30% (9) believed their ill-

ness was due to marine mammal contact. Most of these cases (5 of 9) were never definitively diagnosed despite all 9 workers seeking medical treatment. There were no statistically significant risk factors associated with prolonged malaise.

DISCUSSION

While the internet has become a useful tool for administering health surveys, it possesses many of the same flaws of paper-based or in-person surveys. Persons who have experienced a significant impact to their health are much more likely to remember it and to recount it in such a survey, while people who have not experienced adverse health are less likely to respond, leading to a possible non-response bias (Kuusi et al. 2004). Therefore, our data may overestimate the actual risk of injury and illness in people who contact marine mammals. On the other hand, 58.6% of the survey respondents were members of the research community. As a result of their scientific training, these respondents may have been more likely to require evidence of causation rather than assume that their injuries and illnesses were linked with their marine mammal exposure. The potential for overestimation of prevalence of injury and illness might have been countered by responding scientists' conservative linkages of those injuries and illnesses to marine mammal causes. Written comments by respondents provided evidence that many were aware of the health risks associated with their occupational activities and were making informed decisions regarding their work with marine mammals. One respondent commented, 'Considering the hundreds of necropsies and many months of crawling through fur seal rookery muck (splashed in the face many times), I feel I have really suffered very little in spite of the risks to which I was exposed.' It is also feasible that there could have been rare cases of death resulting from marine mammal contact, making the affected individual unavailable for response. Such deaths are undoubtedly extremely rare or coincidental to marine mammal contact and are unlikely to have influenced estimates; however, we were contacted by the spouse of a marine mammal worker whose husband died after a bite from a pinniped reportedly as a result of a severe hypersensitivity reaction (data not included in analyses).

The most common health problems reported by marine mammal workers were traumatic injuries. Over half of participants reported having been injured by a marine mammal. The analysis of risk factors suggests that individuals who worked in marine mammal facilities or research >5 yr and those exposed to such work >50 d yr^{-1} had the highest risk for injury. It is logical that prolonged and frequent exposure increased risk for injury proportionately with frequency of contact.

Most injuries described were cuts and scrapes, followed in frequency by bites. It appears that individuals who worked with *live* marine mammals >50 d yr^{-1} acquired the skills to mitigate injury, as these occupational exposures in combination were protective. This finding is interesting but not unexpected, as individuals allowed to handle marine mammals on a regular basis are likely the most highly trained and trusted employees.

Cleaning or repairing enclosures or equipment was not a significant individual risk factor for injury. Yet when combined with prolonged exposure (>5 yr), this duty carried an increased risk, making workers over 3 times more likely to be injured than cleaning or repairing enclosures or equipment alone. The interaction between these 2 factors supports the logical assertion that prolonged exposure to a risk factor may increase workers' odds of injury. In addition, individuals who had years of experience with these cleaning and repairing duties may have become less vigilant about safety precautions.

While the highest risks of traumatic injury were associated with direct exposure to live marine mammals, people who had contact with tissue or blood samples and those who contacted excretions and vomitus did have elevated and nearly equivalent odds of injury. Given the nature of the exposure, it is likely that the techniques used to collect and process biological samples involved needles, knives, and scalpels, placing the workers at risk of cuts and scrapes. In contrast to the findings associated with cleaning or repairing enclosures, experience (>5 yr) in these workers decreased risk, suggesting that marine mammal workers in technically-demanding or highly-trained positions may be more careful or have developed techniques to safely perform their duties and avoid personal harm. It may also be possible that individuals in these technically-demanding positions have advanced into more administrative positions over time, thereby increasing their duration of exposure but decreasing their frequency of contact and risk of injury over the years.

Although it is difficult to generalize among different types of occupational exposure, our findings are consistent with the reported nonfatal cases of work-related injuries and illnesses that are recorded by employers under the Occupational Safety and Health Administration's Survey of Occupational Injuries and Illnesses. This study found injuries to be the most common health problem reported in USA workers, and skin ailments to be the second most prevalent non-fatal illness (National Institute for Occupational Safety and Health 2000). Nearly one quarter of our respondents reported experiencing a skin rash or reaction. As with

injury, people with longer and more frequent exposure were at higher risk for skin ailments. These skin reactions were often associated with exposure to excretions/vomitus and cleaning or repairing activities, and may have been in part due to the handling of caustic and harsh cleaning solutions, as most of the skin reactions were described as contact dermatitis or rashes. Rashes were a common written complaint in individuals handling dead marine mammals. Reaction to something on or growing in decomposing whale flesh was repeatedly described. For example, one survey respondent reported that 'the rash was contracted immediately following direct and prolonged contact with deteriorating whale carcasses; the areas affected were those that were in direct contact with the carcasses; other members of the team had same symptoms after the same type of contact with same animals.'

The skin disease commonly referred to as seal finger deserves particular discussion. More than 10% of participants reported having experienced seal finger, and at least half of those affected sought diagnostics and treatment from a physician. *Mycoplasma phocacerebrale* was identified as the likely etiologic agent (Baker et al. 1998); however, seal finger was previously described as being caused by *Erysipelothrix rhusiopathiae*. Cutaneous infections resulting from both of these organisms are clinically similar. The inoculation site is usually extremely painful, swollen, and erythematous with lymphadenitis being common (Thompson et al. 1993, Robson et al. 1998, Hartley & Pitcher 2002). Unfortunately, the recommended treatments are very different. *E. rhusiopathiae* is responsive to penicillins, cephalosporins, and erythromycin, while *Mycoplasma* spp. are usually resistant to the aforementioned antibiotics and responsive to tetracyclines. Improper treatment of infections caused by either of these organisms could result in local and hematogenous spread, leading to tenosynovitis, osteomyelitis, and, in the case of *E. rhusiopathiae*, endocarditis. This severity was illustrated by one participant who reported suffering a prolonged malaise >6 mo with 'life threatening toxemia/encephalopathy' as a sequela to a 'minor skin cut' acquired while working with a harbor porpoise carcass. *E. rhusiopathiae* was cultured from the infection, and despite treatment with 3 different antibiotics, amputation of the affected digit 'proved life-saving.'

Prolonged malaise and respiratory illnesses were infrequently reported; therefore, substantial risk factors were not identified. However, considering the seriousness of the diseases suspected or reportedly diagnosed (including tuberculosis, brucellosis, and leptospirosis), educating workers and volunteers about these zoonotic diseases is very important. They may be difficult to diagnose and can be debilitating or life-threatening for the patient. One participant suffered for more than 6 mo from a tuberculous pneumonia that her physician attributed to her work with dolphins. Unfortunately, the documentation provided in the survey response did not allow for other possible routes of transmission to be examined. Nonetheless, this marine mammal rehabilitation volunteer experienced night sweats, weight loss, chronic fatigue, and anemia; she was treated for 9 mo with isoniazid for the tuberculosis and 'dozens of antibiotics' for secondary bacterial infections. She wrote that she 'had always been an extremely healthy person,' but now is in search of 'continued medical assistance.' Another participant suffered multiple relapses of a respiratory illness (2 to 4 times per year with a 2 to 4 wk duration) during his 3 yr of rendering marine mammal tissues. His illness was characterized by 'non-specific symptoms,' and differential diagnoses included chronic fatigue syndrome, multiple sclerosis, and brucellosis (since 10% of the tissues with which he worked were positive for *Brucella* spp.). A specific diagnosis was never confirmed. This researcher was treated with various antibiotics, some of which improved symptoms temporarily, but the illness recurred.

These cases illustrate a common complaint among respondents: their physicians were inadequately informed about the pathogens that could be transmitted from marine mammals. The variability in risk communication from physician to patient appeared to be very high, with some physicians immediately investigating possible marine mammal zoonoses and others dismissing potential transmission altogether. For example, one participant was told by his physician that there were 'no diseases that could be transmitted from whales to humans — so don't worry about it.' When knowledgeable, patients educated their physicians about the pathogens that marine mammals carry. Multiple respondents reported consulting with wildlife and zoo veterinarians in order to provide adequate information to their physicians on follow-up visits. Since this survey was completed, a pinniped researcher contacted us for advice about confirmation of a diagnosis of a chronic illness characterized by severe headaches: the person had been diagnosed as having leptospirosis by a physician, although all laboratory tests were negative. After a veterinarian's suggestion, further tests were performed indicating the person was suffering from brucellosis, and treatment was changed accordingly.

The prevalence of these severe health problems should not be estimated from these survey results since the occurrences were rare and involved a level of self-diagnosis that may not be completely reliable. However, the accounts of the above participants' illnesses are not unlike case reports of similar illnesses found in the scientific literature in which the suspected organ-

ism was demonstrated by laboratory testing as being linked to a marine mammal. In 1988, a seal trainer from Western Australia was diagnosed with tuberculosis caused by *Mycobacterium bovis*. Diagnosis was made after the trainer developed night sweats, weight loss, exercise intolerance, and a dry productive cough. Bacterial isolates from the trainer and the seals with which he worked were identical based on gel electrophoresis (Brew et al. 1999). Similarly in 1999, a laboratory worker handling marine mammal isolates of *Brucella* suffered from 'continuing headaches, lassitude, and severe sinusitis.' *Brucella* organisms cultured from blood samples of the researcher were indistinguishable from the marine mammal *Brucella* isolate (Brew et al. 1999).

People who work with and around marine mammals are at risk for incurring injury and acquiring zoonotic diseases. Individuals working with marine mammals at least 1 d wk^{-1} are at the greatest risk of injury. Full-time workers and committed volunteers should be advised of the associated risks, and should be encouraged to take the proper safety precautions to minimize exposure to zoonotic diseases. Longer and more frequent exposure to marine mammals increases workers' odds of experiencing a skin ailment, and workers in contact with marine mammal carcasses, excretions, and vomitus must be especially diligent in personal hygiene. Although rare, serious sequelae can result from a seemingly minor skin wound or respiratory infection.

Based on these findings, continued adherence to safety guidelines and the use of protective clothing are recommended to decrease the occurrence of adverse health effects in marine mammal caretakers and researchers. Training of workers, students, and volunteers handling marine mammals should include education on disease risks associated with the zoonotic pathogens that both people and animals carry. Facilities housing marine mammals are encouraged to evaluate risks to their staff and volunteers through disease screening and prevention programs. This information and descriptions of commonly and infrequently reported ailments and their treatments are now available to physicians caring for patients who have contact with marine mammals at www.vetmed.ucdavis.edu/whc/mmz.

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Appendix 1. Questionnaire on marine mammal pathogens that can infect humans. Supported by the Marine Mammal Commission in conjunction with the National Marine Fisheries Service (NMFS)

All information provided is anonymous and strictly confidential

1. How long have you worked in direct contact with marine mammals? (Check one)

❑ Never ❑ 0 to 0.5 years ❑ 0.5 – 1 year ❑ 1 – 5 years ❑ 5- 10 years ❑ More than 10 years

2. On average, how often do (did) you come in contact with marine mammals? (Check one)

❑ 0 days ❑ 1 – 25 days ❑ 26 – 50 days ❑ 51 – 100 days ❑ 101- 150 days ❑ More than 150 days

3. Please indicate situations that describe your work. (Check all that apply)

❑ Direct contact with live marine mammals while you are in the water with them
❑ Direct contact with live marine mammals while you are out of water
❑ Contact with water in which a marine mammal has swum
❑ Contact with marine mammal excretions and/or vomitus
❑ Contact with tissue or blood samples from a marine mammal
❑ Cleaning or repairing enclosures or equipment used in the care of marine mammals
❑ Contact with dead marine mammals

4. The majority of your contact with marine mammals is (was) in the area of: (Select one)

❑ Research ❑ Rehabilitation ❑ Zoo/aquarium ❑ "Swim with" program

5. Please indicate your training related to marine mammals. (Check all that apply)

❑ Animal restraint/handling ❑ Tissue/blood sampling ❑ Infectious disease prevention ❑ Occupational safety

6. During the time in which you HAVE BEEN in contact with marine mammals, did you ever suffer a traumatic injury caused by the animals? ❑Yes ❑No

If Yes, indicate the number of times you had an injury matching the following descriptions (estimates OK).

_____ Located on extremities (i.e. hands, arms)
_____ Located on face
_____ Located centrally (i.e. torso, abdomen)
_____ Superficial scratch or scrape
_____ Cut
_____ Deep wound
_____ Deep wound that required stitches
_____ Fractured bones
_____ Other (describe)
_____

7. During the time in which you were in contact with marine mammals, did you develop a skin rash or reaction? ❑Yes ❑No

If yes, indicate the number of times you had a rash or reaction matching the following descriptions (estimates OK).

_____ Reddened
_____ Painful
_____ Itchy
_____ Nodular (raised and hard)
_____ Swollen (raised and soft)
_____ Involved a joint
_____ Oozing
_____ Blister or fluid filled
_____ Located mainly on hands
_____ Located on other places on the body
Specify_____

Did the lesions ever appear subsequent to direct contact with a marine mammal? ❑Yes ❑No
Did these lesions ever appear after a bite from a marine mammal? ❑Yes ❑No
Were these lesions examined by a medical doctor? ❑Yes ❑No
If yes, what were the doctor's diagnoses? _____

Appendix 1. (continued)

8. During the time in which you Have Been in contact with marine mammals, did you experience any respiratory illnesses? ❑Yes ❑No

If yes, approximately how often

❑ Once or twice ❑Once per year ❑2-4 times per year ❑5-10 times per year

❑More than once per month

How long was the longest episode?

❑ Less than a week ❑ 1-2 weeks ❑2-4 weeks ❑ 1-6 months ❑ More than six months

Do you believe any of these occurrences to be a result of your contact with marine mammals? ❑Yes ❑No

If yes, please explain. _____

_____

Were any of these illnesses diagnosed by a medical doctor? ❑Yes ❑No

What were the doctor's diagnoses? _____

9. During the time in which you were in contact with marine mammals , did you ever experience prolonged malaise? ❑Yes ❑ No

If yes, how often

❑ Once or twice ❑ Once per year ❑ 2-4 times per year ❑ 5-10 times per year

❑More than once per month

How long was the longest episode?

❑ Less than a week ❑ 1-2 weeks ❑ 2-4 weeks ❑ 1-6 months ❑ More than six months

Do you believe any of these occurrences to be a result of your contact with marine mammals? Yes No

If yes, please explain. _____

_____

Was this illness diagnosed by a medical doctor? ❑Yes ❑No

What was the doctor's diagnosis?

_____

10. Please describe any additional symptoms from which you suffered during the time you were in contact with marine mammals? (Check all that appply)

- ❑ Fever
- ❑ Headache
- ❑ Diarrhea
- ❑ Nausea or Vomiting
- ❑ Fatigue and/or weakness
- ❑ Joint pain
- ❑ Yellow skin and eyes
- ❑ Red, runny eyes
- ❑ Ulcers on the eyes

11. Have you ever been diagnosed with complications or disease from any of the following? (Check all that appply)

- ❑ Aeromonas
- ❑ Corynebacterium
- ❑ Mycobacteria tuberculosis
- ❑ Mycoplasma
- ❑ Pseudomonas
- ❑ Streptococcus
- ❑ Poxvirus (Seal & Dolphin Pox)
- ❑ Herpes virus
- ❑ Blastomycoses
- ❑ Brucella
- ❑ Erysipelothrix
- ❑ Mycobacteria bovis
- ❑ Pasteurella
- ❑ Salmonella
- ❑ Vibrio
- ❑ Influenza
- ❑ Rabies
- ❑ Candida
- ❑ Clostridia
- ❑ Leptospira
- ❑ Mycobacteria murium
- ❑ Proteus
- ❑ Staphylococcus
- ❑ Calicivirus (San Miguel Sea Lion Virus)
- ❑ Adenovirus (Sea Lion Hepatitis)
- ❑ Rotavirus
- ❑ Aspergillosis

12. Have you ever had sealfinger? ❑Yes ❑No

13. Do you believe any of your described illnesses to be a result of contact with marine mammals? ❑ Yes ❑ No

If yes, please Explain: _____

_____

_____

Appendix 1. (continued)

14. Have you ever had a positive tuberculosis test during the time you were in contact with marine mammals? ❑Yes ❑No ❑Not tested

If Yes, was this by skin test or chest x-ray

15. Please indicate your gender: ❑ Male ❑ Female

If female, did you ever have a miscarriage during the time you were in contact with marine mammals? ❑ Yes ❑ No

16. Do you consider your immune system to be intact? ❑ Yes ❑No

17. Please list medical treatments for specific problems listed above and their success or failure:

Editorial responsibility: Michael Moore, Woods Hole, Massachusetts, USA

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Deterring Problem Seals & Sea Lions (Pinnipeds)

http://www.nwr.noaa.gov/Marine-Mammals/Seals-and-Sea-Lions/Index.cfm

Questions & Answers on Potential Deterrence of Pacific Harbor Seals & California Sea Lions from Fishing Gear, Catch & Property

Q. Why is NOAA Fisheries Service talking about the deterrence of Pacific harbor seals and California seal lions?
A. Since the passage of the Marine Mammal Protection Act (MMPA) in 1972, populations of California sea lions and Pacific harbor seals have increased dramatically, and are now considered healthy and robust. The increased abundance has been accompanied by a growing number of interactions with humans, raising concerns by private citizens and government officials who are seeking ways to protect property, fishing gear, and catch from damage by sea lions and seals.

The MMPA generally prohibits the harassment, hunting, capturing, or killing of marine mammals, or any attempt to engage in such activities. However, the law does contain exceptions authorizing certain people under certain circumstances to deter marine mammals from damaging private property, including fishing gear and catch, so long as the methods used do not result in the death or serious injury of an animal. To reduce the risk of causing "serious injury" to an animal, deterrence methods should be chosen that avoid penetration or tearing of skin, or rupture of an eye.

Q. What deterrence methods for Pacific harbor seals and California seal lions are available to the public?
A. NOAA Fisheries Service is developing formal guidelines and regulations for safely and legally deterring marine mammals. That guidance is not yet available, so in the interim, the agency is providing this advice for deterring Pacific harbor seals and California seal lions. *See potential deterrence methods (PDF 48KB).*

There is no single non-lethal deterrence method known to be universally effective in discouraging Pacific harbor seals and California seal lions from engaging in problem behaviors. Nevertheless, these methods and techniques have been found useful, in some circumstances, for deterring problem animals that are damaging property, fishing gear or catch. These lists (PDF 48KB) are methods property owners and fishers may consider for use under the appropriate conditions. **Note:** Some of the methods listed (such as loud noise or pyrotechnics) may not be appropriate for use in some areas, or are subject to prohibition under federal, state or local ordinances. The presence of Endangered Species Act-listed species in some areas may advise against the use of certain methods. Please

consult with local authorities to determine if such prohibitions exist in your area, or if ESA-listed species may be encountered.

Q. Which sea lion and seal species may be deterred by the public?
A. Only marine mammals that are not listed under the Endangered Species Act (ESA) may be deterred to protect private property, including gear and catch (read more). ESA-listed and non-ESA-listed species of sea lions and seals that occur in coastal and inland waterways of California, Oregon and Washington are:

ESA-Listed Species *(may NOT be deterred by public)*	**Non-ESA-Listed Species** *(may be deterred by public)*
Steller Sea Lion *(Threatened)*	Pacific Harbor Seal
	California Sea Lion

Q. May I deter a Pacific harbor seal or California seal lion that is hauled out on a beach or breakwater, or is swimming in an area where I want to fish?
A. The MMPA does not allow private citizens to deter marine mammals from undeveloped property (e.g., a beach) or public property (e.g., a breakwater). Private citizens may deter only Pacific harbor seals and California seal lions that are exhibiting problem behavior resulting in, or that could result in, damage to private property, fishing gear or catch.

Q. Do the MMPA and ESA grant additional authority to government officials?
A. Yes. The MMPA and ESA provide authority to city, county, state and federal government officials or their employees to deter "nuisance" marine mammals to prevent damage to public property or to protect the public from potential threats by a nuisance animal.

Q. What limits or constraints apply to the public when deterring Pacific harbor seals or California seal lions?
A. Deterrence of Pacific harbor seals and California seal lions may not result in the following:

- Serious Injury or Mortality - The MMPA authorizes deterrence using non-lethal methods only. Deterrence cannot result in the death or serious injury of marine mammals. NOAA Fisheries Service has defined "serious injury" in regulations to include an injury that is likely to lead to the death of the affected marine mammal.
- Deterrence of ESA-Listed Species - As noted above, the intended or unintended deterrence of threatened or endangered marine mammals is not allowed.
- Violation of Federal or State Laws or Local Ordinances - The use of some deterrence methods may be prohibited or restricted by federal, state or

local governments. For example, a city or county may prohibit the use of, or require special permits for, pyrotechnics. It is your responsibility to check with appropriate authorities to ensure that any deterrence methods used comply with local, state and federal requirements.

- Risk to Human Safety - Some of these techniques may cause injury to you and/or other people. If you deter a seal or sea lion in such a manner that you cause injury to anyone, you may be liable for your actions.
- Taking of Non-Target Marine Mammals - Deterrence is not authorized if it will result in the death, serious injury, or harassment of non-target marine mammals (i.e., individuals other than those causing damage to private property, gear or catch.

Q. Who may deter sea lions or seals?
A. In summary, certain private citizens, marina owners, government officials, and commercial and recreational fisherman may deter sea lions and seals under certain conditions, as described below:

- Private Citizens - Only the owner of the private property (e.g., a dock or vessel) may deter Pacific harbor seals and California seal lions to prevent damage to their private property.
- Marina Owner - Only the marina owner, or an employee of the owner, or an agent of the owner may deter Pacific harbor seals and California seal lions to prevent damage to the marina.
- Government Officials - City, county, state or federal officials or their employees may deter listed and non-ESA-listed sea lions and seals determined to be "nuisance" animals to prevent damage to private or public property, or to protect the public from potential threats.
- Commercial and Recreational Fishermen - Fishermen can deter Pacific harbor seals and California seal lions from damaging gear or depredating catch, only if they are actively fishing.

Seal & Sea Lion Facts of the Columbia River & Adjacent Nearshore Marine Areas

(May 2006)

Pacific harbor seals, California sea lions and Steller sea lions frequent the lower Columbia River and adjacent nearshore marine areas. Other pinnipeds, such as northern fur seals and elephant seals, are occasionally present in this area, but not in great numbers or for very long.

A 2003 census of California sea lions placed their population at about 250,000 animals. California sea lions are present in the lower Columbia during much of the year except in summer months (June-August) when most animals return to breeding rookeries in southern California.

There are two stocks of Steller sea lions in the North Pacific. The stock found off California, Oregon and Washington, British Columbia and Southeast Alaska – referred to as the Eastern stock – numbers about 31,000 animals. Steller sea lions are present year-round at the mouth of the Columbia River.

Several stocks of Pacific harbor seals make up the species in West Coast waters. The Oregon/ Washington coastal stock is estimated to be about 25,000 animals. They're present throughout the year at the mouth of the Columbia.

All seals and sea lions are protected by the Marine Mammal Protection Act (MMPA). The Eastern stock of Steller sea lions is also listed as a threatened species under the federal Endangered Species Act (ESA).

During a typical day in May, approximately 3,000 Pacific harbor seals, 1,000 Steller sea lions, and 800 California sea lions can be observed resting on haul-out sites (such as jetties) in the Columbia River estuary. These seals and sea lions feed in both the Columbia River and adjacent nearshore marine areas. They eat a variety of marine and estuarine prey, including squid, smelt, herring, flatfish, perch, pollock, hake, rockfish and salmon. Based on scat samples collected from several Pacific Northwest estuary and ocean sites (including the Columbia River estuary), salmon species generally make up 10-30 percent of these animals' diet.

During the spring migration of smelt, lamprey, salmon and steelhead, it's common for seals and sea lions to follow these prey species into fresh water upstream of Longview, Wash. (river mile 67), up to Willamette Falls (RM 129) and Bonneville Dam (RM 145). As many as 300 seals and sea lions are known to feed in these upriver areas. Some of these animals stay for a couple of days in fresh water, and others for longer. During these freshwater hunting trips, some of these animals feed heavily on salmon and steelhead. For example, one such animal – identified by brand #C404 – has been observed eating steelhead and spring Chinook salmon below Bonneville Dam for days to weeks during the spring of 2003 through 2006.

No estimate is available for the percentage of spring salmon or steelhead consumed by seals and sea lions in the Columbia or Willamette rivers. However, direct observation of winter steelhead killed in a small area below Willamette Falls 1996-2002, ranged from 0.3 percent to 5.5 percent of the adult return. In the tailrace of Bonneville Dam, the numbers ranged from 0.4 percent of the spring run of salmonids in 2002, and increased to 3.4 percent in 2005. These estimates pertain only to the Willamette and Bonneville study areas, and do not represent the total pinniped impacts on salmon and steelhead in a given year in the Columbia Basin.

In comparison, California sea lions at the Ballard Locks, in Seattle, Wash., were documented to consume as much as 60 percent of the annual run of winter steelhead.

The MMPA and ESA include provisions that allow federal, state and local governments (employees or officials in the course of their duties) to intentionally take marine mammals, if the taking is done in a humane manner and is for: (a) the protection or welfare of the mammal; (b) the protection of the public health and welfare; or (c) the **non-lethal removal** of nuisance animals.

Implementation of non-lethal deterrence methods on nuisance seal and sea lions is costly and results are variable. Federal and state biologists have found that nuisance seal and sea lion feeding patterns can be disrupted through the use of non-lethal deterrence, but no one technique (or combination of techniques) has been universally effective. For example, fish and wildlife agency personnel using various hazing techniques have been only modestly successful at reducing California sea lion predation on salmon and steelhead below Bonneville Dam. However, the same non-lethal hazing methods have been very successful in reducing Steller sea lion predation on Columbia River sturgeon in the same area.

Members of the public may take steps to deter problem seals and sea lions from damaging their property, fishing gear, and catch. There are methods *(PDF 30KB)* property owners and fishers may consider for use under the appropriate conditions. **Note:** Some of the methods listed (such as loud noise or pyrotechnics) may not be appropriate for use in some areas, or are subject to prohibition under federal, state or local ordinances. The presence of Endangered Species Act-listed species in some areas may advise against the use of certain methods. Please consult with appropriate authorities to determine if such prohibitions exist in your area, or if ESA-listed species may be encountered.

More information on West Coast pinnipeds, their impact on fish stocks, and the increasing interaction between pinnipeds and humans is available at http://www.nwr.noaa.gov/Marine-Mammals/index.cfm.

Level A

Level A form guidance- Is the animal stranded? Do I fill out a Level A form?

Situation	Fill out Level A?
Phone report of dead animal with no network response	YES (if sufficient information and/or photos)
Live seal pups on the beach- fill out Level A if you take action such as assessing injury, relocating the pup, transferring to rehab (no Level A if pup is healthy and the only response was posting signs or babysitting)	YES
All dead animals- including on rookeries if information is available	YES
Oil spills- all dead and live stranded animals that are oiled/suspected oiled	YES
Entanglements Live animals swimming with fishing gear, net, debris (reported or disentanglement response)	NO- provide information to Brent/Lynne- a new reporting form is in development
Dead animals entangled in fishing gear, net, debris (floating or on the beach)	YES
Stranded live pinniped entangled in fishing gear, net, debris [If no response attempted, be cautious about tracking repeated reports to avoid double counting]	YES
Ship strikes Report of live animal with evidence of ship strike or report from a vessel that struck an animal (includes reports from vessels suspecting a strike occurred)	NO- provide information to Brent/Lynne- new reporting form in development
Live stranded animal on the beach with evidence of ship strike	YES
Dead animals with signs of ship strike during exam (on the beach or floaters)	YES
Out of habitat situation where there is a response- (i.e., vessel herding a gray whale out of a river, relocation)	YES
Animal dropped off at your rehab facility without any paperwork	YES- please get Level A information from person transporting the animal and fill out form
Healthy animals on the beach even if you respond to a report to evaluate the condition of animal (i.e., healthy pups, molting elephant seals). If it does not meet definition of stranded, do not fill out Level A. Data on level of effort, number of calls, number of responses can be tracked separately by stranding groups if they so choose.	NO

* The term "stranding" means an event in the wild which - A marine mammal is dead and is - On a beach or shore of the United States; or In waters under the jurisdiction of the United States (including any navigable waters); or A marine mammal is alive and is - On a beach ore shore of the United States and is unable to return to the water; On a beach or shore of the United States and, although able to return to the water, is need of apparent medical attention; or In the waters under the jurisdiction of the United States (including any navigable waters), but is unable to return to its natural habitat under its own power or without assistance. 16 U.S.C. 1421g

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #: _____ NMFS REGIONAL #: _____ (NMFS USE) NATIONAL DATABASE#: _____ (NMFS USE)

COMMON NAME: _____ GENUS: _____ SPECIES: _____

EXAMINER Name: _____ Affiliation: _____

Address: _____ Phone: _____

Stranding Agreement or Authority: _____

LOCATION OF INITIAL OBSERVATION

State: _____ County: _____

City: _____

Body of Water: _____

Locality Details: _____

Lat (DD): _____ . _____ N

Long (DD): _____ . _____ W

☐ Actual ☐ Estimated

How Determined: (check ONE)

☐ GPS ☐ Map ☐ Internet/Software

OCURRENCE DETAILS ☐ Restrand GE# _____ (NMFS Use)

Group Event: ☐ YES ☐ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding # Animals: _____ ☐ Actual ☐ Estimated

Findings of Human Interaction: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Collision ☐ 2. Shot ☐ 3. Fishery Interaction

☐ 4. Other Human Interaction: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Gear Collected? ☐ YES ☐ NO Gear Disposition: _____

Other Findings Upon Level A: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

INITIAL OBSERVATION

Date: Year: _____ Month: _____ Day: _____

First Observed: ☐ Beach or Land ☐ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Condition Unknown

LEVEL A EXAMINATION ☐ Not Able to Examine

Date: Year: _____ Month: _____ Day: _____

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Unknown

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)

☐ 1. Left at Site ☐ 6. Euthanized at Site

☐ 2. Immediate Release at Site ☐ 7. Transferred to Rehabilitation:

☐ 3. Relocated Date: Year:_____ Month:_____Day:___ Facility:_____

☐ 4. Disentangled ☐ 8. Died during Transport

☐ 5. Died at Site ☐ 9. Euthanized during Transport

☐ 10. Other:_____

CONDITION/DETERMINATION (Check one or more)

☐ 1. Sick 7. Location Hazardous

☐ 2. Injured ☐ a. To animal

☐ 3. Out of Habitat ☐ b. To public

☐ 4. Deemed Releasable ☐ 8. Unknown/CBD

☐ 5. Abandoned/Orphaned ☐ 9.Other_____

☐ 6. Inaccessible _____

MORPHOLOGICAL DATA

SEX (Check ONE)

☐ 1. Male

☐ 2. Female

☐ 3. Unknown

AGE CLASS (Check ONE)

☐ 1. Adult ☐ 4. Pup/Calf

☐ 2. Subadult ☐ 5. Unknown

☐ 3. Yearling

☐ Whole Carcass ☐ Partial Carcass

Straight length:_____ ☐ cm ☐ in ☐ actual ☐ estimated

Weight:_____ ☐ kg ☐ lb ☐ actual ☐ estimated

PHOTOS/VIDEOS TAKEN: ☐ YES ☐ NO

Photo/Video Disposition: _____

TAG DATA Tags Were:

Present at Time of Stranding (Pre-existing): ☐ YES ☐ NO

Applied during Stranding Response: ☐ YES ☐ NO

ID#	Color	Type	Placement* (Circle ONE)	Applied	Present
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Lateral Body
LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear

CARCASS STATUS (Check one or more)

☐ 1. Left at Site ☐ 4. Towed: Lat_____Long_____ ☐ 7. Landfill

☐ 2. Buried ☐ 5. Sunk: Lat_____Long_____ ☐ 8. Unknown

☐ 3. Rendered ☐ 6. Frozen for Later Examination ☐ 9. Other_____

SPECIMEN DISPOSITION (Check one or more)

☐ 1. Scientific collection ☐ 2. Educational collection

☐ 3. Other: _____

Comments: _____

NECROPSIED ☐ NO ☐ YES ☐ Limited ☐ Complete

☐ Carcass Fresh ☐ Carcass Frozen/Thawed

NECROPSIED BY: _____

Date: Year: _____ **Month:** _____ **Day:** _____

PLEASE USE THE BACK SIDE OF THIS FORM FOR ADDITIONAL REMARKS

ADDITIONAL REMARKS

ADDITIONAL IDENTIFIER: _____ (If animal is restranded, please indicate any previous field numbers here)

DISCLAIMER

THESE DATA SHOULD NOT BE USED OUT OF CONTEXT OR WITHOUT VERIFICATION. THIS SHOULD BE STRICTLY ENFORCED WHEN REPORTING SIGNS OF HUMAN INTERACTION DATA.

DATA ACCESS FOR LEVEL A DATA

UPON WRITTEN REQUEST, CERTAIN FIELDS OF THE LEVEL A DATA SHEET WILL BE RELEASED TO THE REQUESTOR PROVIDED THAT THE REQUESTOR CREDIT THE STRANDING NETWORK AND THE NATIONAL MARINE FISHERIES SERVICE. THE NATIONAL MARINE FISHERIES SERVICE WILL NOTIFY THE CONTRIBUTING STRANDING NETWORK MEMBERS THAT THESE DATA HAVE BEEN REQUESTED AND THE INTENT OF USE. ALL OTHER DATA WILL BE RELEASED TO THE REQUESTOR PROVIDED THAT THE REQUESTOR OBTAIN PERMISSION FROM THE CONTRIBUTING STRANDING NETWORK AND THE NATIONAL MARINE FISHERIES SERVICE.

PAPERWORK REDUCTION ACT INFORMATION

PUBLIC REPORTING BURDEN FOR THE COLLECTION OF INFORMATION IS ESTIMATED TO AVERAGE 30 MINUTES PER RESPONSE, INCLUDING THE TIME FOR REVIEWING INSTRUCTIONS, SEARCHING EXISTING DATA SOURCES, GATHERING AND MAINTAINING THE DATA NEEDED, AND COMPLETING AND REVIEWING THE COLLECTION OF INFORMATION. SEND COMMENTS REGARDING THIS BURDEN ESTIMATE OR ANY OTHER ASPECT OF THE COLLECTION INFORMATION, INCLUDING SUGGESTIONS FOR REDUCING THE BURDEN TO: CHIEF, MARINE MAMMAL AND SEA TURTLE CONSERVATION DIVISION, OFFICE OF PROTECTED RESOURCES, NOAA FISHERIES, 1315 EAST-WEST HIGHWAY, SILVER SPRING, MARYLAND 20910. NOT WITHSTANDING ANY OTHER PROVISION OF THE LAW, NO PERSON IS REQUIRED TO RESPOND, NOR SHALL ANY PERSON BE SUBJECTED TO A PENALTY FOR FAILURE TO COMPLY WITH, A COLLECTION OF INFORMATION SUBJECT TO THE REQUIREMENTS OF THE PAPERWORK REDUCTION ACT, UNLESS THE COLLECTION OF INFORMATION DISPLAYS A CURRENTLY VALID OFFICE OF MANAGEMENT AND BUDGET (OMB) CONTROL NUMBER.

Guide to the Marine Mammal Stranding Report
Level A Responder

INTRODUCTION:

The purpose of this guide is to summarize the protocol for completing the Level A Marine Mammal Stranding Report. While many fields are straight forward this guide will take you step by step through the Level A stranding report, focusing on specific sections that can be easily confused. For additional detail consult "The Examiners Guide to the Marine Mammal Stranding Report Level A Data."

HEADER SECTION:

Field #: The responder should assign this number based on the system used by their stranding organization. For example, Year - MonthDate-Case # 2006-0910-01

NMFS Regional # and National Database #: Leave this blank, this number will be assigned by NOAA Fisheries when the report is entered or validated in the national stranding database.

Letterholder: Leave this section blank unless your network has a Stranding Agreement (SA) with NOAA Fisheries.

Name, Affiliation, Address: This is name of the person filling out the Level A form. Affiliation is: The network group you are a volunteer for and the address is either your personal address or the address that your network group uses. If it is a reporting party separate from the stranding network (i.e. phone call from the public) place their information in the correct lines.

LOCATION:

Latitude/Longitude: This is very important information for NOAA Fisheries; please complete this section if possible in decimal degrees (coordinates can be confirmed by GPS, Internet program or a map.)

OCCURANCE DETAILS:

Findings of Human Interaction: Only check YES if you identify evidence of human interaction. If you check YES, you need to provide a detailed description of how the determination was made (external or internal exam, or necropsy). Check NO if the animal was examined and there was no indication of human interaction. Check "Could not be Determined" if there is insufficient evidence to check YES or NO.

INITIAL OBSERVATION/ LEVEL A EXAMINATION:

Fresh Dead: Carcass is in good condition (little scavenger damage, fresh smell, not bloated.)

Moderate Decomposition: Carcass is in fair condition (carcass intact, bloating evident, mild odor, skin cracked or sloughing.)

Advanced Decomposition: Carcass is in poor condition (severe scavenger damage, strong odor, skin sloughing.)

Mummified/Skeletal: Skin over skeletal remains, remaining tissues are desiccated.

Unknown: Check this box if you are unable to determine the condition of the stranded animal.

MORPHOLIGICAL DATA:

Adult: This age class would be used for an animal that is judged or found upon necropsy to be sexually mature.

Subadult: This age class would be used for an animal that is judged to be greater than one year old, but not yet mature.

Yearling: This age class would be used for an animal that is judged to be approximately one year old, using length or time of year.

Pup/Calf: This age class would be used for an animal that is judged to be smaller than yearling size, or in a population where it would be younger than one year old.

Unknown: This age class would be used for an animal if you are unable to determine the age.

Straight Length/Weight: the metric system is preferred; please use the straight length of the animal.

Photos/Videos Taken: Taking photos is very important, please email or send them in with your reports and note under photo/video disposition where these documents are housed.

OTHER:

Make any other comments you feel necessary on the back of the stranding form.

DEFINITIONS OF TERMS FOR LEVEL A
VERSION 2007

ADMINISTRATIVE INFORMATION

Field #: Assign each stranding event a unique identifier. Format is open to each agency's requirements; however, please remain consistent within your agency.

NMFS Regional #: Leave this blank. NMFS will assign a regional number consistent with the National Marine Mammal Stranding Database.

National Database #: Leave this blank. NMFS will assign a national database number consistent with the National Marine Mammal Stranding Database.

Common Name: The common name of the stranded animal. If identity is not determined to species, describe the level to which the remains can be identified. (Example: unknown, pinniped/cetacean, otariid/phocid, or odontocete/mysticete, delphinid/phocoenid, etc.)

Genus/Species: This is the Latin name for the animal in standard binomial nomenclature. If either genus or species is not identifiable, fill in the appropriate blank with "UNKNOWN."

Examiner: Name of the examiner who is submitting the report. This should be the individual who is responsible for preparing the entire level A stranding report, not necessarily the note taker or a public citizen who first reported the animal

Affiliation: Affiliation of the examiner who is submitting the report. This could be the same organization as listed below under "Stranding Agreement or Authority", a Designee organization (designee of an Stranding Agreement holder), the agency of a federal, state, or local government official authorized under MMPA Section 109(h), public, citizen or none.

Address: Mailing address of the examiners Stranding Agreement organization or government agency office.

Phone: Daytime (Work) phone number where the examiner may be reached for further comment. NOTE: Please include only business addresses and phone numbers, to prevent the release of personal information to the public.

Stranding Agreement or Authority: Stranding Agreement holder or agency through which the examiner has been authorized to take marine mammals or marine mammal parts. If the examiner is the member of a "Designee Organization" record the name of the Stranding Agreement holder under whom the examiners organization is designated. If the examiner is operating under 109(h) authority, include the name of the government organization.

LOCATION OF INITITAL OBSERVATION

State, County, and City: The standard state, county, and city names for the stranding location. For floating carcasses (U.S. waters between 3 and 200 miles offshore), fill State with "EEZ" and closest state. This should include boroughs, parishes, provinces, islands, commonwealths, and territories.

Body of Water: The major ocean basin closest to the site where the animal was observed stranded (e.g., Atlantic Ocean, Gulf of Mexico, Pacific Ocean, Gulf of Alaska) and describe the specific location in "Locality Details".

Locality Details: Using known landmarks (access point, mile markers, street addresses etc), describe the precise locality where the animal was found. Compass bearings and relative distances are useful but GPS coordinates are preferred. For animals swimming or floating, this should include the referencing the associated ocean, sea, gulf, bay, inlet, estuary, or river.

GPS Coordinates: Documentation in decimal degrees is **required.** NOTE: Negative longitude represents the Western Hemisphere, positive longitude represents the Eastern Hemisphere, negative latitude represents the Southern Hemisphere, and positive latitude represents the Northern Hemisphere. Note that most GPS units can be set to display latitude and longitude in the decimal degree format and there are many lat/long conversion websites on the internet.

Actual or Estimated: Indicate if the latitude/longitude coordinates are exact (from a GPS unit) or an estimate (based on a map, website, previous strandings, known lat/longs for landmarks, etc.).

How Determined: Indicate how the latitude/longitude coordinates were obtained. Check the box that represents method of data collection:

- **Global Positioning System (GPS)**
- **Map**
- **Software program/Internet website**

OCCURRENCE DETAILS - The occurrence details help define the reason for the response and details associated with the stranding event.

Restrand - Check this box if the animal has previously stranded, either responded to by your organization or another. The animal may have tags from a rehabilitation facility, or may have recognizable and distinctive features. If this box is checked, you should indicate the previous field numbers assigned to this animal (by your facility or others), if known, on the back of the form in the space marked "Additional Identifiers."

GE # - Leave this blank. NMFS will assign a regional designation to represent the "Group Event Number".

Group Event - A group event is a stranding event which involves two or more animals, either simultaneously or over a period of time.

If Yes - identify the type of group event. These designations are not exclusive, more than one option may be selected:

Cow/Calf Pair – this would be two animals stranding where one is the mother and the other is the offspring (a mom/pup pair would also qualify).

Mass Stranding - this is 2 or more cetaceans that simultaneously strand, other than cow-calf pairs.

- **Number of Animals** - Indicate the number of cetaceans involved in the mass stranding, and whether this count is an "Actual" or "Estimate"count.

NOTE: Animals may be involved in other types of group events that will be determined after the Level A data sheet is filled out and submitted. These animals will be assigned a **"Group Event Number (GE#)"** and the group event fields will be incorporated into a separate database in the National Database by the Regional Stranding Coordinator or by the Onsite Coordinator if the case of Unusual Mortality Event. Examples of these types of events include:

- "*hazmat or oil spill*" - any animal affected by a spill of oil or another hazardous material;
- "*pre-event investigation*" - animals sampled after a group event is suspected, but before it has been officially designated as an Unusual Mortality Event by the Working Group on Marine Mammal Unusual Mortality Events (WGMMUME);
- "*unusual mortality event*" - any animal part of a die-off that has been officially designated as a UME by the WGMMUME; and
- "*repeat event*" - animals stranding during a die-off that has been designated as a repeat event by the WGMMUME.

If you wish, you may update your Level A datasheet for your records to reflect the Group Event number that will be listed in the National Database after the Regional Stranding Coordinator has verified the entry.

Findings of Human Interaction - This field does not represent cause of stranding or cause of death. These data should not be used out of context or without verification.

Check "Yes" if there are any signs or evidence of human interaction (HI), whether or not you believe they were the cause of death. If you check "Yes," use the back of this form in ADDITIONAL REMARKS to further explain the nature of the injury (or evidence) and how it was assessed and determined to be human related. If possible, document injuries or marks with photographs or sketches/drawings. Describe the injury or mark, the type of fishing gear recovered the location of any wounds (gunshot, fishing gaff, knife incision, line or net entanglement, etc.). Note any external markings or color patterns and if the injury or mark could be determined as antemortem or postmortem (i.e., if animal

seen with injury when alive or by histological confirmation). Also, describe any relevant circumstances regarding the interaction (e.g., whether the interaction was witnessed). Please indicate if you used the Protocol developed by the Virginia Aquarium and Cape Cod Stranding Network entitled "2006 *Protocol for Examining Marine Mammal for Signs of Human Interaction*" and attach a copy of the completed Form to the Level A Data sheet. Also indicate if you have attended training on this protocol.

Check "No" if the animal was examined and there was no indication of human interaction. Check

"Check Could not Be Determined (CBD)" if there is insufficient evidence to indicate an interaction, the animal was not thoroughly examined, the animal was too decomposed for a thorough examination, there may have been signs of something that may have been a human interaction but you can't tell for sure, or the observer does not feel competent to determine this type of injury (do not guess).

If you checked "Yes", check the box that most accurately details the type of human interaction:

> **Boat Collision** - Check if there are any signs of boat or ship collision such as propeller wounds or blunt trauma from a boat hull.
>
> **Shot** - Check if there are any signs of gunshots. Add in the comments how this was determined (metal detector, bullet found, etc.)
>
> **Fishery Interaction** - Check if there are any signs of fishery interaction such as wounds related to fishing gear, or fishing gear attached to the animal.
>
> **Other Human Interaction** - If you checked "Yes" and there were signs of human interactions other than those listed, please describe in this blank. This could include signs of as ingested plastic, debris entanglement, wounds from other weapons besides firearms (arrows, harpoons, etc.), non-boat vessel related injuries (car or train collision, etc.), mutilation, etc. Use the back of this form under "ADDITIONAL REMARKS" to continue your description, if necessary.

How Determined - If you checked "Yes" or "No", describe how the signs of human interaction were determined:

- **External Exam** – The entire external surface of animal is visually assessed for signs of HI. If the entire surface could not be examined, please state why and which parts were looked at (e.g., large whale could not be turned over, only dorsal surface examined)
- **Internal Exam** - The response included an examination of some or all of the body cavity. However, the condition of the animal or other factors precluded the collection and analysis of samples from internal organs. Please indicate in the

Not Able to Examine - Check this box if you were unable to examine the animal. Some examples would be: the animal was inaccessible (at the bottom of a cliff, on an island, floating, etc.); the animal washed out with the tide before you responded; manpower/time constraints made a response impossible; etc.

Condition at Examination - Check the appropriate box that indicates the physical state of the animal or carcass on the date of the Level A examination:

- **Alive (Code 1):** Check this box if the animal was alive at the initial observation.
- **Fresh Dead (Code 2):** Check this box if the carcass was in good condition (fresh/edible). Normal appearance, usually with little scavenger damage; fresh smell; minimal drying and wrinkling of skin, eyes and mucous membranes; eyes clear; carcass not bloated, tongue and penis not protruded; blubber firm and white; muscles firm, dark red, well-defined; blood cells intact, able to settle in a sample tube; serum unhemolyzed; viscera intact and well-defined, gut contains little or no gas; brain firm with no discoloration, surface features distinct, easily removed intact.
- **Moderate Decomposition (Code 3):** Check this box if the carcass was in fair condition (decomposed, but organs basically intact). Carcass intact, bloating evident (tongue and penis protruded) and skin cracked and sloughing; possible scavenger damage; characteristic mild odor; mucous membranes dry, eyes sunken or missing; blubber blood-tinged and oily; muscles soft and poorly defined; blood hemolyzed, uniformly dark red; viscera soft, friable, mottled, but still intact; gut dilated by gas; brain soft, surface features distinct, dark reddish cast, fragile but can usually be moved intact.
- **Advanced Decomposition (Code 4):** Check this box if the carcass was in poor condition (advanced decomposition). Carcass may be intact, but collapsed; skin sloughing; epidermis of cetaceans may be entirely missing; often severe scavenger damage; strong odor; blubber soft, often with pockets of gas and pooled oil; muscles nearly liquefied and easily torn, falling easily off bones; blood thin and black; viscera often identifiable but friable, easily torn, and difficult to dissect; gut gas-filled; brain soft, dark red, containing gas pockets, pudding-like consistency.
- **Mummified/Skeletal (Code 5):** Check this box if mummified or skeletal remains. Skin may be draped over skeletal remains; any remaining tissues are desiccated.
- **Unknown:** Check this box if the stranded animal was dead at the time of initial observation but information on the condition of the carcass is unavailable.

INITIAL LIVE ANIMAL DISPOSITION - Indicate what action(s) was/were taken to handle a live animal (NOTE: check all that apply at the time of completing the Level A examination):

- **Left at Site:** Check if the animal was reported, and was confirmed stranded by a reliable source and acknowledged by the Regional Coordinator, but no response

was made; or the animal was observed by the response team, but no other actions were taken.

- **Immediate Release at Site:** Check if the animal was reported and treated or evaluated, but was not removed from the site.
- **Relocated:** Check if the animal was evaluated or treated, was removed from the site of stranding, and was transported and released at another site without being admitted to an authorized rehabilitation facility.
- **Disentangled:** Check if the animal had entangling gear removed and was released/swam away.
- **Euthanized at Site:** Check if the animal was found alive but was euthanized by an authorized entity.
- **Died at Site:** Check if the animal was found alive and died before transport to an authorized rehabilitation facility or relocation.
- **Transferred to Rehabilitation:** Check if the animal was transported to an authorized rehabilitation facility.
    - **Date** - Fill in the date of the transfer
    - **Facility** - Fill in the name of the authorized rehabilitation facility to which the animal was transferred.
- **Died during Transport:** Check if the animal was found alive and died during transport to a care facility.

- **Euthanized during Transport:** Check if the animal was found alive and was euthanized during transport to an authorized rehabilitation facility by an authorized entity.

- **Other:** Check if the disposition of the live animal differs from the options listed above and document here.

CONDITION/DETERMINATION - Indicate the condition of the animal at the time of the response This question should help provide your reasoning for the disposition that was selected. (NOTE: Check all that apply).

- **Sick:** Check if the animal appears sick or is behaving oddly, with no external signs of injury.
- **Injured**: Check if the animal shows evidence of physical injury.
- **Out of Habitat**: Check if the animal was found in area not typical for its species. This could include atypical location and time of year for its known life history. Generally an out of habitat case involves a free swimming animal that is reported in an area outside it's normal habitat, tends to remain there for a period of time, and may need intervention to return to it's normal habitat (e.g. a bottlenose dolphin in a freshwater river that doesn't leave on its own accord, an ice seal in Florida, or a humpback whale in an embayment). This does not include a typical live stranding of an offshore species close to the beach.
- **Deemed Releasable:** Check if the animal shows no outward signs of illness or injury.
- **Abandoned/Orphaned:** Check if the animal is a cetacean calf found stranded on

the beach without an adult female, or a pup/calf that has been monitored and determined to be abandoned. The length of time that the animal should be observed without intervention may be up to 48 hours and varies by region; check with your Regional Stranding Coordinator for your regional policy.

- **Inaccessible:** Check if the animal is in an inaccessible location and therefore was not closely examined (condition could not be determined). Examples of inaccessible locations include: at the base of a cliff, areas with dangerous surf conditions, mudflats, islands, ice, etc.
- **Location Hazardous**
  - **To Animal** - Check if the animal is in a location that is deemed hazardous to its health and welfare (i.e. up a freshwater river, pinnipeds found inland, etc.)
  - **To Public** - Check if the animal is in a location that is deemed hazardous to the public (i.e. a crowded public beach, a marina, etc.)
- **Unknown/CBD**: Check if the animal could not be examined or if the condition could not be determined.
- **Other**: Describe any other situation not addressed above.

MORPHOLOGICAL DATA

SEX (Check One): Check the box indicating the animal's sex, or check "Unknown" if unable to determine.

AGE CLASS (check One): Check the box indicating the animal's age class. If possible, use information based on reproductive organs, teeth or accepted length/age data:

- **Adult**: This age class would be used for an animal that is judged or found upon necropsy to be sexually mature.
- **Subadult**: This age class would be used for a animal that is judged to be greater than one year old, but not yet mature.
- **Yearling**: This age class would be used for an animal that is judged to be approximately one year old, using length or time of year.
- **Pup/Calf:** This age class would be used for a stranded animal that is smaller than yearling size, or in a population where it would be younger than one year old.
- **Unknown**: This age class would be used for an animal if you are unable to determine its age.

Whole Carcass: Check the box if the carcass is sufficiently intact for the Level A morphometric data (straight length, weight) to be collected.

Partial Carcass: Check the box if the carcass is **not** sufficiently intact for the Level A morphometric data (straight length, weight) to be collected. If you measure the remains of the carcass, the metric (weight or length) must be entered as "estimated". Also record what part is missing in the ADDITIONAL REMARKS section on the back of this form. If neither length nor weight is measured, enter **"zero"** in the respective blanks.

Straight Length - Record the straight length (not contoured) of the animal on the date of initial examination.

- **cm** = centimeters (preferred)
- **in** = inches
    - **actual** = Check if this was an actual measurement (physical measurement)
    - **estimated** = Check if this was an estimated measurement (visual measurement). For example, if the carcass is not intact (e.g. flukes degraded or severed, head missing, etc. and record what part is missing in the ADDITIONAL REMARKS section on the back of this form.
- **Weight** - Record the weight of the animal on the date of initial examination. Please check if this was an actual or estimated measurement.
    - **kg** = kilograms (preferred)
    - **lb** = pounds
    - **actual** = Check if this was an actual measurement (physical measurement)
    - **estimated** = Check if this was an estimated measurement (visual measurement) or if the carcass was not intact. Record what part is missing in the ADDITIONAL REMARKS section on the back of this form.

PHOTOS/VIDEO Taken - Check "Yes" or "No" to indicate whether visual media was taken of this stranding event.

- **Photo/Video Disposition** - If photos or video were taken of the event, use this line to indicate where these documents are housed.

TAG DATA

Present at Time of Stranding (Pre-exisiting) - Mark **"YES"** if tags or identification markings were pre-existing (present on the animal at the time of stranding).

Applied During Stranding Response - Mark **"YES"** if tags or identification markings were applied by the stranding response organization (i.e. prior to release at stranding or relocation site, to prevent a carcass from being double-counted, etc.).

NOTE: If no tags were present or applied, the responder should check **"NO"** for both boxes and skip the rest of the section.

Document details about the type, color, and placement of identification tags, brands, or markings:

ID# - Write the number(s) of the identifying tag(s), brand(s), or other applied marking(s), if applicable.
Color - Using basic color-names, indicate the identifying color of tags where applicable.
Type - List the type of tag, brand, or other applied marking. For example, radio, PIT, plastic, roto, spaghetti, satellite, freeze brand, bleach mark, paint, etc.
Placement - Circle (ONE) the location of each applied/present marking:
D = dorsal body
DF = dorsal fin

ADDITIONAL REMARKS section the systems examined and not examination as well as examination findings.

- **Necropsy** – a necropsy was done, detailed information was documented, and internal tissues were collected for analysis. Please refer to the definitions and check whether the necropsy was limited or complete in the section below entitled "SPECIEMEN DISPOSITION."
- **Other** – other obvious signs of HI including presence of gear, and eye witness account of a human interaction.

Gear Collected - Check "Yes" if you collected fishery gear from the animal (hook, line, net, etc.). Check "No" if you did not collect any gear, or if there was no gear to collect.

Gear Disposition - If you checked "Yes", use this line to indicate what was done with that gear (i.e. sent to NMFS Enforcement or Regional Stranding Coordinator), or where the gear is housed.

Other Findings Upon Level A - Check "Yes" if there are any signs or evidence of other (non-human related interaction) findings related to the stranding, whether or not you believe they were the cause of death; check "No" if there was no indication of other factors; check "CBD" if there is insufficient evidence to indicate. Non-human related injuries or disease may include signs of infectious or parasitic disease and signs of trauma from beaching, conspecific interactions/aggression, interspecific interactions, scavengers and predators, etc. See above definition of external and internal exam for more description. Also, document if the animal was pregnant and in other findings – include comments.

If Yes, choose one or more – check the box that most accurately details the other factors:

- **Illness**
- **Injury**
- **Pregnant**
- **Other** (indicate what was found)

How Determined (check one or more) – if you noted other findings than HI signs, check how this was determined (please use the back of this form in ADDITIONAL REMARKS section to include more detail):

- **External Exam** (see above for definition)
- **Internal Exam** (see above for definition)
- **Necropsy** (see above for definition)
- **Other** – document the process

INITIAL OBSERVATION

Date - Enter the date the stranded animal was first observed by any witness. This is the earliest known date of observation of the stranded animal.

First Observed - Check the appropriate box that indicates the how the animal was initially observed:

- **Beach or Land**
- **Floating (in the water)**
- **Swimming.**

Condition at Initial Observation - Check the appropriate box that indicates the physical state of the animal or carcass on the date of the initial observation:

- **Alive (Code 1):** Check this box if the animal was alive at the initial observation.
- **Fresh Dead (Code 2):** Check this box if the carcass was in good condition (fresh/edible). Normal appearance, usually with little scavenger damage; fresh smell; minimal drying and wrinkling of skin, eyes and mucous membranes; eyes clear; carcass not bloated, tongue and penis not protruded; blubber firm and white; muscles firm, dark red, well-defined; blood cells intact, able to settle in a sample tube; serum unhemolyzed; viscera intact and well-defined, gut contains little or no gas; brain firm with no discoloration, surface features distinct, easily removed intact.
- **Moderate Decomposition (Code 3):** Check this box if the carcass was in fair condition (decomposed, but organs basically intact). Carcass intact, bloating evident (tongue and penis protruded) and skin cracked and sloughing; possible scavenger damage; characteristic mild odor; mucous membranes dry, eyes sunken or missing; blubber blood-tinged and oily; muscles soft and poorly defined; blood hemolyzed, uniformly dark red; viscera soft, friable, mottled, but still intact; gut dilated by gas; brain soft, surface features distinct, dark reddish cast, fragile but can usually be moved intact.
- **Advanced Decomposition (Code 4):** Check this box if the carcass was in poor condition (advanced decomposition). Carcass may be intact, but collapsed; skin sloughing; epidermis of cetaceans may be entirely missing; often severe scavenger damage; strong odor; blubber soft, often with pockets of gas and pooled oil; muscles nearly liquefied and easily torn, falling easily off bones; blood thin and black; viscera often identifiable but friable, easily torn, and difficult to dissect; gut gas-filled; brain soft, dark red, containing gas pockets, pudding-like consistency.
- **Mummified/Skeletal (Code 5):** Check this box if mummified or skeletal remains. Skin may be draped over skeletal remains; any remaining tissues are desiccated.
- **Unknown:** Check this box if the stranded animal was dead at the time of initial observation but information on the condition of the carcass is unavailable.

LEVEL A EXAMINATION

Date – Enter the date of examination that the animal was responded to and examined by your organization to collect Level A data (location, condition, signs of human interaction, species, sex, age class, length, weight, and any other visual observations). Complete morphometrics and necropsy could be taken later.

L = lateral body
LF = left front flipper/appendage
LR = left rear flipper/appendage
RF = right front flipper/appendage
RR = right rear flipper/appendage
Applied = Check "Applied" for each of the tags, brands, or other makings that were applied after the animal stranded, as part of the stranding or rescue response. If the animal was rehabilitated and released with tags or markings, you may update this part of the Level A form after they are applied.
Present = Check "Present" for each of the tags, brands, or other markings that were already present when the animal stranded.

CARCASS/SPECIMEN DISPOSITION

CARCASS STATUS (Check all that apply) - Check the following boxes to indicate how the carcass was disposed:

- **Left at site** - Check this box if the carcass, including skeleton, was left where it was found to decompose.
- **Buried** - Check this box if most of the carcass, including skeleton, was buried.
- **Rendered** - Check this box if the carcass, including skeleton, was rendered.
- **Towed** - Check this box if the carcass, including skeleton, was towed to sea. Fill in the latitude and longitude of the position where the carcass was left.
- **Sunk** - Check this box if the carcass, including skeleton, was sunk. Fill in the latitude and longitude of the position where the carcass was sunk..
- **Frozen for later examination** - Check this box if all or most of the carcass and/or skeleton was retained and frozen for later examination.
- **Landfill** - Check this box if the carcass, including skeleton, was sent to a landfill or other waste facility.
- **Unknown** - Check this box if the fate of the carcass is unknown or if the carcass was lost.
- **Other** – Check this box if the fate of the carcass is other than what is listed above and document here.

SPECIMEN DISPOSITION (Check all that apply) – Check the following boxes to indicate if nondiagnostic specimens were collected for scientific, educational, or other purposes (i.e., skin for genetics, blubber for contaminants, bones for collection, etc.). The disposition (both transitory and final) of these specimens should be recorded on the back of the form under "ADDITIONAL REMARKS." Please check with your NMFS regional stranding coordinator regarding marine mammal parts authorizations prior to retention and transfer.

- **Scientific collection** - check this box if specimens from the live animal or carcass, including skeletal parts, were retained for scientific research.
- **Educational collection** - check this box if specimens from the live animal or carcass, including skeletal parts, were retained for educational purposes.

- **Other** - check this box if the fate of specimens from the live animal or carcass, including skeletal parts, was other than that above and briefly indicate the disposition.
- **Comments** - List comments regarding disposition of the specimen (i.e., identifying which tissues were collected and retained, differentiating where tissues were sent, etc.).

NECROPSY - Indicate "YES" if a necropsy was completed to obtain Level-C data.

- **Limited Necropsy** - A partial necropsy includes a detailed exam of the carcass in which some of the organs or systems are examined, collected, and analyzed according to established protocols, but either the condition of the animal or other factors limits a complete necropsy. Please indicate in the **ADDITIONAL REMARKS** section the systems examined and not examination as well as examination findings.
- **Complete necropsy** - A complete necropsy consists of a detailed exam where the majority of organs are examined, collected (i.e., if feasible, this could include tissues for histopathology) and analyzed according to established protocols. This will include documenting any internal lesions, bruising, or broken/fractured bones, and
  examining the entire GI tract for lesions, foreign material, gear, and other natural contents (e.g. food), and the lungs/bronchi. A necropsy report is generated and disseminated to the pathologist on record.
- **Carcass Fresh** = Check if the necropsy was conducted on a fresh carcass (not frozen before examination).
- **Carcass Frozen/Thawed** = Check if the necropsy was conducted on a carcass that was frozen and thawed.

NECROSPIED BY - List the name and contact information of the primary person/facility who conducted the necropsy.

Date – List the date when the necropsy was done.

BACK OF FORM

ADDITIONAL IDENTIFIERS: Include any additional information related to the Field ID number or identification of the stranding event. Examples include: previous Field ID numbers if this animal previously stranded; ID numbers assigned by other organizations (including authorized rehabilitation facilities to which the animal is transferred), former identification numbers from scientific research projects, etc.

ADDITIONAL REMARKS: Include comments, and list other data sheets that may have been completed such as human interaction, morphometrics, necropsy, rehabilitation disposition, etc. Include further details or comments on any of the Level A data fields from the front of the sheet.

Specimen Requests

Specimen Request Form

Please fill out this form to request specimens from the stranding network. To obtain specimens you must have prior authorization via a scientific research permit issued by the National Marine Fisheries Service, authorization to salvage as part of official duties, authorization via 16 U.S.C. 1382 (c) or have received prior authorization from the Regional Administrator of the Northwest Region. Specimen requests may be fulfilled by the network at their discretion based on available resources and ability. Specimen requests will be considered independently by the first response stranding network member and do not necessarily require that you or your group is available to assist with the stranding response.

Requesting group/ Organization/researcher Contact information (Phone numbers, e-mail)	

Species	**Condition codes that are acceptable**	**Tissue type/sample requested* (include size of sample requested)**	**Sample container (foil, glass jar, Ziploc/ Whirlpak)**	**Sample storage (fresh, frozen, formalin)**	**Description of purpose (research project, education, Prescott grant)**

*Please attach any relevant sampling protocols with specific directions on taking samples

Ship/Transport instructions (shipping/delivery address if different from above:

Resources available: Are you able to supply sample containers (jars, vials, etc.), shipping materials (boxes, gel packs, coolers), shipping costs (FedEx number)??

Education

Sharing the Shore with Harbor Seal Pups in Washington State

Points to Remember

Haul-outs:

Harbor seals utilize specific shoreline locations on a regular basis as resting places (haul-outs). Haul-outs include beaches, rocks, log booms, floats and buoys. Seals will return to these locations to haul-out but any shoreline or floating feature with easy access to the water can serve as a resting spot.

Harbor seals rest out of the water for several hours each day to regulate body temperature, interact with each other, and sleep. Harbor seals are vulnerable on land and are therefore wary of being approached while out of the water. Some seals, however, may tolerate activity close by. The most frequently reported encounters with seals out of the water involve pups that are too young to have developed protective wariness (escape response).

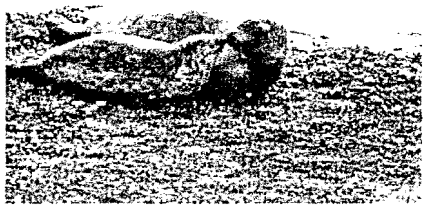
Pups and Pupping:

Pups are born in the spring and summer and the timing of the peak birth period varies geographically.

Location	Time of Year
Columbia River, Willapa Bay, Grays Harbor	Mid-April - June
Olympic Peninsula	May - July
San Juan Islands, Eastern Puget Sound	June - August
Southern Puget Sound	July - September
Hood Canal	August - October

The majority of pups are born at protected haul-out sites, which are called rookeries, but a female may give birth anywhere that there is easy access to the waters edge.

Nursing pups remain with their mothers for 4 to 6 weeks and then are weaned to forage and survive on their own. A nursing pup may double its birth weight by the time it is weaned and uses stored fat reserves as it learns to feed on its own. Up to 50% of the pups born will not survive the first year of life. Contributing factors to pup mortality are; conditions associated with fetal development or premature birth; disease; predation by shoreline predators or domestic dogs; infection; dehydration; or starvation.



Human Interference:

Harbor seals are less mobile and therefore more vulnerable to disturbance or predation while out of the water. Adult seals are more wary and escape to the water more quickly than pups. Females will flee to the water if disturbed or approached and may leave their pups behind.

Although the percentage of successful female/pup reunions has not been documented, anecdotal reports indicate that pups have successfully reunited up to 48 hours after separation. A female seal is more likely to return to reclaim her pup once the disturbance near the pup goes away. If activity continues near the pup, the female may eventually give up trying and the pup will be abandoned. A nursing pup that is separated from its mother will not survive.

Things You Can Do to Promote Responsible Wildlife Viewing

Share the Shoreline

- If you see a seal on the beach, give it space. The NMFS marine mammal viewing guidelines recommend a **MINIMUM** approach distance of 100 yards. The approach limitation will minimize the potential for disturbing a resting animal and/or reduce stress for an animal that may be recovering from illness or injury.
- Observe from a distance using binoculars or a spotting scope if you want to see the animal close up.
- Keep pets away. Dogs are naturally curious about other animals in their environment. Seals pups can easily fall prey to dogs, to avoid a negative interaction dogs should be leashed and kept away from the seals on the beach. Older seals may bite in self defense. Some diseases are infectious to both dogs and seals, and may pose a risk to humans as well, if they come in direct contact with an infected animal.

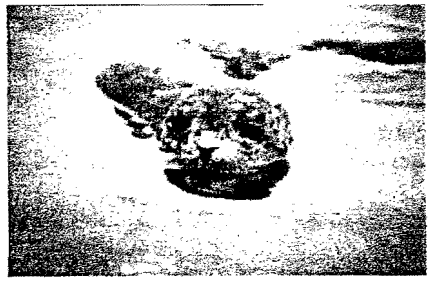
Share Information

- If the beach is regularly patrolled or maintained by a local agency, alert them to the presence of the animal so that they can check on it periodically to determine if there is a need to post informational signs or to intervene in some way. A minimum undisturbed observation period of 24 to 48 hours is recommended to determine whether the pup is being attended by a female. Signs of an attendant female would include; sightings of seal(s) in the water nearby; tracks near the pup; movement of the pup up or down the beach, or in and out of the water.
- Advise neighbors of the animals presence, note its location and when it was first observed.
- Remind others that seal pups need to use shoreline habitat to warm up (**DO NOT** pour water on seal pups); and rest (**DO NOT** handle, cover or attempt to feed seal pups).
- Feeding or baiting seals in the wild is a form of harassment and is harmful. Seals that are fed by humans quickly learn to seek humans for feeding opportunities.
- If the pup has been unattended for 48 hours, or is clearly in distress (injured), contact:

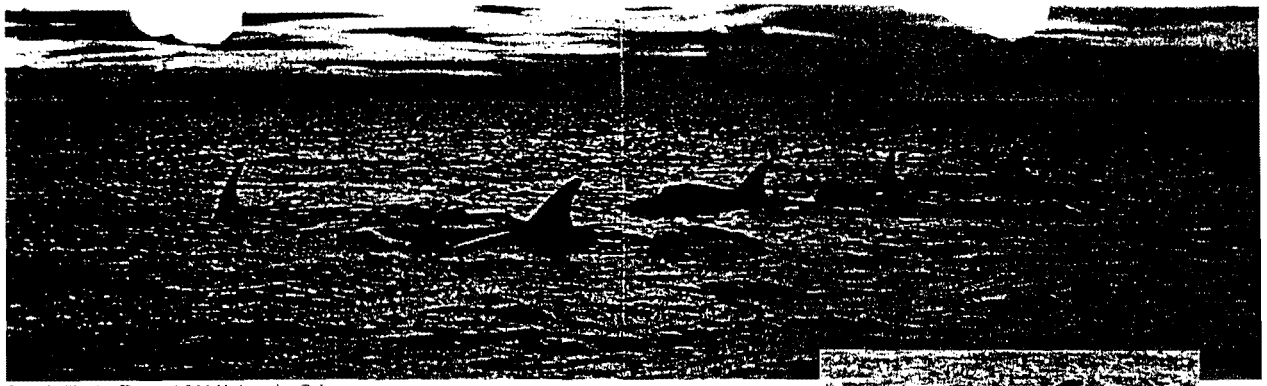
NW Marine Mammal Stranding Network Hotline
1-800-853-1964
or contact local authorities at

Report Harassment

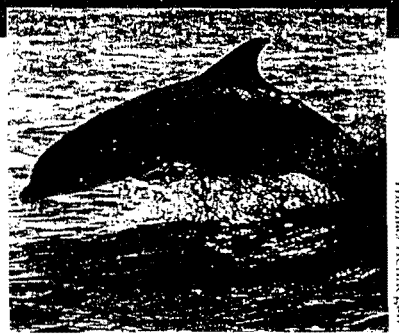
Seals are federally protected from harassment and capture by the public. If you observe incidents of people or pets tormenting, disturbing or attempting to remove a seal from the beach, contact the **NOAA Fisheries Enforcement Hotline (1-800-853-1964)** to report a violation.



U.S. Department of Commerce
Northwest Regional Office
NOAA Fisheries National Marine Fisheries Service



Bernd Würsig, Texas A&M University-Galveston



Thomas Henningsen

What you can do ...

- Do not feed marine mammals when you are boating or walking along a pier.
- Maintain a minimum distance of 50 to 100 yards from all animals, whether in the water or on shore, to prevent disturbance or harassment.
- Learn more about marine mammals by visiting a library, nature center or museum and teach others what you know.
- Find out who handles live marine mammal strandings in your area in case you see one. If no separate organization exists, contact the National Marine Fisheries Service, U.S. Fish and Wildlife Service or your state wildlife agency.
- A seal or sea lion pup found alone on shore is generally not abandoned, but has only temporarily been left behind while the mother forages. Leave it alone. Any attempt to move the animal can result in injury or ultimate abandonment by the mother.
- Keep your distance ... respect their beauty, enjoy watching them, but don't feed them, harm them, or swim with them. You can return another day — make sure they can too.

The cooperating agencies' programs are open to all citizens without regard to race, color, sex, handicap, religion, age or national origin. Publication of this document was supported in part by the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, and by Institutional Grant NA16RG0157-01 to Texas A&M University by the National Sea Grant Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Text and design — *Amy Bronsunk* front panel photo — *Dr. Bernd Würsig*, Texas A&M University-Galveston.

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NA16RG0157-01
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Protecting Marine Mammals

Look

from a distance ... but don't touch, feed or harm in the wild

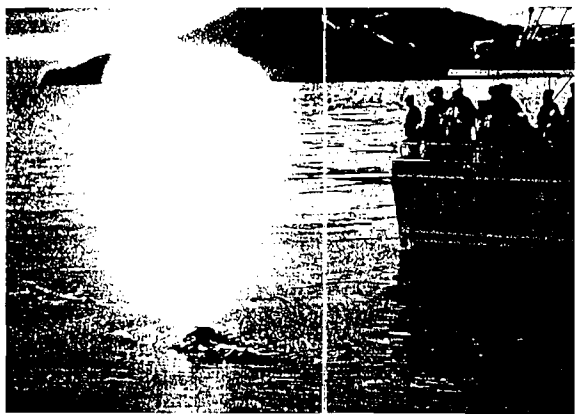
Sea Grant College Program
Texas A&M University

Office of Protected Resources
National Marine Fisheries Service
1335 East-West Highway

Sue Keller, Alaska Sea Grant

Who doesn't get a thrill from watching a dolphin jump through the waves on a summer day? Or a sea lion sun itself on a windswept rock? Or experience a feeling of serenity in watching the migration of majestic whales along the coast?

Who hasn't wanted, at least once, to get even closer to these marine mammals — to join in their antics, to become part of their habitats, to respond to their apparent calls for human contact?



Kurt Byers, Alaska Sea Grant

Why not? What possible harm can we do by hand-feeding dolphins, sea lions or seals? Or by piloting our boats close enough so we can reach out and touch a passing marine mammal? What harm is there in swimming with playful dolphins or porpoise and teaching them to be friendly with humans?

Unfortunately, we can kill them.

Not intentionally, not even today. But our well-meaning actions on a summer's day are putting more and more marine mammals at risk.

These animals are protected by the Marine Mammal Protection Act ... and some by the Endangered Species Act. The National Marine Fisheries Service, which is responsible for managing and protecting whales, dolphins, porpoise, seals and sea lions, has regulations prohibiting feeding marine mammals in the wild and others that specify how close people can get to the animals. We've learned, albeit slowly, that these activities may significantly change the marine mammals' behavior by disrupting their normal feeding and reproductive patterns.

Consider the facts ...

- Feeding marine mammals can affect their ability to cope and live in their natural habitat.
- It reduces the animal's natural wariness of humans and increased interactions with people can lead to injury or death to the marine mammals.
- Feeding marine mammals encourages them to approach boats and increases their chances of colliding with boats. They become more apt to tangle with fishing gear or boat propellers.
- Regular feeding programs may cause migratory animals to remain in areas after their natural primary prey species have left and the animals could be subjected to food shortages and inhospitable conditions.
- Marine mammals who are accustomed to being fed when boats are around and people are in the water may become aggressive in their efforts to get food and could injure swimmers.

Did you know ...

- After dolphin feeding became popular along the Gulf and southern Atlantic coasts, scientists found more stranded dolphins with wounds and scars from boat propellers. More dolphins also began approaching boats and begging for handouts.
- People have been seen trying to feed marine mammals such things as beer, junk food or non-edible foreign objects.
- Marine mammals have been hit by boat propellers, snagged by fish hooks and chased down by high-powered motor boats. Pups or calves too young to feed themselves die when they are separated from their mothers.
- Gunshot wounds are a common cause of death in seals and sea lions on the West Coast and off Florida's east coast, and dolphins have been shot in the Gulf of Mexico.
- In the first year of a program to assess marine mammal interactions with commercial fishing operations, 89 dolphins and porpoise were entangled in coastal gillnets and trawl fisheries
- In Hawaii an increase in vessel traffic may have displaced humpback whales from their traditional nursery areas where they are most protected from predators

A.K.H. Kam, Hawaii Sea Grant

Bernd Würsig, Texas A&M U[illegible]y-Galveston

Be Whale Wise

Marine Wildlife Guidelines for Boaters, Paddlers and Viewers *(Revised 2005)*

Guidelines:

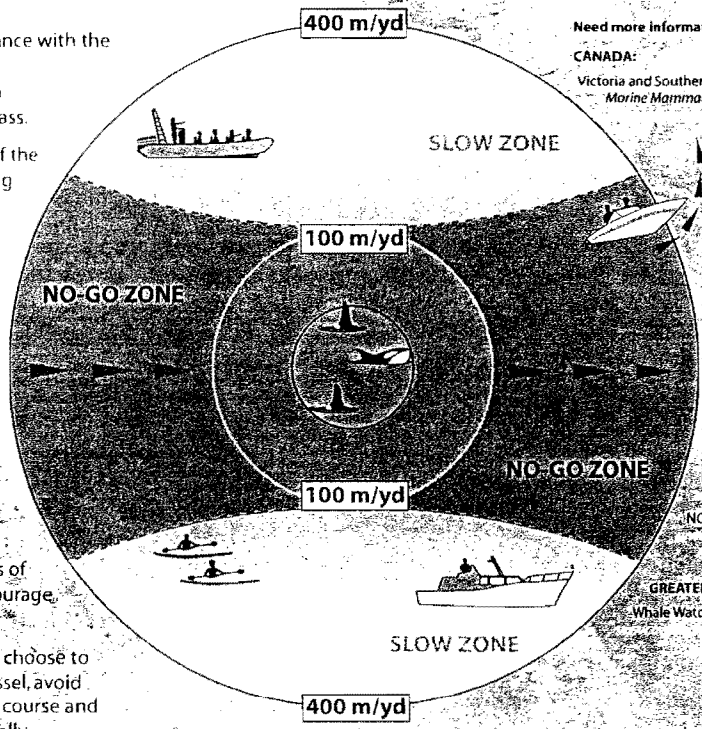
1. BE CAUTIOUS and COURTEOUS: approach areas of known or suspected marine wildlife activity with extreme caution. Look in all directions before planning your approach or departure.
2. SLOW DOWN: reduce speed to less than 7 knots when within 400 metres/yards of the nearest whale. Avoid abrupt course changes.
3. **KEEP CLEAR of the whales' path.** If whales are approaching you, cautiously move out of the way.
4. DO NOT APPROACH whales from the front or from behind. Always approach and depart whales from the side, moving in a direction parallel to the direction of the whales.
5. **DO NOT APPROACH or position your vessel closer than 100 metres/yards to any whale.**
6. If your vessel is not in compliance with the 100 metres/yards approach guideline (#5), place engine in neutral and allow whales to pass.
7. STAY on the OFFSHORE side of the whales when they are traveling close to shore.
8. LIMIT your viewing time to a recommended maximum of 30 minutes. This will minimize the cumulative impact of many vessels and give consideration to other viewers.
9. DO NOT swim with, touch or feed marine wildlife.

Bow and stern-riding porpoises and dolphins:

1. DO NOT drive through groups of porpoises or dolphins to encourage bow or stern-riding.
2. Should dolphins or porpoises choose to ride the bow wave of your vessel, avoid sudden course changes. Hold course and speed or reduce speed gradually.

Seals, sea lions and birds on land:

1. BE CAUTIOUS AND QUIET when around haul-outs and bird colonies, especially during breeding, nesting and pupping seasons (generally May to September).
2. REDUCE SPEED, minimize wake, wash and noise, and then slowly pass without stopping.
3. AVOID approaching closer than 100 metres/yards to any marine mammals or birds.
4. PAY ATTENTION and move away, slowly and cautiously, at the first sign of disturbance or agitation.
5. DO NOT disturb, move, feed or touch any marine wildlife, including seal pups. If you are concerned about a potentially sick or stranded animal, contact your local stranding network where available.



Marine Protected Areas, Wildlife Refuges, Ecological Reserves and Parks:

1. CHECK your nautical charts for the location of various protected areas.
2. ABIDE by posted restrictions or contact a local authority for further information.

To report a marine mammal disturbance or harassment:

CANADA:
Fisheries and Oceans Canada: 1-800-465-4336

US:
NOAA Fisheries, Office for Law Enforcement: 1-800-853-1964

To report marine mammal sightings:

BC Cetacean Sightings Network(BC)
or 1-866-I SAW ONE

The Whale Museum Hotline (WA state)
or 1-800-562-8832

Orca Network (WA state)
or 1-866-ORCANET

Need more information?

CANADA:

Victoria and Southern Gulf Islands:
Marine Mammal Monitoring Project (M3)
or 250-383-2086

Johnstone Strait and Northern Vancouver Island:
Straitwatch
or 250-974-7064

Robson Bight (Michael Bigg) Ecological Reserve:

Fisheries and Oceans Canada:

US:

Washington State, Haro Strait Region:
Soundwatch Boater Education Program
or 360-378-4710

NOAA Fisheries, Northwest Region:

NOAA Fisheries, Office of Protected Species:

GREATER VICTORIA and WASHINGTON STATE:
Whale Watch Operators Association NW:

Fisheries and Oceans Canada | Pêches et Océans Canada | BCParks | aquarium | SEATTLE AQUARIUM | Orca Network

Educational Links!

For background info on marine mammals, please visit:

http://www.nwr.noaa.gov/Marine-Mammals/index.cfm

For information on marine mammal research programs, please visit:

NOAA's National Marine Mammal Lab
http://www.afsc.noaa.gov/NMML/

Cascadia Research Collective
http://www.cascadiaresearch.org/

For information on killer whale research, education programs and to report sightings, please visit:

Center for Whale Research
http://www.whaleresearch.com/

Orca Network
http://www.orcanetwork.org/

The Whale Museum
http://www.whale-museum.org/

Killer Whale Tales
http://www.killerwhaletales.org/

Northwest Fisheries Science Center Marine Mammal Program
http://www.nwfsc.noaa.gov/research/divisions/cbd/marine_mammal/marinemammal.cfm

For information on local zoos and aquariums with marine mammal displays, please visit:

Seattle Aquarium
http://www.seattleaquarium.org/

Oregon Coast
http://www.aquarium.org/

Point Defiance
http://www.pdza.org/

Species ID

Marine Mammals in Washington and Oregon

1. Cetaceans – Order Cetacea
    a. Mysticetes (Baleen Whales) – Suborder Mysticeti
        i. **Family Balaenidae**
            1. Northern Pacific Right Whale* – *Eubalaena glacialis*
        ii. **Family Balaenopteridae**
            1. Blue Whale * – *Balaenoptera musculus*
            2. Fin Whale * – *Balaenoptera physalus*
            3. Sei Whale * – *Balaenoptera borealis*
            4. Minke Whale – *Balaenoptera acutorostrata*
            5. Humpback Whale *– *Megaptera novaeangliae*
        iii. **Family Eschrichtiidae**
            1. Gray Whale – *Eschrichtius robustus*
    b. Odontocetes (Toothed Whales) – Suborder Odontoceti
        i. **Family Physeteridae**
            1. Sperm Whale * – *Physeter macrocephalus*
        ii. **Family Kogiidae**
            1. Dwarf Sperm Whale – *Kogia simus*
            2. Pgymy Sperm Whale – *Kogia breviceps*
        iii. **Family Ziphiidae (Beaked Whales)**
            1. Baird's Beaked Whale – *Berardius bairdii*
            2. Cuvier's Beaked Whale – *Ziphius cavirostris*
            3. Hubb's Beaked Whale – *Mesoplodon carlhubbsi*
            4. Stejneger's Beaked Whale – *Mesoplodon stejnegeri*
        iv. **Family Phocoenidae (Porpoises)**
            1. Harbor Porpoise – *Phocoena phocoena*
            2. Dall's Porpoise – *Phocoenoides dalli*
        v. **Family Delphinidae (Dolphins)**
            1. Striped Dolphin – *Stenella coeruleoalba*
            2. Common Dolphin – *Delphinus spp.*
            3. Pacific White-sided Dolphin – *Lagenorhynchus obliquidens*
            4. Risso's Dolphin – *Grampus griseus*
            5. False Killer Whale – *Pseudorca crassidens*
            6. Short-finned Pilot Whale – *Globicephala macrorhynchus*
            7. Northern Right Whale Dolphin – *Lissodelphis borealis*
            8. Killer Whale – *Orcinus orca*
                a. *Southern Resident Killer Whale* *

* Listed as Endangered under the Endangered Species Act
** Listed as Threatened under the Endangered Species Act

2. **Pinnipeds - Order Pinnipedia**
    a. Sea lions and Fur seals
        i. **Family Otariidae**
            1. California Sea Lion - *Zalophus californianus*
            2. Steller Sea Lion ** - *Eumetopias jubatus*
            3. Northern Fur Seal - *Callorhinus ursinus*
            4. Guadalupe Fur Seal** - *Arctocephalus townsendi*
    b. True seals
        i. **Family Phocidae**
            1. Harbor Seal - *Phoca vitulina*
            2. Northern Elephant Seal - *Mirounga angustirostris*
3. **Other Marine Mammals**
    a. Sea otters
        i. **Family Mustelidae**
            1. Sea Otter - *Enhydra lutris*

* Listed as Endangered under the Endangered Species Act
** Listed as Threatened under the Endangered Species Act

Age Class Length and Weight for Pinnipeds and Cetaceans

* All lengths and weight estimates are provided by: Geraci, J.R, and V.J. Lounsbury. 2005. Marine Mammals Ashore: A Field Guide for Strandings, Second Edition. National Aquarium in Baltimore, Baltimore, MD.

Northern Fur Seal

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	0.6 m = 60 cm	23.6 in	4.5-6 kg = 9.9-13.2 lb
Weaning			12-14 kg = 26.4-30.8 lb
Adult Female	1-1.5 m = 100-150 cm	39.37 -59 in	30-60 kg = 66-132 lb
Adult Male	1.9-2.3 m = 190-230 cm	74.8-90.5 in	180-270 kg = 396-594 lb.

Guadalupe Fur Seal

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	0.6 m= 60 cm	23.6 in	
Weaning			
Adult Female	1.4-1.7 m = 140-170 cm	55-66.9 in	40-55kg = 88-121 lb.
Adult Male	1.8-2.4 m = 180-240 cm	70.8-94.4 in	160-220kg = 352-484 lb.

Steller Sea Lion

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	1 m= 100 cm	39.37 in	16-23 kg=35.2-50.6 lb
Weaning	1.8 m=180 cm	70.86 in	
Adult Female	2.2-2.9 m = 220-290 cm	86.6-114 in	190-350 kg = 418-770 lb.
Adult Male	2.4-3.3 m = 240-330 cm	94.48-129.9 in	410-1100 kg = 902-2420 lb.

California Sea Lion

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	0.7 m = 70 cm	27.55 in	6-9 kg = 13.2-19.8 lb.
Weaning			25 kg = 55 lb.
Adult Female	1.5-2 m = 150-200 cm	59.0-78.74 in	50-110 kg = 110-242 lb.
Adult Male	2-2.4 m = 200-240 cm	78.74-94.48 in	250-390 kg = 550-858 lb.

Northern Elephant Seal

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	1.2-1.4 m = 120-140 cm	47.24-55.1 in	30-45 kg = 66-99 lb.
Weaning			100-160 kg = 220-352 lb.
Adult Female	2-3.5 m = 200-350 cm	78.74 – 125.9 in	600-900 kg = 1320-1980 lb.
Adult Male	3.8-4.1 m = 380-410 cm	149.6-161.41 in	1200-2300 kg = 2640-5060 lb.

Harbor Seal

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	0.7-0.9 m = 70-90 cm	27.5-35.4 in	9-15 kg = 19.8-33 lb.
Weaning	0.9 m = 90 cm	35.4 in	20-29 kg = 44-63.8 lb.
Adult	1.5-1.9 m = 150-190 cm	59-74.80 in	75-120 kg = 165-264 lb.

Gray Whale

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	4.6-5 m = 460-500 cm	15.09-163.4 ft.	500-680 kg = 1100-1496 lb.
Weaning			8.5 m = 27.8 ft.
Adult	11-15 m = 1100-1500 cm	36.0-49.21 ft.	16-35 tons

Humpback Whale

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	4-4.6 m = 400-460 cm	13.1-15.09 ft.	680-1400 kg = 1496-3080 lb.
Weaning	8-10 m = 800-1000 cm	17.6-22 ft.	
Adult	12-16 m = 1200-1600 cm	26.4-35.2 ft.	30-45 tons

Harbor Porpoise

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	0.7-0.9 m = 70-90 cm	27.5-35.4 in	5-6 kg = 11-13.2 lb.
Weaning	1.1-1 m = 100-110 cm	39.37-43.30 in	
Adult	1.4-1.7 m = 140-170 cm	55.1-66.9 in	601-80 kg = 132-176 lb.

Dall's Porpoise

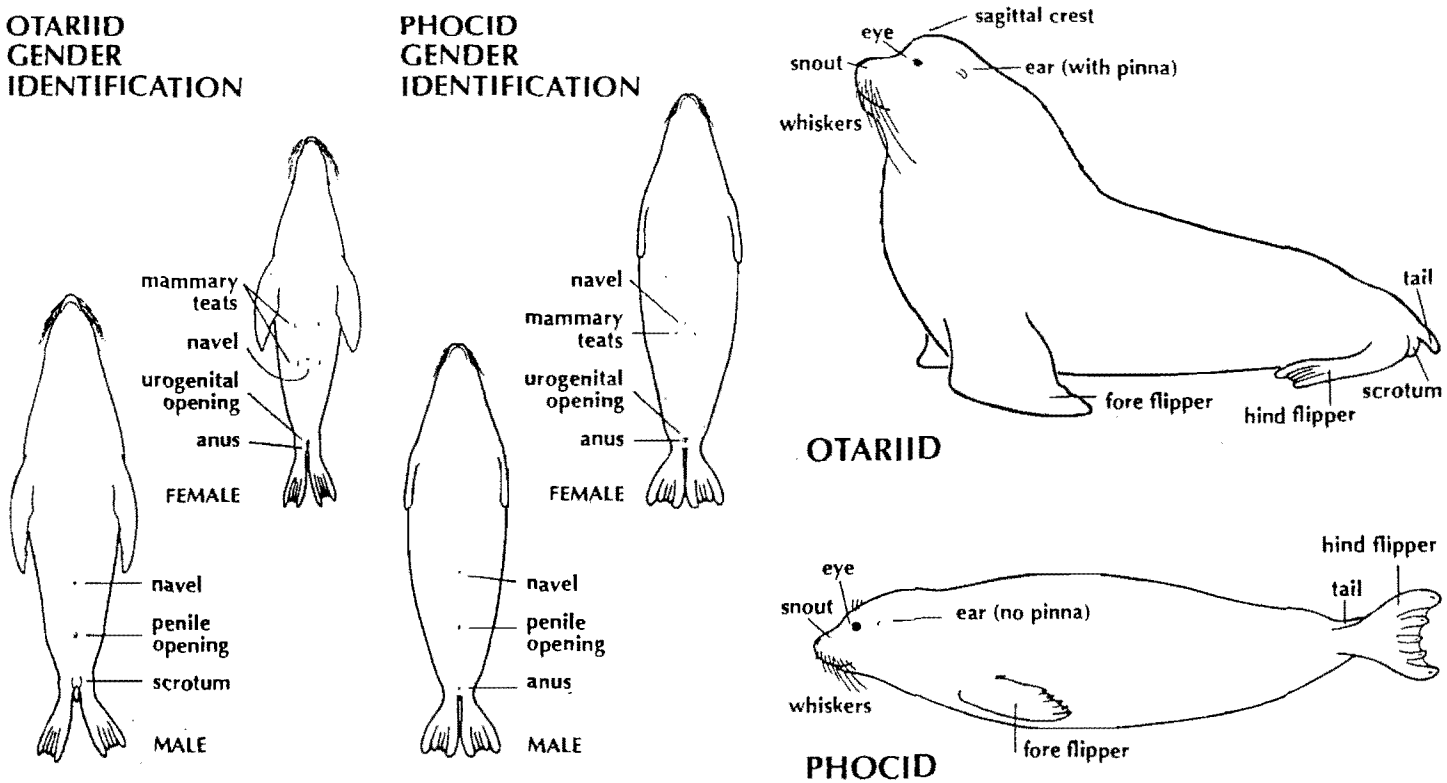
Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	1 m = 100 cm	39.37 in	11-25 kg = 24.2-55 lb
Adult	1.8-2.2 m = 180-220 cm	70.8-86.61 in	100-200 kg = 220-484 lb.

Killer Whale

Age Class	Length (cm & m)	Length (inches or ft.)	Weight
Neonate	2.1-2.5 m = 210-250 cm	6.88-8.2 ft.	180 kg = 396 lb.
Weaning	4 m = 400 cm	13.12 ft.	
Adult Female	7-8 m = 700-800 cm	22.9-16.24 ft.	4 tons
Adult Male	8-9 m = 800-900 cm	26.24-29.5 ft.	5.6-8 tons

Pinnipeds

Morphology of Pinnipeds



From "Guide to Marine Mammals of Alaska" by Kate Wynne

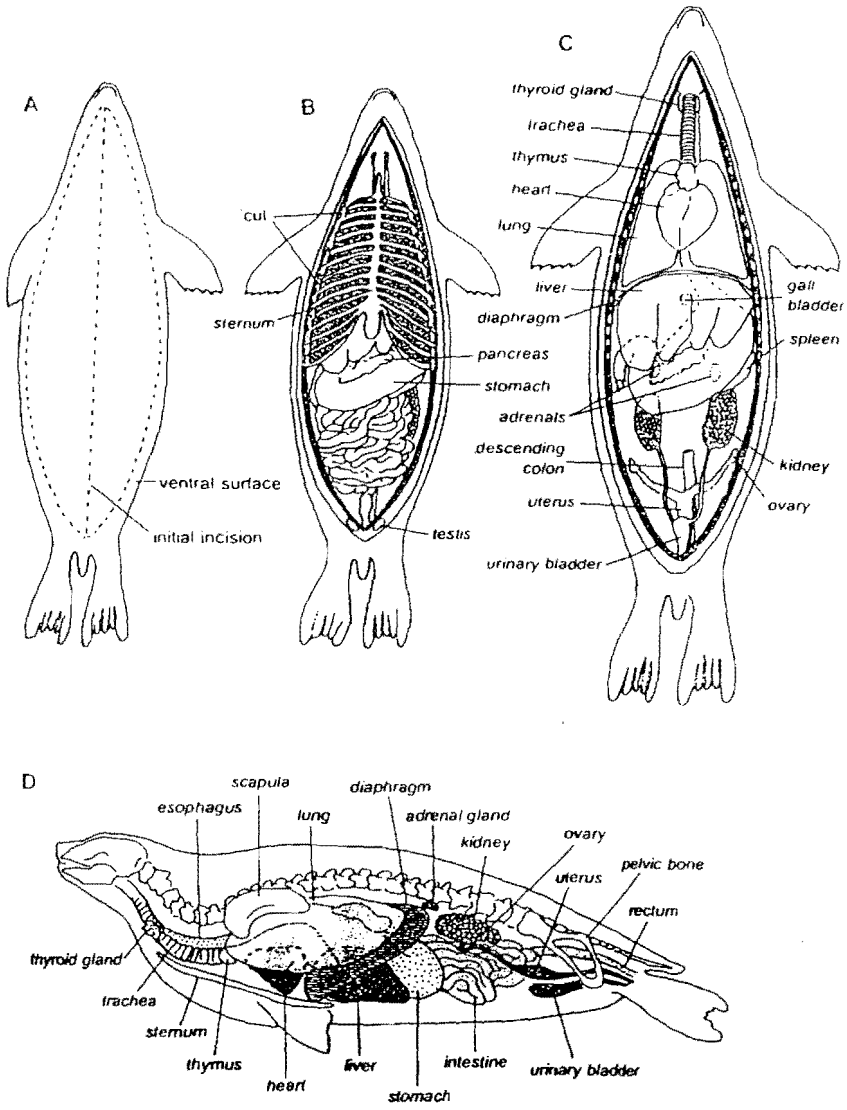
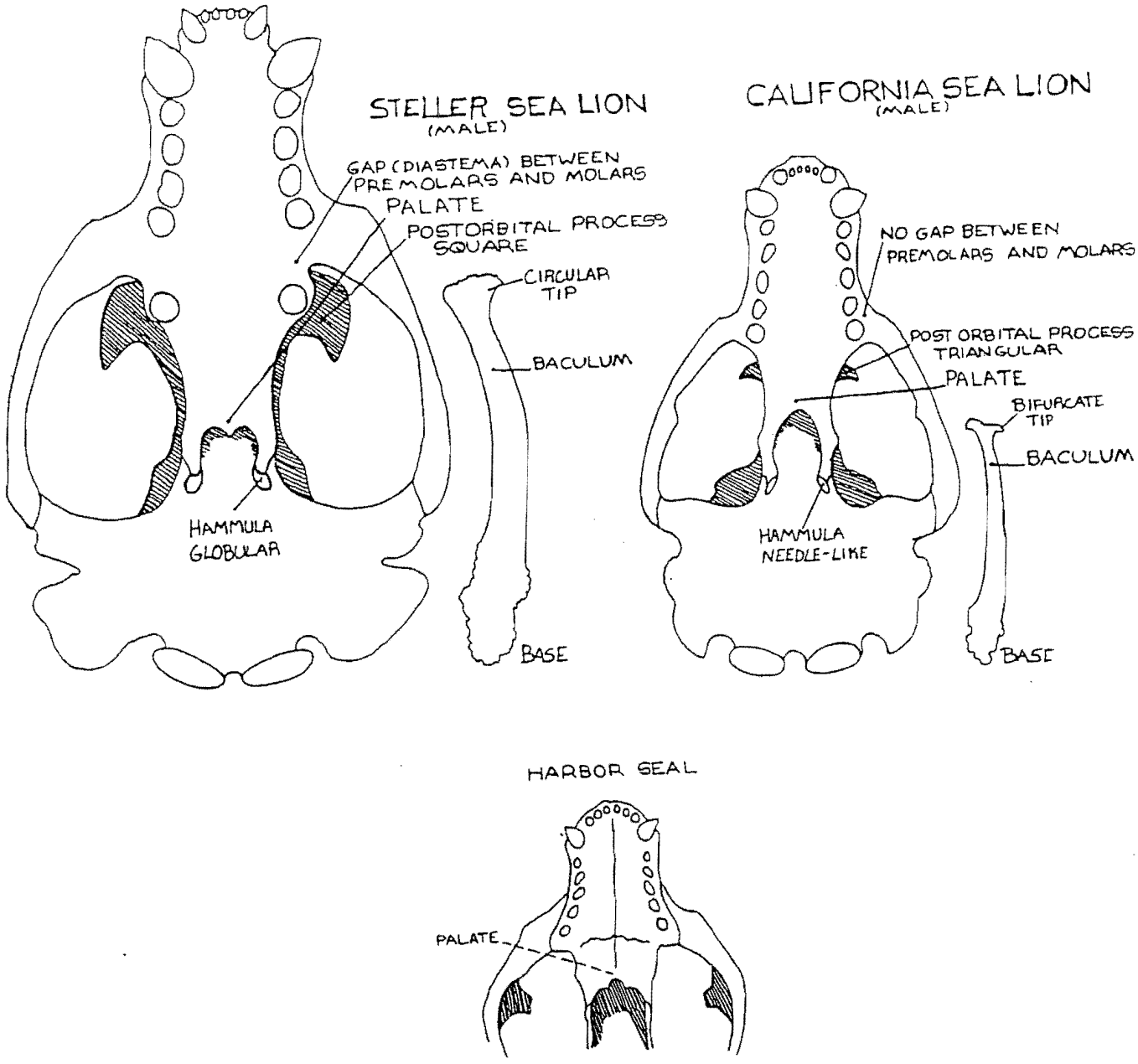


Fig. 10.11. Pinniped dissection and internal anatomy. **A.** Initial incisions. **B.** Ventral view of superficial viscera before removal of sternum and costal cartilages. **C.** Ventral view of major internal organs after removal of intestines (modified from Fay et al. 1979[34] and Winchell 1990[109]). **D.** Lateral view of major internal organs of a phocid seal (modified from Rommel[87]).

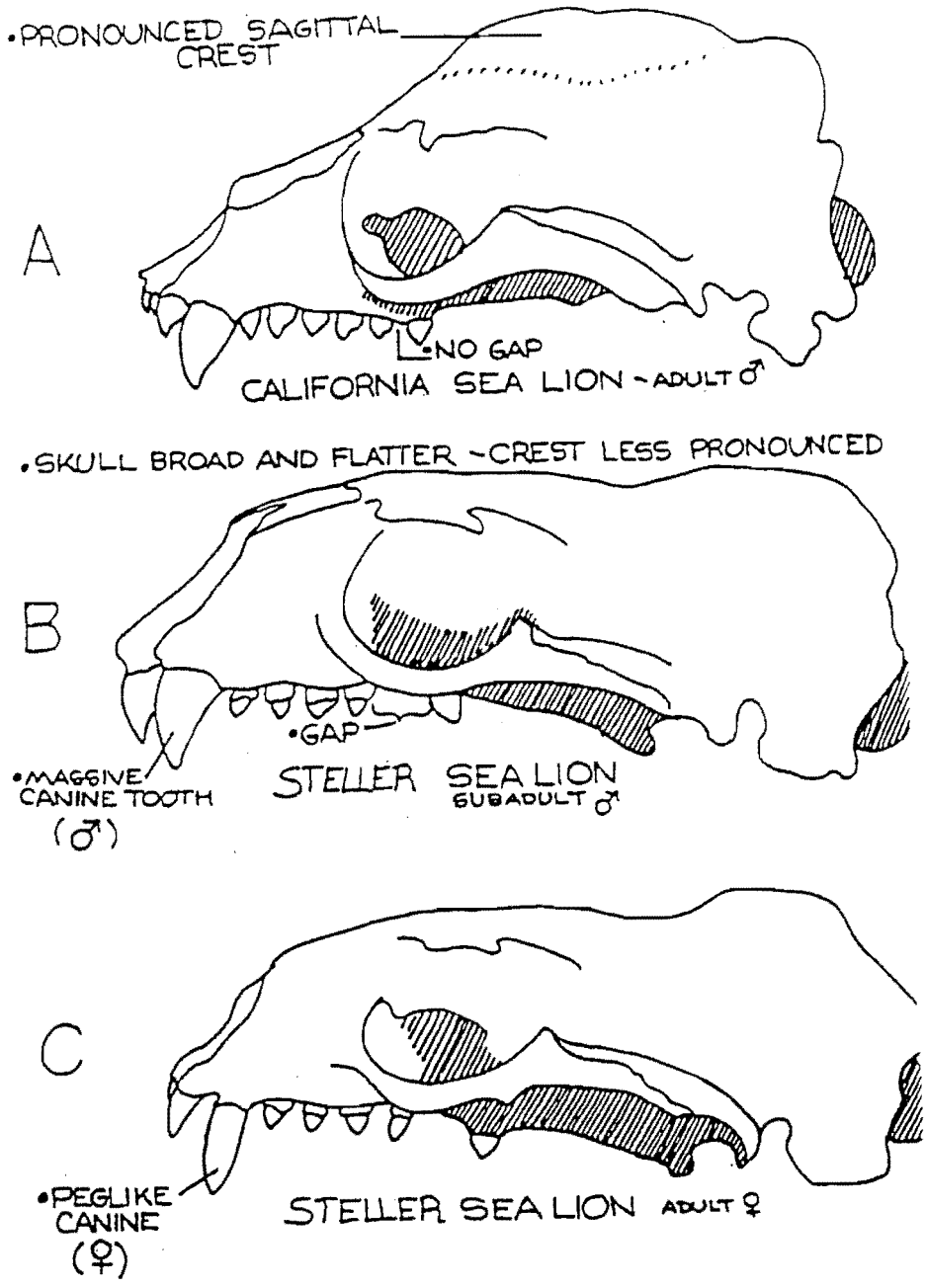
From "Marine Mammals Ashore: A Field Guide for Strandings" by Geraci & Lounsbury

Phocidae Seals	Vs.	Otaridae Sea Lions & Fur Seals
Wriggling undulations, cannot rotate hind limbs forward for "walking" motion.	**Locomotion**	Can walk on all four feet, the hind limbs are rotated forward under the posterior end for support.
Use mainly the hind limbs for propulsion.	**Swimming**	Use mainly the forelimbs for propulsion.
No external ear present.	**Ear Present?**	Small external ear present.
Small fore flippers, less than ¼ of the total body length.	**Flipper Size**	Large fore flippers, about ¼ of the total body length.
Five claws on the hind flippers.	**Claws?**	Three middle claws on the hind flippers.
Often spotted or occasionally banded, no under fur present.	**Coat**	Colors are usually uniform, never spotted or banded and may possess distinct under fur.
Hair covers all flippers.	**Hair on flippers?**	All surfaces of flippers sparsely haired or naked.
Mammae with two or four teats.	**Teats**	Mammae with four teats.
Males are equal to or slightly smaller or larger than females.	**Sexual dimorphism**	Males are larger than females.
Most species monogamous.	**Reproduction**	All species polygynous.

Information was compiled from "Whales and other Marine Mammals of Washington and Oregon" by Tamera Eder.



D. G. Ainley, G.W. Page, L.T. Jones, L.E. Stenzel and R.L. LeValley. 1980. "Beached Marine Birds and Mammals of the North American West Coast: A Manual for Their Census and Identification" FWS/OBS-80/03

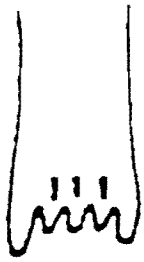


D. G. Ainley, G.W. Page, L.T. Jones, L.E. Stenzel and R.L. LeValley. 1980. "Beached Marine Birds and Mammals of the North American West Coast: A Manual for Their Census and Identification" FWS/OBS-80/03

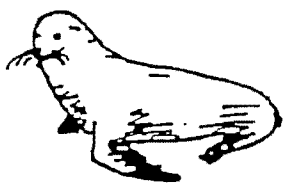
A GUIDE TO PINNIPEDS

-ear pinnae present
-beige & brown whiskers
-short fur

-fore flippers mostly hairless
-fur extends down onto flipper
-nails rudimentary



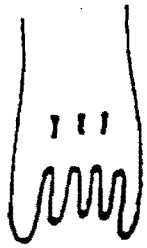
-hind flippers hairless
-nails present on middle 3 digits
-nails located 1/4 of the length of the flipper from the trailing edge
-able to bring hind flippers under the body



CA. SEA LION

-long ear pinnae present
-beige & brown whiskers
-long fur

-fore flippers hairless
-fur line stops at the top of the flipper, cutting straight across
-nails rudimentary



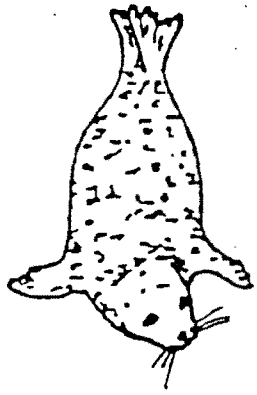
-hind flippers hairless
-nails present on middle 3 digits
-nails located 1/3 of the length of the flipper from the trailing edge
-able to bring hind flippers under the body

NORTHERN FUR SEAL

-no pinnae; ear hole visible
-white whiskers

-fore flippers haired
-nails present

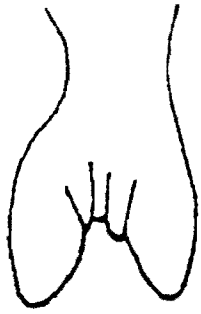
-hind flippers haired
-nails present
-hind flippers always behind body



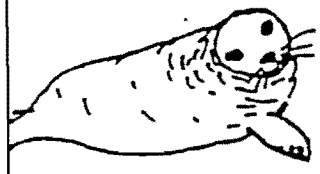
HARBOR SEAL

-no pinnae; ear hole not visible
-black whiskers

-fore flippers haired
-nails present
-first digit elongated



-hind flippers haired
-nails absent
-hind flippers always behind body



NO. ELEPHANT SEAL

Harbor Seals

Phoca vitulina

Location: Can be seen in throughout Washington and Oregon, Europe, Asia, and northern coasts of North America.

Size: Males and Females range from 4-6 ft. and a maximum of 310 pounds.

Diet: Rockfish, cod, herring, flounder, and salmon.

Reproduction: Nurseries provide protection for pups; they are sexually mature at 3-7 years. Use the below table to estimate when harbor seal pups are born in your area.

Location	**Time of Year**
Columbia River, Willapa Bay, Grays Harbor	Mid-April - June
Olympic Peninsula	May - July
San Juan Islands, Eastern Puget Sound	June - August
Southern Puget Sound	July - September
Hood Canal	August - January

Table provided by Washington Department of Fish and Wildlife, Marine Mammal Investigations.

Gestation: 10 months.

Lactation: Weaned at 4-6 weeks, milk is 50% fat.

Behavior: Seal pups are temporarily left on shore while their mother forages for food. If you see a seal pup alone on the beach, the best thing to do is stay 100 yards away from the animal, harbor seal mothers are shy and will not return if there are disturbances around the pup. A required 48 hour observation time is necessary to determine if the pup is being attended by the mother or if it has been abandoned.

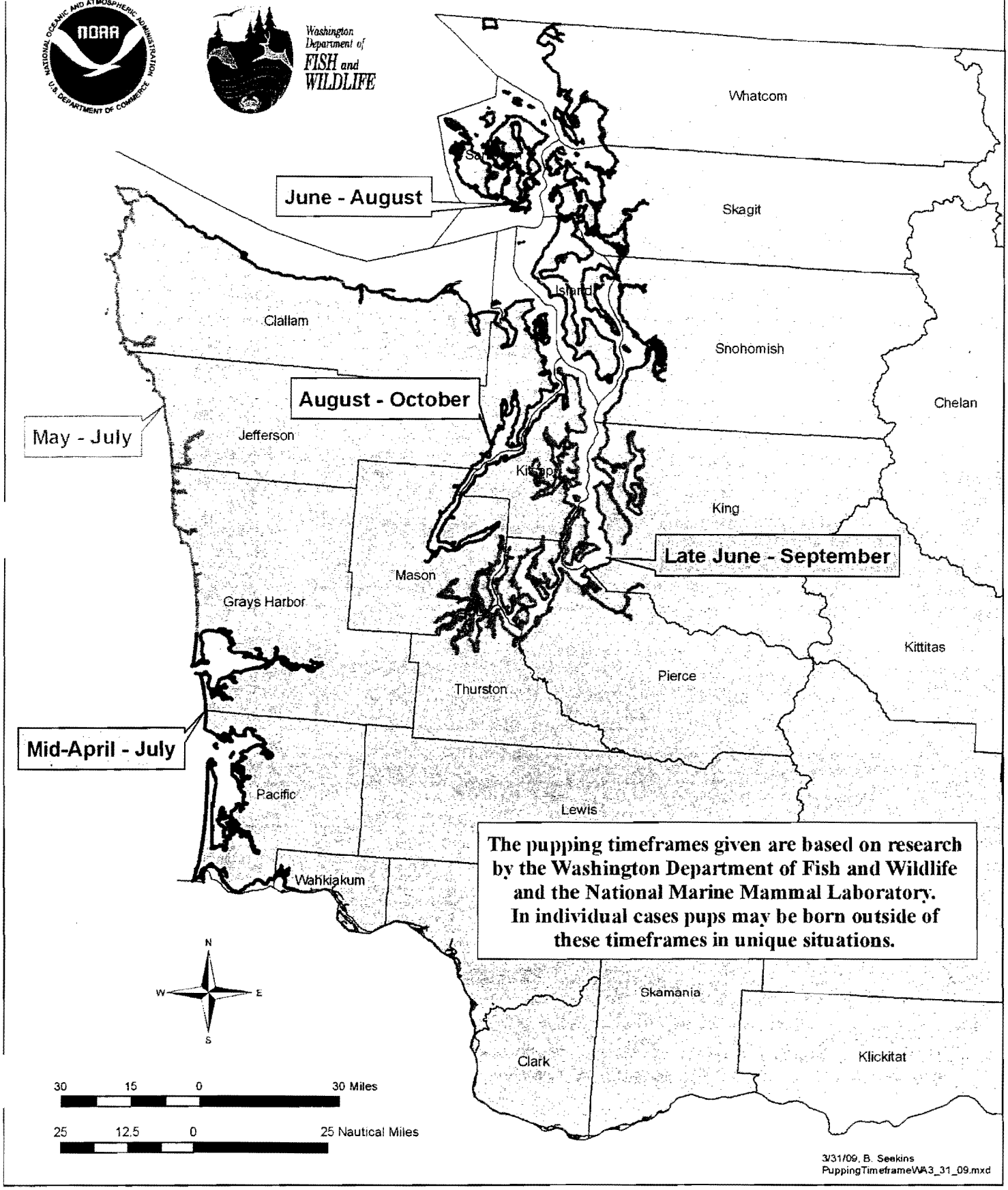
Sleep: Haul out at night and during the day; they have the ability to sleep underwater and come up for air once every 30 minutes, they are unable to sleep at the surface of the water.

Locomotion: On land harbor seals are very awkward, they are unable to move their hind limbs forward to create a "walking" motion, and instead they drag themselves along using their front flippers in a "caterpillar" motion. Locomotion on land is accomplished by wriggling undulations using mainly the front flippers; the hindlimbs cannot be rotated forward and are dragged behind. This does not mean they are injured.

Strandings: Harbor seals are the most common species to strand in Washington and Oregon State. Included below is stranding information from the past five years. Please note that 2006 numbers include only January through June.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

Harbor Seal Pupping Timeframes in Washington State



The pupping timeframes given are based on research by the Washington Department of Fish and Wildlife and the National Marine Mammal Laboratory. In individual cases pups may be born outside of these timeframes in unique situations.

3/31/09, B. Seekins
PuppingTimeframeWA3_31_09.mxd

Northern Fur Seal

Callorhinus ursinus

Location: Found from California through Alaska, across the North Pacific to Japan. Some leave Alaska rookeries in October and November and remain offshore until March through June. Some males stay in the North Pacific while the females and sub-adults spend winter offshore from Southeast Alaska to California.

Size: Males range from 6-7.5 feet and can be up to 620 pounds. Females are 3.5 – 5 feet and are around 120 pounds.

Diet: Mainly feed at night on squid, herring, capelin, and pollock.

Reproduction: Territories are established in May and June and females will arrive and give birth, mating 8-10 days after the pup is born.

Gestation: 10 months

Lactation: Four to five months

Behavior: This species only comes ashore to breed, and is pelagic for 7 to 10 months of the year. This species is known to be aggressive.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

Guadalupe Fur Seal

Arctocephalus townsendi

Location: Breed and pup mainly at Isla Guadalupe, Mexico and Isla Benito del Este, Baja California. It is considered uncommon for animals to be seen north of Central California, although individuals have been stranded or sighted as far north as Alaska. The whereabouts of Guadalupe Fur Seals during the nonbreeding season, from autumn through spring, are generally not known.

Size: Males can be up to 7.3 feet long and up to 490 pounds. Females are ~6 feet and are around 120 pounds.

Diet: Is poorly known but appears to consist of pelagic squid, lanternfish, and mackerel.

Reproduction: Females give birth from early June through July, with a peak in late June. Territories are established by males and breeding occurs one week after females give birth.

Gestation: 11-12 months

Lactation: Nine months

Behavior: Presumably solitary at sea. On land they are mostly asocial and space out to avoid contact with other seals. In nearshore waters, they spend most of their time grooming at the surface.

NW Region: In 2007, 19 Guadalupe Fur Seals stranded in Washington and Oregon. Since Guadalupe Fur Seals are rarely seen this far north, this event was considered to be an Unusual Mortality Event (UME). The UME has since been closed and a team has been identified to investigate the cause of this event. Please report all Guadalupe Fur Seal strandings to the NOAA Stranding Program Office at: 206-526-6733.

National Audubon Society. Guide to Marine Mammals of the World. New York, NY: Chanticleer Press, Inc., 2002.

Northern Elephant Seal

Mirounga angustirostris

Location: Can be found from coastal Baja California to the Gulf of Alaska. Between December and March adult Northern Elephant Seals arrive in California and Mexico to give birth and mate. After pupping and mating, the adults and young migrate to their feeding grounds as far north as the Aleutian Islands. They have one of the longest migrations of any mammal, some have been recorded traveling over 13,000 miles roundtrip.

Size: Males range from 12-16 feet and can weigh up to 5,000 pounds. Females are smaller and range from 7-12 feet and weigh around 2,000 pounds.

Diet: Squid, octopus, small sharks, rays, and large fish. They can dive for 80 minutes and reach depths of 5,000 feet.

Reproduction: Males form harems usually when they are 9-10 years of age, battling for status in the social hierarchy. Females come ashore and within a few days give birth to a pup conceived in the previous breeding season. A few days before her pup is weaned she breeds again and then returns to sea. They fast during mating season and can lose up to 36% of their body weight during this time.

Gestation: 11 months.

Lactation: No more than one month.

Behavior: These animals are polygynous breeders with a social hierarchy. Molting occurs, they shed their short, dense pelage along with large patches of old skin. Molting is a natural condition that takes 4-5 weeks to complete and is not an attractive process, this does not mean they are injured. Sometimes juveniles get "scabby molt" with skin lesions and birds will pick making the process even more gruesome. Elephant seals are vulnerable during molting and some animals will die. Hauling out on shoreline habitat allows the skin to warm up and will help the molting process, do not attempt to feed our pour water on the animal. The best thing you can do is stay 100 yards away from the animal!

Sleep: Rest at the surface of the water.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

California Sea Lion

Zalophus californianus

Location: Coastal waters of the North Pacific, Vancouver Island south to Mexico. Usually seen August to April on the coast of Washington.

Size: Average male is 8 feet and 800 pounds, females are 5 feet and 250 pounds. Nearly all California seal lions in our region are males, which average 600-800 pounds.

Diet: California Sea Lions eat over 50 species of fish, squid, octopus, and mollusks.

Reproduction: Breeding takes place from May to July, but breeding grounds are typically south of Oregon. Males establish their territories and females give birth and then mate one month later.

Gestation: 10 months

Lactation: Weaned by 8 months

Behavior: California sea lions are playful and intelligent, their behavior is rarely aggressive. A common behavior exhibited by sea lions is called "sailing". This is when a sea lion holds their flippers above the water motionless for a long period of time; they are regulating their body temperature. A lot of times people believe the animal is trapped in a net, if you cannot see a buoy or net gear the animal is most likely exhibiting this behavior.

Strandings: California sea lions are becoming more abundant in Washington and Oregon State. With increased populations more reports of strandings occur. The low in the past five years was 22 animals; the highest was in 2004 with a total of 133 animals.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

Steller Sea Lion

Eumetopias jubatus

Location: Can be seen from southern California up to Alaska, throughout the Aleutian Islands and south to Japan. Can be seen in the Pacific Northwest but are considered to be threatened under the Endangered Species Act.

Size: Males are 8.5-11 feet in length and can be up to 2,200 pounds. Females are 6-7 feet and up to 800 pounds.

Diet: Feed primarily on fish, for example, rockfish, herring, and greenling. They also feed on squid, octopus, shrimp, salmon, and other marine species. They have been observed swallowing rocks which is believed to help with digestion.

Reproduction: Hundreds of sea lions congregate at rookery sites that have been used for generations. Males form a harem at rookeries to establish their territory for breeding seasons. Females arrive and give birth in mid-May to June, mating again only two weeks after giving birth. Females are mature at three to seven years of age but males typically do not breed before the age of 10.

Gestation: 10 months

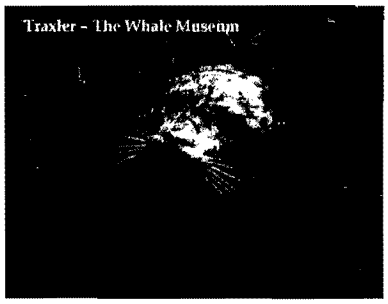
Lactation: One year

Behavior: Steller sea lions are known for their curiosity and playfulness, sometimes leaping from the water and they have been seen jumping across surfaced whales! Sea lions can also be aggressive and will bite if they feel threatened, please stay 100 yards away from these animals!

Strandings: Steller sea lion strandings number anywhere from 5-23 each year from 2002-2006. Some animals are found shot due to competition with fisheries.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

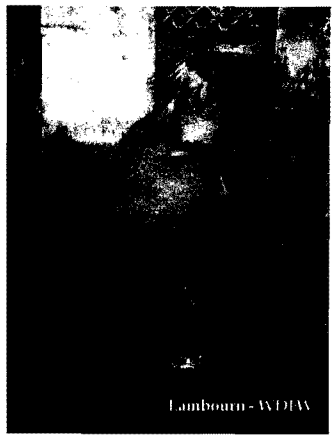
Pinnipeds!



Harbor Seal

Harbor Seal Pup

Northern Fur Seal

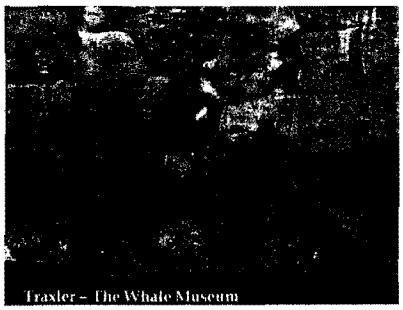


Guadalupe Fur Seal

Northern Fur Seal

Cascadia Research

← Northern Elephant Seals ↑

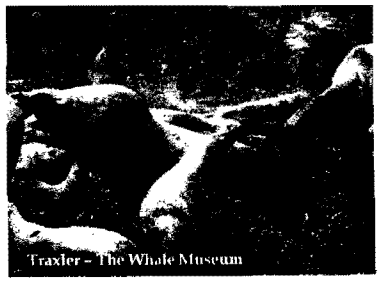


California Sea Lion

California Sea Lion

California Sea Lion

Steller Sea Lion

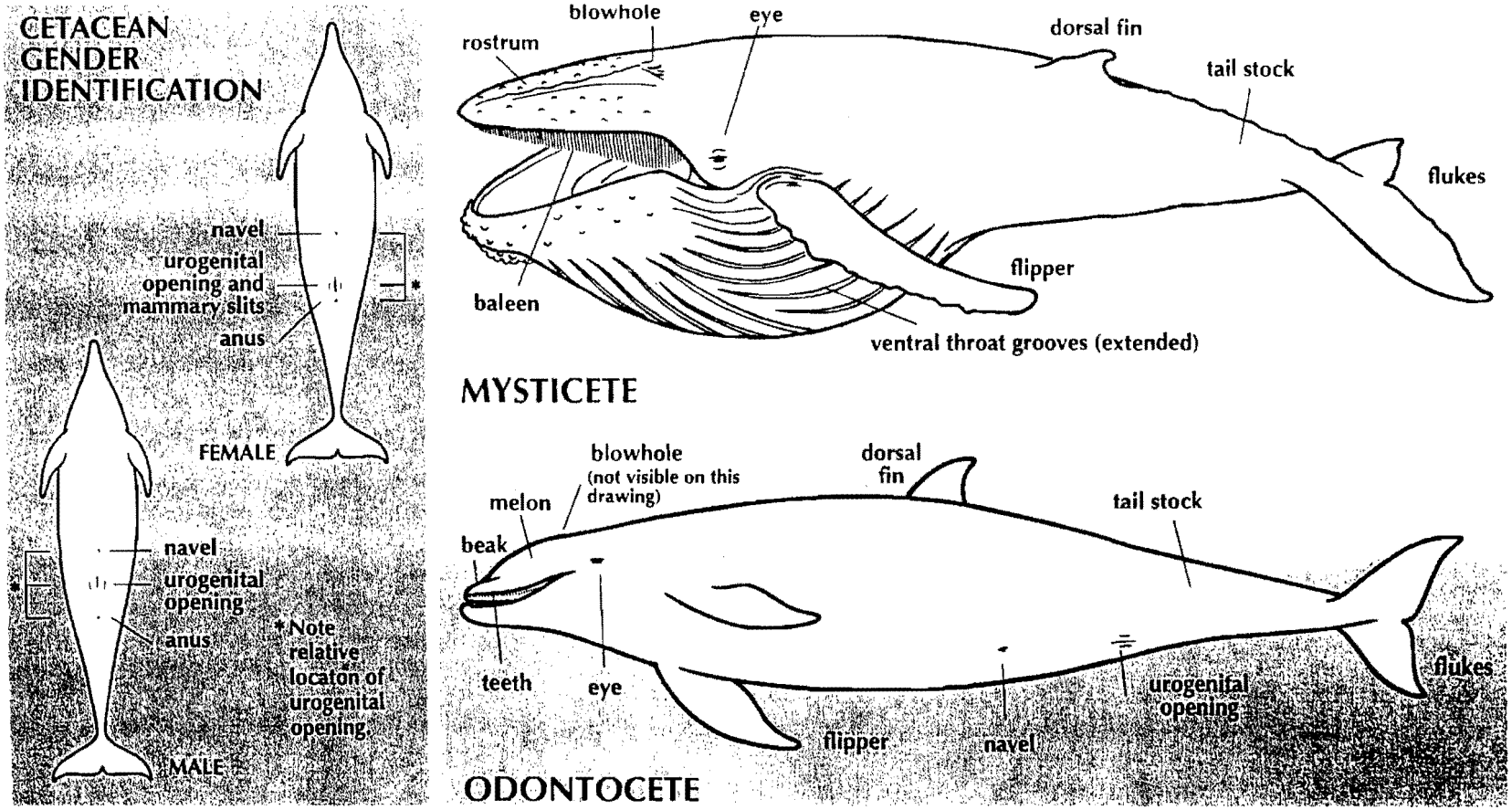


Steller Sea Lion

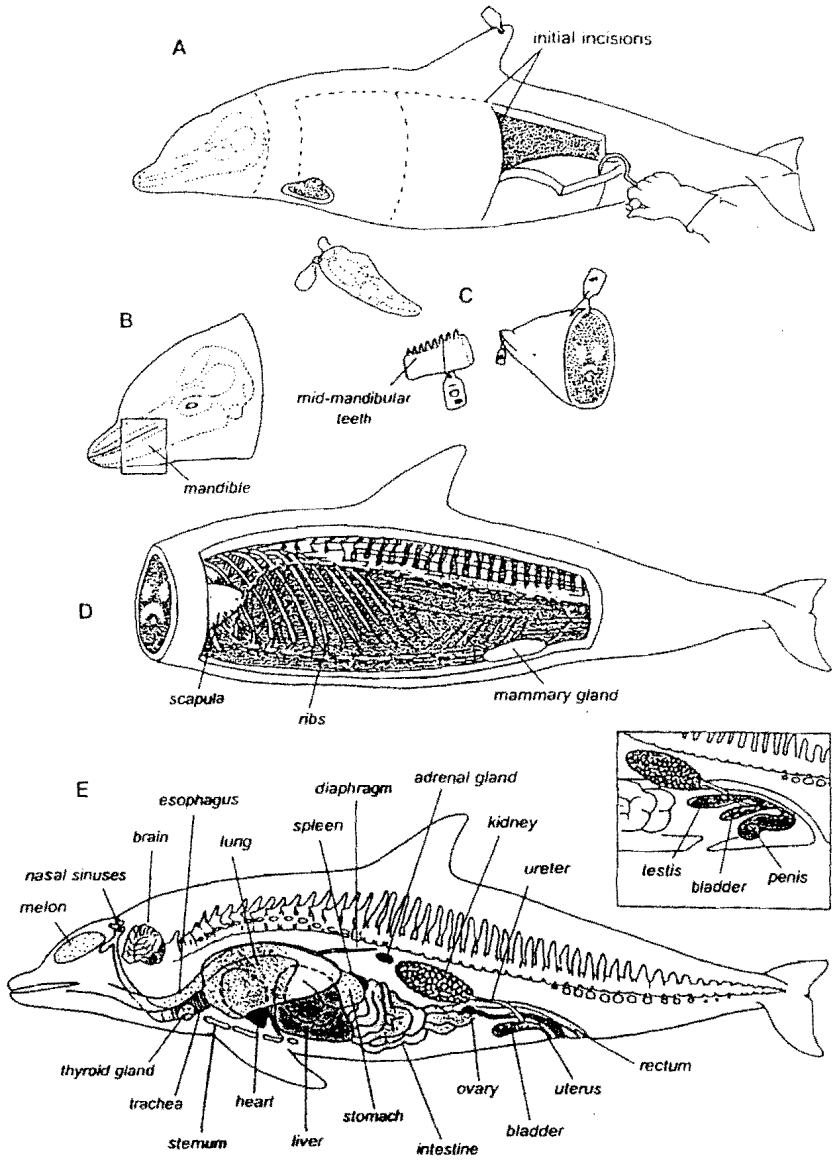
Steller Sea Lion

Cetaceans

Morphology of Cetaceans



Kate Wynne. Guide to Marine Mammals of Alaska. Fairbanks, AK: Alaskan Sea Grant College Program, 1992.



From "Marine Mammals Ashore: A Field Guide for Strandings" by Geraci & Lounsbury

Mysticeti	Vs.	*Odontoceti*
Two	**Blowholes**	One
Symmetrical	**Skull**	Asymmetrical
Baleen	**Feeding**	Teeth
Large	**Tongue Size**	Small
Not present, but doubtful	**Echolocation**	Present
Large	**Size**	Small to Large
Females usually larger than males	**Sexual Dimorphism**	Males usually larger than females
Small groups	**Pods?**	Complex social systems

Dolphin	Vs.	Porpoise
Cone	**Teeth**	Spade
Melon with pronounced beak	**Head**	Blunt with no prominent beak
6-12 feet	**Size**	4-7 feet
Robust	**Body Shape**	Streamlined
All ocean waters	**Preferred waters**	Shallow and nearshore
Six	**Sub-families**	Two
Thirty-three	**# of Species**	Six

* Some exceptions apply to specific species.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

Harbor Porpoise

Phocoena phocoena

Location: Harbor porpoises can be found in cold waters throughout the Northern Hemisphere and occur in coastal waters no deeper than 300 meters.

Size: The average adult is 5 feet in length and weighs a maximum of 150 pounds.

Diet: Preys upon small schooling fish such as herring, mackerel, or smelt. A good feeding ground can attract hundreds of harbor porpoises.

Reproduction: Sexually mature at 3-5 years and they breed in the summer months. Most harbor porpoises have a life span of 10-13 years.

Gestation: 10-11 months.

Lactation: Lasts approximately 8 months.

Behavior: Harbor porpoises are the smallest porpoise in the Pacific Northwest and are considered to be shy. They generally avoid moving vessels and do not bow ride or perform acrobatics. They can be found in groups of 2-10 animals and prefer shallow coastal waters.

Strandings: The Working Group for Unusual Marine Mammal Mortality Events has declared an unusual mortality event for harbor porpoises in Washington and Oregon State for 2006. This is due to an increased number in strandings and an investigation is underway to determine the cause of these strandings.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

Dall's Porpoise

Phocoenoides dalli

Location: Can be found in the North Pacific, are common from the Bering Sea and the Gulf of Alaska and as far south as Baja California. They are found in coastal and pelagic waters and prefer cold temperatures.

Size: Adults average six feet in length and a maximum of 490 pounds.

Diet: Dall's porpoise have been observed feeding on a variety of fish including mackerel, capelin, hake and even squid. The maximum feeding depth has been estimated at 1600 feet and they require large amounts of food at frequent intervals due to their high metabolic rate.

Reproduction: Sexually mature at 3-4 years of age and little is known about their breeding behavior. Observations have been made indicating there are two calving periods, one taking place in February and March, and the other in July and August. Life span of 20 years.

Gestation: 11 ½ months.

Lactation: 2-4 months

Behavior: Are typically seen in groups of 2-20 individuals and they are very fast swimmers, with observations of speeds up to 35 mph. They are common bow riders and are rarely acrobatic.

Strandings: Since 2002 a total of 46 Dall's porpoise have stranded in Washington and Oregon State. Click on the link below for more information.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

Gray Whale

Eschrichtius robustus

Location: This species is a coastal cetacean, usually seen over the continental shelf. During migration most animals pass within about a mile of the shoreline, and gray whales occasionally come into Puget Sound. Gray whales spend April-November in their Arctic feeding grounds and December-April in Mexican breeding areas. Between October and February the species migrates south along the West Coast, returning north between February and July. This round trip migration of 7,400-12,400 miles every year is believed to be the longest of any mammal.

Size: Adult gray whale length is 39-46 feet, with the largest recorded measuring a little longer than 49 feet. Weight is 15-39 tons. A gray whale can live approximately 70 years.

Diet: The gray whale is unique among cetaceans as a bottom-feeder that rolls onto its side, sucking up sediment from the seabed. Bottom-dwelling organisms live in this sediment, and stay in the baleen as water and silt are filtered out. Gray whales feed in shallow waters, usually 150-400 feet deep. Adults can consume 1-1½ tons of food per day during peak feeding periods.

Reproduction: Gray whales are sexually mature at 8 years of age and they breed in November and December during their migration south.

Gestation: 13.5 months

Lactation: Lasts anywhere from 7 to 9 months.

Behavior: They are usually found in groups of 2-3 animals.

Strandings: Gray whale strandings in Washington and Oregon coast are fairly common and provide resources for education and scientific research.

Tamera Eder. Whales and other Marine Mammals of Washington and Oregon. Renton, WA: Lone Pine, 2001.

GRAY WHALE EXAMINATION FORM

General Information

Field No.: _____ Strand Date: _____ Exam Date: _____

Location: _____

_____ Lat: _____ Long: _____

Carcass Description

Sex: ♂/♀/? Condition: _____

_____

_____ Fresh/Slight/Moderate/Advanced Photos: Roll___ Frames____

Measurements (centimeters)

Total Length: _____ Max. Flipper Width: _____ Ant. Flipper Length: _____

Fluke width: _____ Blubber Thickness: Dorsal _____ / Lateral _____ / Ventral _____

Examination Notes (samples)

Contaminants (frozen): **Skin/Blubber**: ...in EPA washed jar ❑ ...in foil ❑ ...in Teflon bag ❑

Milk: ...in EPA washed jar ❑ ...in Teflon bag ❑ **Liver**: ...in EPA washed jar ❑ ...in Teflon bag ❑

Disease Screening (frozen): **Blood**: ...whole ❑ ...serum ❑

Toxins/Metals (frozen in clean plastic): **Urine** ❑ **Feces** ❑ **Stomach Contents** ❑ **Liver** ❑ **Kidney** ❑

Histology Tissues (in formalin): **Liver** ❑ **Kidney** ❑ **Lung** ❑ **Gonad** ❑ **Skin/Blubber** ❑

Other Specimens: ❑ (list) _____

Reporting Source: _____

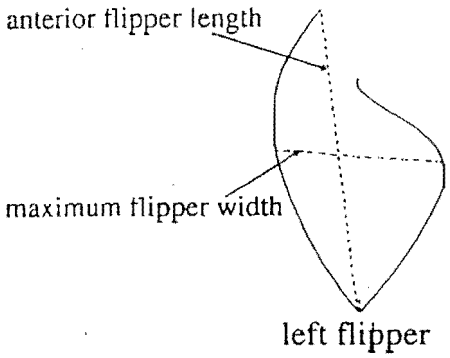
Contact (name and phone of where tissue and data are archived): _____

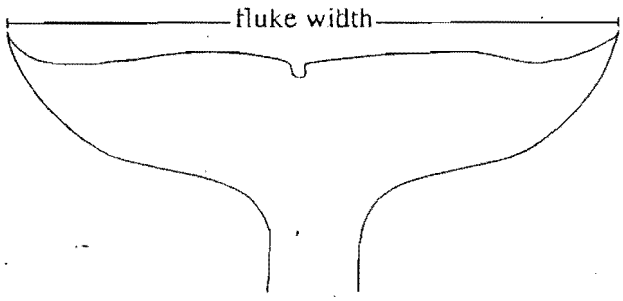
_____

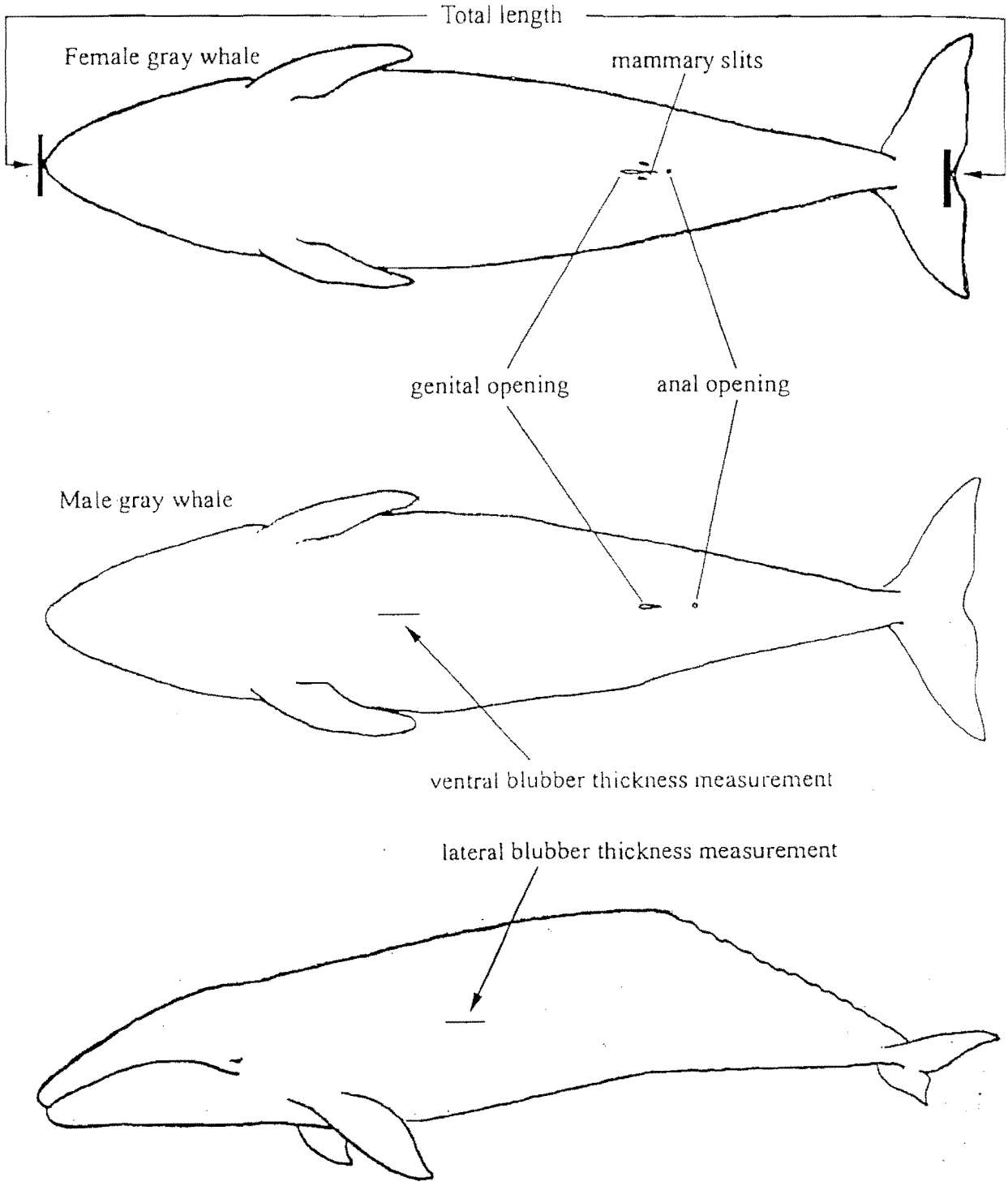
_____

Collector(s): _____ Date: _____

Necropsy by: _____ Date:






Total length
Female gray whale
mammary slits
genital opening
anal opening
Male gray whale
ventral blubber thickness measurement
lateral blubber thickness measurement

U.S. Department of Commerce
Northwest Regional Office
NOAA Fisheries National Marine Fisheries Service

Killer Whale Fact Sheet

(June 2006)

All killer whales are members of the toothed-whale family and belong to the same genus and species, *Orcinus orca*. However, there are two forms of killer whale found in Puget Sound, called "residents" and "transients." Some taxonomists (scientists who study the relationships within and between species) believe that some differences between forms of killer whales may be great enough to further sub-divide the species.

As the terms transient and resident imply, the two forms of killer whales have different behavior and movement patterns, but both forms can be found seasonally in Puget Sound. Transient killer whales travel in smaller groups (called "pods") and hunt other marine mammals for food. Resident killer whales spend more time in the Sound, travel in larger pods and eat mostly fish.

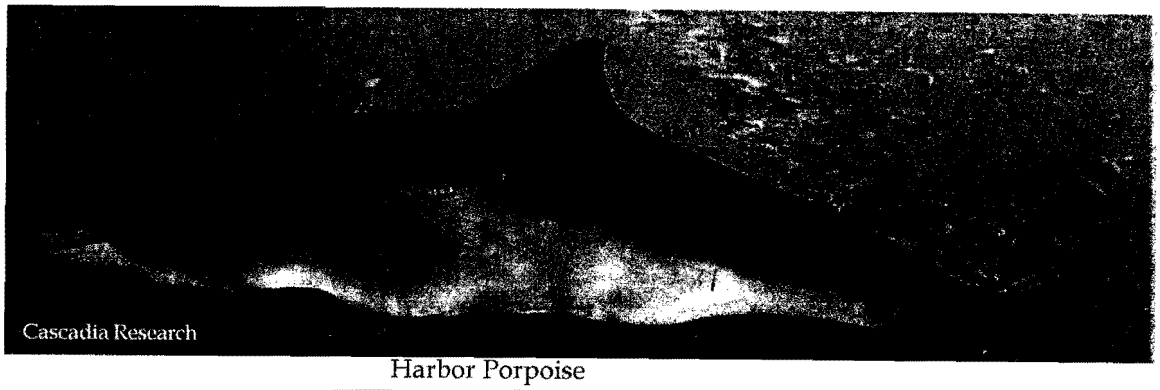
Southern Resident killer whales are fish eating with a seasonal (summer) home range that includes Washington and southern British Columbia waters (Puget Sound, the Strait of Juan de Fuca and the southern Strait of Georgia). Along the north Pacific coast, resident killer whales occur from Oregon and Washington to the Bering Sea. In the Pacific Northwest, the two closest resident killer whale communities (groups of pods that share a common home range), are the Southern Residents and the Northern Residents, which live in northern British Columbia and southeast Alaska.

Killer whales grow to considerable size. The males can reach lengths of 25 feet or more and weigh 10,000 pounds. Females are typically a little smaller. They range all over the world, including the Atlantic Ocean and as far north as Iceland, as far south as Antarctica.

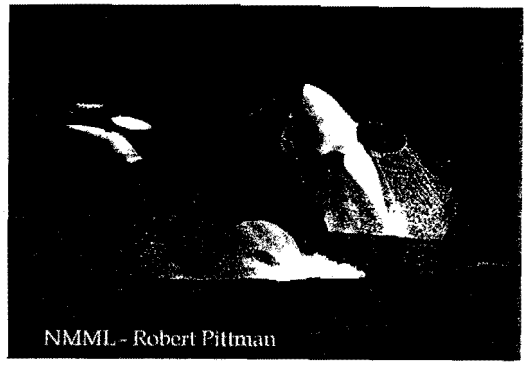
Most of the information we have about Southern Resident killer whales has been collected in Puget Sound during the summer months. Very little is known about their movements or feeding areas during the winter. In 1999, for the first time, scientists observed resident whales from Puget Sound as far south as Monterey, California.

As far as we know, the number of Southern Resident killer whales has never been large, perhaps numbering between 100 and 200 before 1960. Live captures of whales from the Southern Resident community, for the public display industry, reduced the number to fewer than 70 in 1973, when an annual killer whale census of the population began. As of July 2005, the population totaled 90 Southern Residents. The peak number was reached in 1996 when 97 whales were counted. There is no comprehensive world-wide estimate of the total number of killer whales.

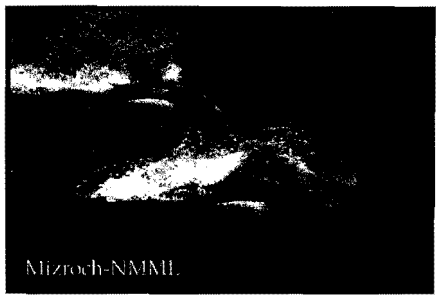
Cetaceans!



Harbor Porpoise

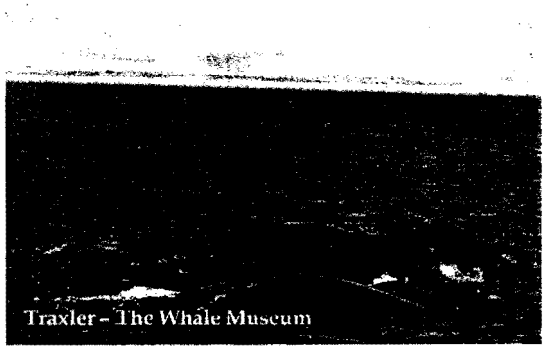


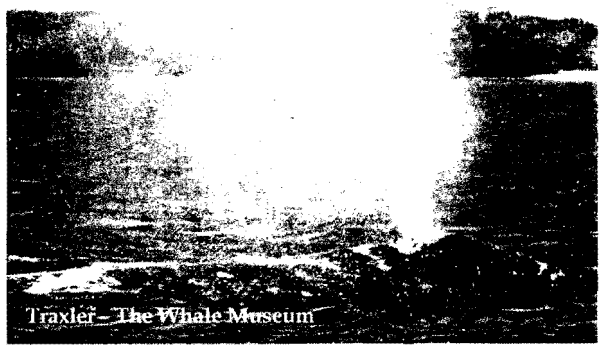
← Killer Whales



Dall's Porpoise

↑ Gray Whales ↓





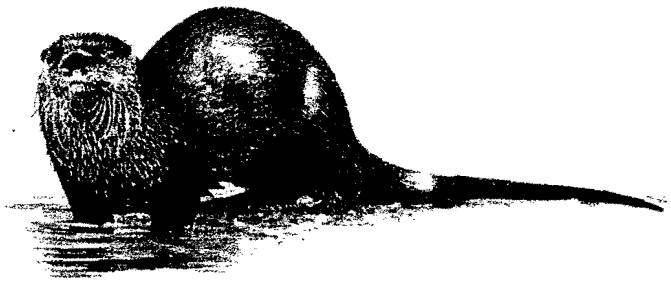
Other Species

Sea Otters and River Otters

Sea otters are the smallest marine mammal and are a maximum of 100 pounds and ~ 5 feet in length. Sea otters have well rounded teeth adapted for crushing shells of crabs, urchins, and other invertebrates. Sea otters use rocks as tools to dislodge prey and break open their food. They tend to stay in open waters gathering and "rafting" together in groups. There are isolated populations in British Columbia, Washington, California, and Alaska and can be found in offshore kelp beds, rocky inlets, and reefs.

River Otters are about 4.5 feet and weigh 30 pounds. They can be found in coastal marshes, lakes, and streams throughout North America. They are most abundant on the coast in bays and inland marine waters. They live in family groups and construct dens in hollow logs, stumps, roots, or take over the den of a muskrat or beaver.

If you are confused about the differences between Sea Otters and River Otters use the table on the next page!



River Otter
Illustrated by Gary Ross

Sea Otter
Illustrated by Gary Ross

Sea Otter	Vs.	River Otter
Marine only	**Habitat**	Marine and Fresh Water
Congregate in kelp beds, up to 15 individuals	**Group**	Family groups
Maximum of 100 pounds	**Weight**	30 pounds
Long and Soft, 1 million hairs per square inch	**Fur**	Coarse and Dense
Flattened, less than 1/3 of total body length	**Tail**	Round, more than ½ of total body length
On surface, belly up	**Swimming**	Belly down, back almost submerged
Single, carried on the chest	**Young**	Up to 4, never on chest
On back while floating, need to eat 25-30% of body weight each day	**Feeding**	On land or while swimming
Mussels, sea urchins, abalone, and other small invertebrates	**Food Source**	Fish and small invertebrates
At sea, on back	**Sleeping**	On land in dens
Squeal, hiss, snarl, and grunts	**Sound**	High pitched whistles, chuckles, and grunts

To report a dead Sea Otter please call the
United States Fish and Wildlife Sea Otter Hotline:
1-877-326-8837

WASHINGTON/OREGON SEA OTTER STRANDING DATA *Version*: December 20, *2005*	**Return completed sheets to:** Deanna Lynch 510 Desmond Dr. Suite 102 Lacey, WA 98503 Telephone: 360-753-9545 FAX: 360-534-9331 Email: deanna_lynch@fws.gov	**Report stranded (live or dead) sea otters to:** 1-87-SEAOTTER 1-877-326-8837

REFERENCE INFORMATION

WASO: WASOM: _____

Other: NWHC: _____

DATE FOUND: _____ | _____ | _____ (month / day / year) DATE EXAMINED: _____ | _____ | _____ (month / day / year)

FOUND/REPORTED BY: _____ PHONE _____

EXAMINED BY: _____ PHONE _____

RECOVERY AREA: _____

RECOVERY LOCATION: Geographic: _____

Global: _____ (latitude) | _____ (longitude)

CARCASS CONDITION & MORPHOMETRICS

CONDITION: _____ 1 = Alive 2 = Fresh Dead 3 = Moderate Decomposition 4 = Advanced Decomposition 5 = Mummified/Fragment U = Undetermined (see key on reverse for code descriptions)

AGE: _____ 1 = Pup 2 = Immature 3 = Subadult 4 = Adult 5 = Aged Adult 6 = Juvenile U = Undetermined

SEX: _____(male / female / undetermined)

TOTAL LENGTH: _____cm _____in WEIGHT: _____kg _____lb

NOSE SCAR: Size: _____ (≈ diameter of scar or wound) Freshness: _____ (white = healed, pink =healing, red/bleeding = Fresh)

TEETH: _____ 1 = Excellent 2 = Good 3 = Fair 4 = Poor 5 = All Milk Teeth 6 = Some Milk Teeth U = Undetermined

PELAGE COLOR (grizzling): _____ 1 = None To Slight 2 = To Eyes 3 = To back of head (Lamboidal Crest) 4 = To Chest 5 = To Tail 6 = Natal U = Undetermined (color refers to lightness of fur on head, neck, and belly)

OBVIOUS TRAUMA: _____ (No / Yes / Undetermined, see reverse)

CARCASS DISPOSITION: _____(left on beach, skull taken, recovered)
(If recovered, include name of person recovering and where, when, and time carcass was sent)

MARKING INFORMATION

TAGGED OR TAG EVIDENCE: _____ (yes / no)

Right: _____ (color) | _____ (position) | _____ (number) Transmitter frequency

Left: _____ (color) | _____ (position) | _____ (number) PIT TAG: Working: _____(yes / no / undetermined)

PIT Number: _____

KNOWN AGE: _____ (Yes/No) Tag Date: _____ (Day) | _____ (Month) | _____ (Year) Age At Tagging: _____ (estimate) | _____ (cementum)

Wt At Tagging: _____kg _____lb

DESCRIPTION OF TRAUMA AND/OR FIELD REMARKS (continue on separate sheet if necessary): _____

_____

_____

_____

_____

CONDITION CODES MODIFIED FROM: J.R. Geraci and V. J. Lounsbury. 1993. ***Marine Mammals Ashore: A Field Guide For Strandings.*** Texas A&M Sea Grant Publication. 305pp.

CODE 1: Live Animals--***Uses***: morphometrics; limited life history, external gross pathology, parasitology and microbiology; biopsies; blood studies, including DNA analysis and clinical chemistry.

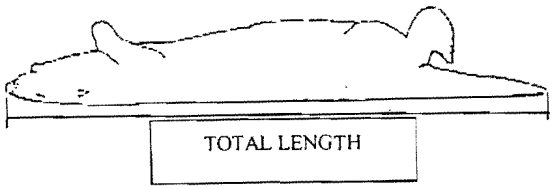
CODE 2: Carcass in Good Condition (Fresh/Edible)-- ***Characteristics***: normal appearance, usually with little scavenger damage; fresh smell; minimal drying and wrinkling of skin, eyes and mucous membranes; eyes clear; carcass not bloated, muscles firm, dark red, well-defined; blood cells intact, able to settle in a sample tube; serum unhemolyzed; viscera intact and well-defined; gut contains little or no gas; brain firm with no discoloration, surface features distinct, easily removed intact. ***Uses***: morphometrics; DNA analysis; life history; parasitology; gross and histopathology; toxicology; microbiology; limited blood studies.

CODE 3: Fair (Decomposed, but organs basically intact)-- ***Characteristics***: carcass intact, bloating evident and skin cracked and sloughing; possible scavenger damage; characteristic mild odor; mucous membranes dry, eyes sunken or missing, muscles soft and poorly defined; blood hemolyzed, uniformly dark red; viscera soft, friable, mottled, but still intact; gut dilated by gas; brain soft, surface features distinct, dark reddish cast, fragile but can usually be moved intact. ***Uses***: morphometrics; DNA analysis; limited life history; parasitology; gross pathology; marginal for toxicology (useful for metals, marginal for organochlorines, poor for biotoxins); histopathology of skin, muscle, lung, and possibly firm lesions.

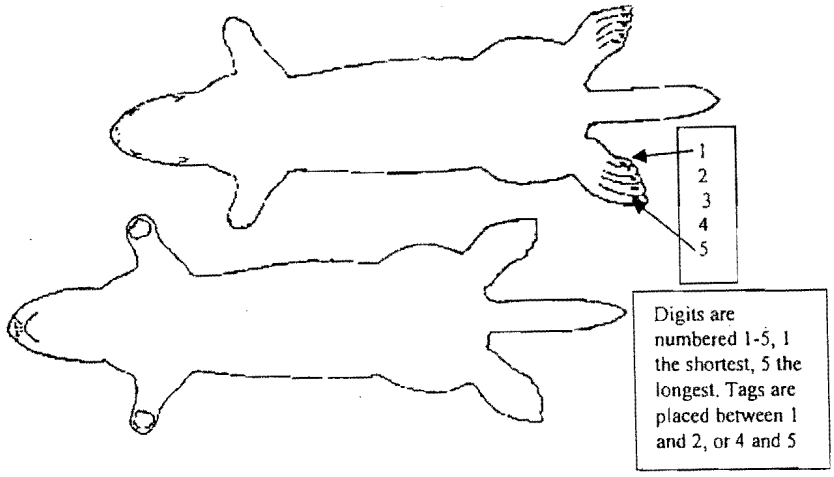
CODE 4: Poor (Advanced decomposition)-- ***Characteristics***: carcass may be intact, but collapsed; skin sloughing, often severe scavenger damage; strong odor; muscles nearly liquefied and easily torn, falling easily off bones; blood thin and black; viscera often identifiable but friable, easily torn, and difficult to dissect; gut gas-filled; brain soft, dark red, containing gas pockets, pudding-like consistency. ***Uses***: morphometrics; limited life history (teeth, baleen, bone, claws, some stomach contents, possibly reproductive condition); limited DNA analysis, parasitology, and gross pathology.

CODE 5: Mummified or Skeletal Remains-- ***Characteristics***: skin may be draped over skeletal remains; any remaining tissues are desiccated ***Uses***: morphometrics; limited life history (teeth, baleen, claws, bone) and DNA analysis..

TOTAL LENGTH: With the carcass in the supine position total length is measured from the tip of the nose to the tip of the tail. If length is measured in any other manner please note how measured on the form.



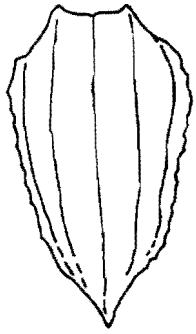
WOUNDS OR TRAUMA: On the illustrations below draw any trauma areas or wounds noted during field examination.



Wider Caribbean Sea Turtles

IDENTIFICATION KEY

Flexible carapace with
- 5 distinct ridges
- no scutes

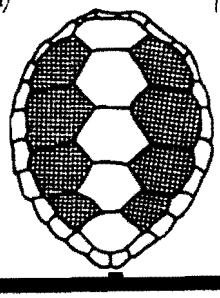


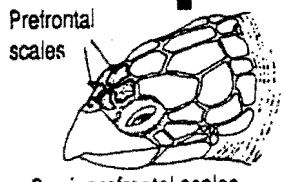
Carapace strongly tapered
Carapace leathery, flexible
Color dark gray or black with white or pale spots
Jaw deeply notched
To 500 kg, "shell" to 180 cm

Leatherback turtle
(Dermochelys coriacea)

Bony carapace (shell) with
- no continuous ridges
- large scutes (shell plates)

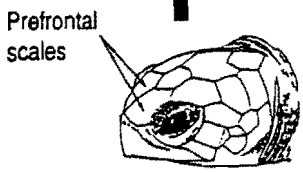
4 pair lateral scutes (shown shaded)





2 pair prefrontal scales
Over-lapping shell scutes
Pointed face, distinct over-bite
Juvenile color/pattern variable
Adult color orange, brown, yellow
To 85 kg, shell to 95 cm

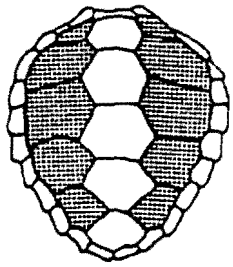
Hawksbill turtle
(Eretmochelys imbricata)



1 pair prefrontal scales
No over-lapping shell scutes
Round face, serrated jaw
Juvenile color/pattern variable
Adult color dark gray green
To 230 kg, shell to 125 cm

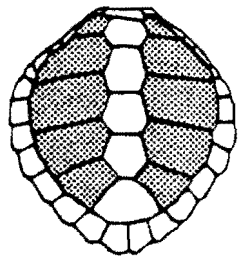
Green turtle
(Chelonia mydas)

5 (rarely 6) pair lateral scutes



Carapace longer than wide
3 bridge scutes
No pores in bridge scutes
Head broad (to 25 cm)
Color red-brown to brown
To 200 kg, shell to 120 cm

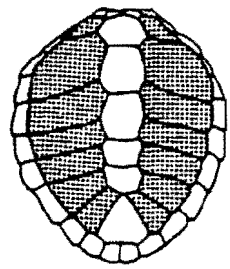
Loggerhead turtle
(Caretta caretta)



Carapace very round
4 bridge scutes with pores
Very rarely south of 16° N
Juvenile color charcoal gray
Adult color dark gray green
To 45 kg, shell to 70 cm

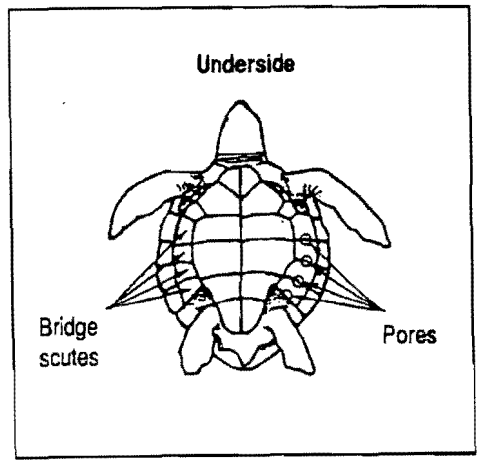
Kemp's Ridley turtle
(Lepidochelys kempii)

6 or more pair lateral scutes



Carapace nearly circular
4 bridge scutes with pores
Very rarely north of 13° N
Juvenile color charcoal gray
Adult color dark gray green
To 45 kg, shell to 70 cm

Olive Ridley turtle
(Lepidochelys olivacea)



Photos: Scott A. Eckert (loggerhead, olive ridley) and others by Peter C. H. Pritchard.

APPENDIX I: NATURAL RESOURCES METRICS AND DESIGNATION LETTERS

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Participants and Attendees

Navy Lead	Last Name	First Name	Organization	Telephone	Email
	Gordon	Brittany	WA Dept Fish and Wildlife	(360) 895-4756	Brittany.gordon@dfw.wa.gov
	Kunz	Cindi	NAVFACNW	360-396-1860	cindi.kunz@navy.mil
	McFeron	Curtis	NMFS	360-534-9309	curtis.mcferon@noaa.gov
	Muck	Jim	USFWS	360-753-9586	jim_muck@fws.gov
	Quan	Jennifer		360-753-2000	jennifer.quan@noaa.gov
	Stockton	Julia	NAVFACNW	360-476-6067	julia.stockton@navy.mil
	Street	Sara	NAVFACNW	3603965394	sara.c.street@navy.mil
	Wagoner	Linda	NAVFACNW	425-304-3466	linda.wagoner@navy.mil
	Waldbillig	Chris	WA Dept Fish and Wildlife	360-874-7258	chris.waldbillig@dfw.wa.gov
	Yasenak	Tyler	NAVFACNW	360-315-2452	Tyler.yasenak@navy.mil

Protected Species

- Proposed and Candidate Species - None.

- State, Local, and other Species - None.

- Threatened and Endangered Species
  - Bocaccio - Sebastes paucispinis
  - Bull Trout - Salvelinus confluentus
  - Chinook salmon - Oncorhynchus (=Salmo) tshawytscha
  - Chum salmon - Oncorhynchus keta
  - Humpback whale - Megaptera novaeangliae
  - Killer whale - Orcinus orca
  - Marbled murrelet - Brachyramphus marmoratus
  - Steelhead - Oncorhynchus (=Salmo) mykiss
  - yelloweye rockfish - Sebastes ruberrimus

INRMP Projects

FY17 Projects

- 68436NR020 : CWA NW NBK Cattail Estuary Restoration
- 68436NR035 : CHE NW NBK INRMP
- 68742CN001 : 1 CR NW Marbled Murrelet Density and Occupancy Surveys
- 68742CN002 : 1 S NW Threatened and Endangered Fish and Forage Fish Habitat Quality Assessments/Improvements and Forage Fish Surveys
- 68436MSF16 : 1 CP NW NBK Magnetic Silencing Facility Demo Study

Support of Installation Mission

7.0. Please identify the mission types related to your reporting unit/site. Select all that apply.

Communications (C4), Education & Training, Helicopter Ops, Logistics, Ordnance Ops, Research & Development, Special Forces, Homeport/Shipyard Ops, Military Construction, Submarine Ops

7.1. To what extent has the Natural Resource program/INRMP supported the current PRIMARY MISSION and potential future mission(s)?

Mission well supported and fully capable

7.2. To what extent has the Natural Resource program/INRMP supported other mission areas (secondary missions)?

Mission well supported and fully capable

7.3. To what extent does the Natural Resources program affect mission-related operational/training activities?

Neutral

7.4. To what extent does the Natural Resources Program/INRMP minimize possible constraints imposed by natural resources regulatory requirements?

Partially minimizes

7.5. If applicable, please provide examples of how unresolved Natural Resources issues areresultinginmission impacts or work arounds.

Projects are routinely altered to avoid impact to sensitive areas, e.g., wetlands, old growth trees, eelgrass beds, fish migration routes. Workarounds are typically available, but designs are sub-optimized.

7.6. If applicable, please provide examples of how the INRMP or Natural Resources program actions have resulted in mission benefits.

Realistic schedules are in place due to the understanding of the consultation requirements with the regulatory agencies. Workarounds to projects are available, with designs typically being sub-optimal.

7.7. What is the level of coordination between natural resources staff and other installation/site(s) departments and military staff?

Effective coordination

7.8. Have stakeholders from every major tenant command participated in the INRMP preparation and review process?

None of the above

Enter then name of your Regional Commander / Commanding Officer.

E. A. Schrader

Enter then rank of your Regional Commander / Commanding Officer.

Captain

Findings

N/A

Recommendations

N/A

Summary Score

Focus Area	Score
1 - Natural Resources Management	0.46
2 - Listed Species Critical Habitat	0.68
3 - Recreation Use and Access and Conservation Law Enforcement	0.93
4 - Sikes Act Cooperation	0.84
5 - Team Adequacy	0.92
6 - INRMP Implementation	0.80
7 - Support of Installation Mission	0.59
NBK BANGOR - Overall Score	0.75

Participants and Attendees

Navy Lead	Last Name	First Name	Organization	Telephone	Email
	Gordon	Brittany	WA Dept Fish and Wildlife	(360) 895-4756	Brittany.gordon@dfw.wa.gov
	Kunz	Cindi	NAVFACNW	360-396-1860	cindi.kunz@navy.mil
	McFeron	Curtis	NMFS	360-534-9309	curtis.mcferon@noaa.gov
	Muck	Jim	USFWS	360-753-9586	jim_muck@fws.gov
	Quan	Jennifer		360-753-2000	jennifer.quan@noaa.gov
	Stockton	Julia	NAVFACNW	360-476-6067	julia.stockton@navy.mil
	Street	Sara	NAVFACNW	3603965394	sara.c.street@navy.mil
	Wagoner	Linda	NAVFACNW	425-304-3466	linda.wagoner@navy.mil
	Waldbillig	Chris	WA Dept Fish and Wildlife	360-874-7258	chris.waldbillig@dfw.wa.gov
	Yasenak	Tyler	NAVFACNW	360-315-2452	Tyler.yasenak@navy.mil

Protected Species

- Proposed and Candidate Species - None.

- State, Local, and other Species - None.

- Threatened and Endangered Species
  - Bocaccio - Sebastes paucispinis
  - Bull Trout - Salvelinus confluentus
  - Chinook salmon - Oncorhynchus (=Salmo) tshawytscha
  - Humpback whale - Megaptera novaeangliae
  - Killer whale - Orcinus orca
  - Marbled murrelet - Brachyramphus marmoratus
  - Steelhead - Oncorhynchus (=Salmo) mykiss
  - yelloweye rockfish - Sebastes ruberrimus

INRMP Projects

FY17 Projects

- 68436NR035 : CHE NW NBK INRMP
- 68742CN001 : 1 CR NW Marbled Murrelet Density and Occupancy Surveys

Support of Installation Mission

7.0. Please identify the mission types related to your reporting unit/site. Select all that apply.

Communications (C4), Helicopter Ops, Research & Development, Education & Training, Logistics, Special Forces, Homeport/Shipyard Ops, Military Construction

7.1. To what extent has the Natural Resource program/INRMP supported the current PRIMARY MISSION and potential future mission(s)?

Mission well supported and fully capable

7.2. To what extent has the Natural Resource program/INRMP supported other mission areas (secondary missions)?

Mission well supported and fully capable

7.3. To what extent does the Natural Resources program affect mission-related operational/training activities?

Neutral

7.4. To what extent does the Natural Resources Program/INRMP minimize possible constraints imposed by natural resources regulatory requirements?

Partially minimizes

7.5. If applicable, please provide examples of how unresolved Natural Resources issues areresultinginmission impacts or work arounds.

Projects are routinely altered to avoid impact to sensitive areas, e.g. wetlands, old growth trees, eelgrass beds, fish migration routes. Workarounds are typically available, but designs are sub-optimized.

7.6. If applicable, please provide examples of how the INRMP or Natural Resources program actions have resulted in mission benefits.

Due to the understanding of the environmental consultation requirements, reasonable timeline for project development occurs. Workarounds to project limitations are available, with design typically being sub-optimized.

7.7. What is the level of coordination between natural resources staff and other installation/site(s) departments and military staff?

Effective coordination

7.8. Have stakeholders from every major tenant command participated in the INRMP preparation and review process?

None of the above

Enter then name of your Regional Commander / Commanding Officer.

E. A. Schrader

Enter then rank of your Regional Commander / Commanding Officer.

Captain

Findings

N/A

Recommendations

N/A

Summary Score

Focus Area	Score
1 - Natural Resources Management	0.90
2 - Listed Species Critical Habitat	0.72
3 - Recreation Use and Access and Conservation Law Enforcement	0.93
4 - Sikes Act Cooperation	0.88
5 - Team Adequacy	0.80
6 - INRMP Implementation	1.00
7 - Support of Installation Mission	0.59
KEYPORT NUWC - Overall Score	0.83

Participants and Attendees

Navy Lead	Last Name	First Name	Organization	Telephone	Email
	Gordon	Brittany	WA Dept Fish and Wildlife	(360) 895-4756	Brittany.gordon@dfw.wa.gov
	Kunz	Cindi	NAVFACNW	360-396-1860	cindi.kunz@navy.mil
	McFeron	Curtis	NMFS	360-534-9309	curtis.mcferon@noaa.gov
	Muck	Jim	USFWS	360-753-9586	jim_muck@fws.gov
	Quan	Jennifer		360-753-2000	jennifer.quan@noaa.gov
	Stockton	Julia	NAVFACNW	360-476-6067	julia.stockton@navy.mil
	Street	Sara	NAVFACNW	3603965394	sara.c.street@navy.mil
	Wagoner	Linda	NAVFACNW	425-304-3466	linda.wagoner@navy.mil
	Waldbillig	Chris	WA Dept Fish and Wildlife	360-874-7258	chris.waldbillig@dfw.wa.gov
	Yasenak	Tyler	NAVFACNW	360-315-2452	Tyler.yasenak@navy.mil

Protected Species

- Proposed and Candidate Species - None.

- State, Local, and other Species - None.

- Threatened and Endangered Species
  - Bocaccio - Sebastes paucispinis
  - Bull Trout - Salvelinus confluentus
  - Chinook salmon - Oncorhynchus (=Salmo) tshawytscha
  - Humpback whale - Megaptera novaeangliae
  - Killer whale - Orcinus orca
  - Marbled murrelet - Brachyramphus marmoratus
  - Steelhead - Oncorhynchus (=Salmo) mykiss
  - yelloweye rockfish - Sebastes ruberrimus

INRMP Projects

FY17 Projects

- 3241612001 : 1 S NW - NBK Bremerton-Listed Fish Surveys
- 68436NR021 : 1 CP NW - NBK Charleston Beach Habitat Replenishment
- 68436NR035 : CHE NW NBK INRMP
- 68742CN001 : 1 CR NW Marbled Murrelet Density and Occupancy Surveys
- 32416FF016 : 1 CP NW NBK Bremerton Forage Fish Surveys
- 32416CHA16 : 4 S NW NBK Bremerton Beach Monitoring

Support of Installation Mission

7.0. Please identify the mission types related to your reporting unit/site. Select all that apply.

Communications (C4), Education & Training, Logistics, Military Housing, Research & Development, Homeport/Shipyard Ops, Military Construction, Submarine Ops

7.1. To what extent has the Natural Resource program/INRMP supported the current PRIMARY MISSION and potential future mission(s)?

Mission well supported and fully capable

7.2. To what extent has the Natural Resource program/INRMP supported other mission areas (secondary missions)?

Mission well supported and fully capable

7.3. To what extent does the Natural Resources program affect mission-related operational/training activities?

Neutral

7.4. To what extent does the Natural Resources Program/INRMP minimize possible constraints imposed by natural resources regulatory requirements?

Partially minimizes

7.5. If applicable, please provide examples of how unresolved Natural Resources issues areresultinginmission impacts or work arounds.

Projects are routinely altered to avoid impact to sensitive areas, e.g. wetlands, old growth trees, eelgrass beds, fish migration routes.

7.6. If applicable, please provide examples of how the INRMP or Natural Resources program actions have resulted in mission benefits.

Workarounds to projects are available, with designs being sub-optimized.

7.7. What is the level of coordination between natural resources staff and other installation/site(s) departments and military staff?

Effective coordination

7.8. Have stakeholders from every major tenant command participated in the INRMP preparation and review process?

None of the above

Enter then name of your Regional Commander / Commanding Officer.

E. A. Schrader

Enter then rank of your Regional Commander / Commanding Officer.

Captain

Findings

N/A

Recommendations

N/A

Summary Score

Focus Area	Score
1 - Natural Resources Management	0.79
2 - Listed Species Critical Habitat	0.62
3 - Recreation Use and Access and Conservation Law Enforcement	0.88
4 - Sikes Act Cooperation	0.85
5 - Team Adequacy	0.84
6 - INRMP Implementation	0.50
7 - Support of Installation Mission	0.59
NBK BREMERTON - Overall Score	0.72

Participants and Attendees

Navy Lead	Last Name	First Name	Organization	Telephone	Email
	Gordon	Brittany	WA Dept Fish and Wildlife	(360) 895-4756	Brittany.gordon@dfw.wa.gov
	Kunz	Cindi	NAVFACNW	360-396-1860	cindi.kunz@navy.mil
	McFeron	Curtis	NMFS	360-534-9309	curtis.mcferon@noaa.gov
	Muck	Jim	USFWS	360-753-9586	jim_muck@fws.gov
	Quan	Jennifer		360-753-2000	jennifer.quan@noaa.gov
	Stockton	Julia	NAVFACNW	360-476-6067	julia.stockton@navy.mil
	Street	Sara	NAVFACNW	3603965394	sara.c.street@navy.mil
	Wagoner	Linda	NAVFACNW	425-304-3466	linda.wagoner@navy.mil
	Waldbillig	Chris	WA Dept Fish and Wildlife	360-874-7258	chris.waldbillig@dfw.wa.gov
	Yasenak	Tyler	NAVFACNW	360-315-2452	Tyler.yasenak@navy.mil

Protected Species

- Proposed and Candidate Species - None.

- State, Local, and other Species - None.

- Threatened and Endangered Species
  - Bull Trout - Salvelinus confluentus
  - Chinook salmon - Oncorhynchus (=Salmo) tshawytscha
  - Steelhead - Oncorhynchus (=Salmo) mykiss

INRMP Projects

FY17 Projects

68436NR035 : CHE NW NBK INRMP

Support of Installation Mission

7.0. Please identify the mission types related to your reporting unit/site. Select all that apply.

Ordnance Ops, Logistics

7.1. To what extent has the Natural Resource program/INRMP supported the current PRIMARY MISSION and potential future mission(s)?

Mission well supported and fully capable

7.2. To what extent has the Natural Resource program/INRMP supported other mission areas (secondary missions)?

Mission well supported and fully capable

7.3. To what extent does the Natural Resources program affect mission-related operational/training activities?

Neutral

7.4. To what extent does the Natural Resources Program/INRMP minimize possible constraints imposed by natural resources regulatory requirements?

Partially minimizes

7.5. If applicable, please provide examples of how unresolved Natural Resources issues areresultinginmission impacts or work arounds.

Projects are routinely altered to avoid impact to sensitive areas, e.g. wetlands, old growth trees, eelgrass beds, fish migration routes.

7.6. If applicable, please provide examples of how the INRMP or Natural Resources program actions have resulted in mission benefits.

Workarounds are typically available, but designs are sub-optimized.

7.7. What is the level of coordination between natural resources staff and other installation/site(s) departments and military staff?

Effective coordination

7.8. Have stakeholders from every major tenant command participated in the INRMP preparation and review process?

None of the above

Enter then name of your Regional Commander / Commanding Officer.

E. A. Schrader

Enter then rank of your Regional Commander / Commanding Officer.

Captain

Findings

N/A

Recommendations

N/A

2017 Natural Resources Annual Report: BREMERTON RR

Summary Score

Focus Area	Score
1 - Natural Resources Management	0.74
2 - Listed Species Critical Habitat	0.25
4 - Sikes Act Cooperation	0.85
5 - Team Adequacy	0.80
6 - INRMP Implementation	1.00
7 - Support of Installation Mission	0.59
BREMERTON RR - Overall Score	0.70

Participants and Attendees

Navy Lead	Last Name	First Name	Organization	Telephone	Email
	Gordon	Brittany	WA Dept Fish and Wildlife	(360) 895-4756	Brittany.gordon@dfw.wa.gov
	Kunz	Cindi	NAVFACNW	360-396-1860	cindi.kunz@navy.mil
	McFeron	Curtis	NMFS	360-534-9309	curtis.mcferon@noaa.gov
	Muck	Jim	USFWS	360-753-9586	jim_muck@fws.gov
	Quan	Jennifer		360-753-2000	jennifer.quan@noaa.gov
	Stockton	Julia	NAVFACNW	360-476-6067	julia.stockton@navy.mil
	Street	Sara	NAVFACNW	3603965394	sara.c.street@navy.mil
	Wagoner	Linda	NAVFACNW	425-304-3466	linda.wagoner@navy.mil
	Waldbillig	Chris	WA Dept Fish and Wildlife	360-874-7258	chris.waldbillig@dfw.wa.gov
	Yasenak	Tyler	NAVFACNW	360-315-2452	Tyler.yasenak@navy.mil

Protected Species

- Proposed and Candidate Species - None.

- State, Local, and other Species - None.

- Threatened and Endangered Species
  - Bocaccio - Sebastes paucispinis
  - Bull Trout - Salvelinus confluentus
  - Chinook salmon - Oncorhynchus (=Salmo) tshawytscha
  - Humpback whale - Megaptera novaeangliae
  - Killer whale - Orcinus orca
  - Marbled murrelet - Brachyramphus marmoratus
  - Steelhead - Oncorhynchus (=Salmo) mykiss
  - yelloweye rockfish - Sebastes ruberrimus

INRMP Projects

FY17 Projects

68436NR035 : CHE NW NBK INRMP

Support of Installation Mission

7.0. Please identify the mission types related to your reporting unit/site. Select all that apply.

Ordnance Ops, Special Forces, Education & Training, Military Housing, Helicopter Ops

7.1. To what extent has the Natural Resource program/INRMP supported the current PRIMARY MISSION and potential future mission(s)?

Mission enhanced, well supported and fully capable

7.2. To what extent has the Natural Resource program/INRMP supported other mission areas (secondary missions)?

Mission well supported and fully capable

7.3. To what extent does the Natural Resources program affect mission-related operational/training activities?

Neutral

7.4. To what extent does the Natural Resources Program/INRMP minimize possible constraints imposed by natural resources regulatory requirements?

Partially minimizes

7.5. If applicable, please provide examples of how unresolved Natural Resources issues areresultinginmission impacts or work arounds.

Projects are routinely altered to avoid impact to sensitive areas, e.g. wetlands, old growth trees, eelgrass beds, fish migration routes.

7.6. If applicable, please provide examples of how the INRMP or Natural Resources program actions have resulted in mission benefits.

Workarounds are typically available, but designs are sub-optimized.

7.7. What is the level of coordination between natural resources staff and other installation/site(s) departments and military staff?

Effective coordination

7.8. Have stakeholders from every major tenant command participated in the INRMP preparation and review process?

None of the above

Enter then name of your Regional Commander / Commanding Officer.

E. A. Schrader

Enter then rank of your Regional Commander / Commanding Officer.

Captain

Findings

N/A

Recommendations

N/A

2017 Natural Resources Annual Report: JACKSON PARK AND NAVAL HOSPITAL

Summary Score

Focus Area	Score
1 - Natural Resources Management	0.79
2 - Listed Species Critical Habitat	0.46
3 - Recreation Use and Access and Conservation Law Enforcement	0.95
4 - Sikes Act Cooperation	0.85
5 - Team Adequacy	0.80
6 - INRMP Implementation	1.00
7 - Support of Installation Mission	0.65
JACKSON PARK AND NAVAL HOSPITAL - Overall Score	0.79

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00933
3 Nov 11

From: Commanding Officer, Naval Base Kitsap, Bremerton, WA
To: Mr. Tye Yasenak, NAVFAC NW Environmental, Bangor, WA

SUBJ: DESIGNATION AS NATURAL RESOURCE MANAGER/COORDINATOR FOR NAVAL BASE KITSAP BANGOR, CAMP WESLEY HARRIS, AND NAVAL BASE KITSAP KEYPORT

Ref: (a) OPNAVINST 5090.1C

1. You are hereby designated as Installation Natural Resources Manager/Coordinator for Naval Base Kitsap Bangor, Camp Wesley Harris, and Naval Base Kitsap Keyport.

2. In accordance with reference (a), you shall oversee natural resources issues, conditions of natural resources, status of Integrated Natural Resource Management Plan objectives, and any potential or actual conflicts between mission requirements and natural resources mandates, ensuring that the NBK CO is informed. As installation Natural Resources Manager/Coordinator, you are responsible for the inherently governmental decisions made on behalf of the installation and CO with regard to Sikes Act compliance.

P. M. DAWSON

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00861
30 Apr 15

From: Commanding Officer, Naval Base Kitsap, Bremerton, WA
To: Ms. Julia Stockton, NAVFAC NW Environmental, Bremerton, WA

Subj: DESIGNATION AS NATURAL RESOURCE MANAGER/COORDINATOR FOR NAVAL BASE KITSAP BREMERTON, CAMP MCKEAN, NAVAL HOSPITAL BREMERTON, AND JACKSON PARK HOUSING COMPLEX

Ref: (a) OPNAVINST M-5090.1

1. You are hereby designated as the Installation Natural Resources Manager/Coordinator for Naval Base (NAVBASE) Kitsap Bremerton, Camp McKean, Naval Hospital Bremerton, and Jackson Park Housing Complex.

2. In accordance with reference (a), you shall oversee natural resources issues, conditions of natural resources, status of Integrated Natural Resource Management Plan objectives, and any potential or actual conflicts between mission requirements and natural resources mandates, ensuring that the NAVBASE Kitsap Commanding Officer (CO) is informed. As installation Natural Resources Manager/Coordinator, you are responsible for the inherently governmental decisions made on behalf of the installation and CO with regard to Sikes Act compliance.

T. A. ZWOLFER