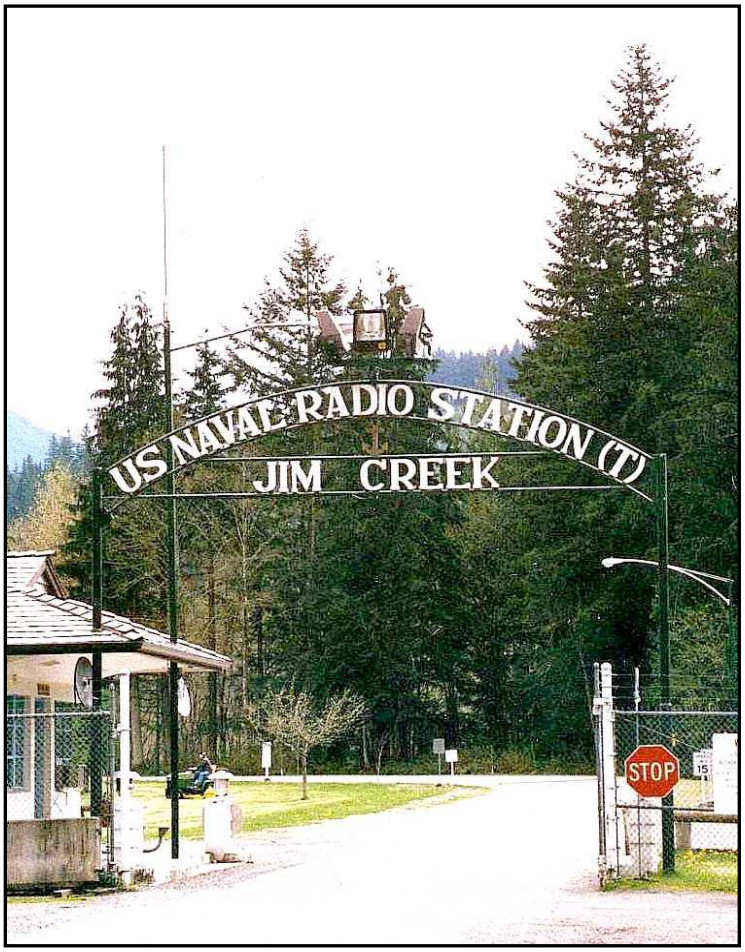
NAVAL RADIO STATION (TRANSMITTER)

JIM CREEK

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN



2018

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Acknowledgements

This document was prepared by Linda Wagoner, former Installation Natural Resources Manager, Naval Station Everett who retired at the end of May 2018. Assistance with writing the document was provided by Cindi Kunz, Senior Natural Resources Specialist and Region Environmental Coordinator by Direction; Terri Jones, Region Forester; and Jennifer Sullivan, Natural Resources Manager, Naval Station Everett. Also, Commander, Navy Installations Command (CNIC) and NAVFAC Headquarters staff reviewed this document and provided input, as well as NAVFAC Northwest and CNIC Northwest legal staff, and Morale, Welfare, and Recreation staff for Naval Station Everett. Technical review was provided by Jim Muck, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service; Ruth Milner, District Biologist, Washington Department of Fish and Wildlife; and Don Hubner, National Marine Fisheries Service West Coast Region.

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Commander, Navy Region Northwest

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

11/1/18
Date

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Commanding Officer

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:

8 NOV 17

M. F. DAVIS
Captain, U.S. Navy
Commanding Officer, Naval Station Everett

Date

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Washington Department of Fish and Wildlife

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

Approved by:

KELLY SUSEWIND
Director
Washington Department of Fish and Wildlife

11/27/18
Date

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U.S. Fish and Wildlife Service

This Integrated Natural Resources Management Plan meets the requirements 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 & Wildlife Office
U.S. Fish & Wildlife Service

11/28/2018
Date

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National Oceanic and Atmospheric Association (NOAA) / National Marine Fisheries Service (NMFS)

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:

KIM KRATZ
Assistant Regional Administrator
Oregon & Washington Coastal Office
NOAA-National Marine Fisheries Service

7 FEBRUARY 2019
Date

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Natural Resources Staff

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:

CYNTHIA KUNZ
Sr. Natural Resources Specialist
Region Environmental Coordinator by Direction

11/13/2018
Date

Approved by:

JENNIFER SULLIVAN
Natural Resources Manager
Naval Station Everett

02/07/2019
Date

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This plan will be reviewed annually and updated as necessary. Updates and changes will be recorded below.

DATE	SECTION/PAGE	CHANGE/MODIFICATION	RATIONALE
	All	Revision	Critical habitat designation for Puget Sound steelhead and exemption for installation streams; Need for new NEPA; existing NEPA is outdated.

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Executive Summary

This Integrated Natural Resources Management Plan (INRMP) for Naval Radio Station (Transmitter) Jim Creek (NRS(T) Jim Creek) is a revision of the INRMP most recently signed in 2009. NRS(T) Jim Creek encompasses about 4,827 acres in the foothills of the Cascade Mountains in Western Washington (Figure ES 1 and ES 2). It is within the Area of Responsibility (AOR) of Naval Station Everett (NSE). This INRMP was developed separately from the NSE INRMP, as a stand-alone document, to guide natural resources management specifically at the NRS(T) Jim Creek location. The military mission of NRS(T) Jim Creek is to provide operational command and control communications for the Pacific Submarine Fleet by managing, operating and maintaining a Very Low Frequency (VLF) radio transmitting system. Outdoor recreational activities also occur at the installation.

This INRMP complies with the Sikes Act (16 United States Code [U.S.C.] 670a *et seq*., as amended). The Sikes Act requires Department of Defense (DoD) installations that contain significant natural resources to carry out programs to conserve and rehabilitate natural resources. Sikes Act Section 16 U.S.C. 670a(3)(a) requires that, consistent with the use of military installations and to ensure the preparedness of the Armed Forces, the Secretaries of the military departments shall implement INRMPs in coordination with the U.S. Fish and Wildlife Service (USFWS) and the appropriate State fish and wildlife management agency(s) to conserve and rehabilitate natural resources on military installations, to provide for the sustainable multipurpose use of natural resources in installations, including hunting, fishing, trapping, and non-consumptive uses and, subject to safety requirements and military security, allow public access to military installations to use these resources. This INRMP is prepared and implemented in cooperation with the USFWS and the Washington Department of Fish and Wildlife (WDFW). Because species under the jurisdiction of the National Marine Fisheries Service (NMFS) would benefit from implementation of this INRMP, this agency was also included as a cooperator.

The primary purpose of this INRMP is to ensure that natural resources management and military operations are integrated and carried out consistent with environmental stewardship practices, laws, and regulations. This will ensure that installation lands are available to support the military mission, with no net loss in capabilities, while maintaining the lands in good condition. Consistent with OPNAV M-5090.1, the Navy's Environmental Readiness Program Manual (2014), this INRMP focuses to the maximum extent practicable on ecosystem-based management and on interrelationships between individual components of natural resources conservation (e.g., habitat protection, migratory bird management, and forestry management), mission requirements, and recreational uses of the NRS(T) Jim Creek property.

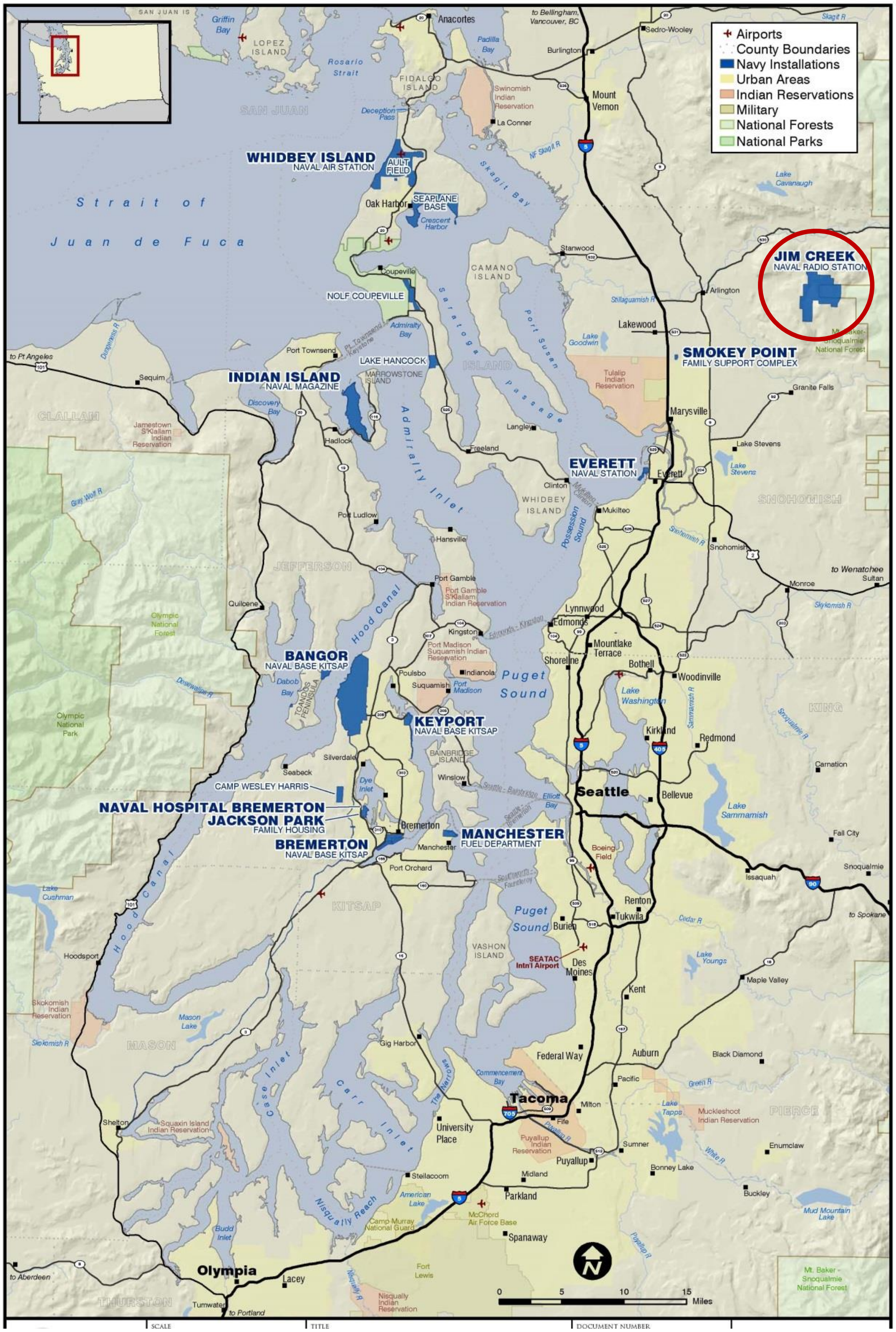
This INRMP will be reviewed annually for relevance and effectiveness and updated as needed. Changes in the military mission, training activities, or technology at NRS(T) Jim Creek will be analyzed to assess their impact on natural resources, and the INRMP modified as needed to ensure

continued natural resource conservation while supporting military activities. A review for operation and effect will be completed and documented with the cooperating agencies at least once every five years.

The most recent NRS(T) Jim Creek INRMP analysis under the National Environmental Policy Act (NEPA) was performed in 1999 and was based on an INRMP dated 1997. Due to changes in the status of some species since the 1999 Environmental Assessment (EA), (e.g., bald eagles are no longer listed under the Endangered Species Act [ESA], steelhead are listed under the ESA, critical habitat was designated for steelhead) and other changed environmental conditions, new NEPA analysis was needed in order to analyze this proposed INRMP revision. An EA was conducted to analyze the effects on the human environment of implementing this INRMP, and documents a decision of whether there are significant impacts if this proposed INRMP is adopted. The proposed INRMP and the EA were made available for public review and comment for 30 days from February 9th to March 12th, 2018, and no comments were received. The NEPA analysis and the NEPA decision document are included as Appendix B to this INRMP.

This INRMP is organized according to *Integrated Natural Resources Management Plan Guidance for Navy Installations* (2006) and was developed consistent with guidance in OPNAV M-5090.1 *Environmental Readiness Manual*. In addition, Department of Defense Instruction 4715.03, *Natural Resources Conservation Program* (2011), and the Department of Defense Manual 4715.03 *Integrated Natural Resources Management Plan (INRMP) Implementation Manual* (2013) provide policy and procedures to prepare, review, update, revise and implement INRMPs and were referenced in preparing this document.

Actions and projects contemplated in this INRMP are subject to the availability of appropriated funds, and no provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. §1341.



ES 1.-Location of Naval Radio Station (T) Jim Creek.

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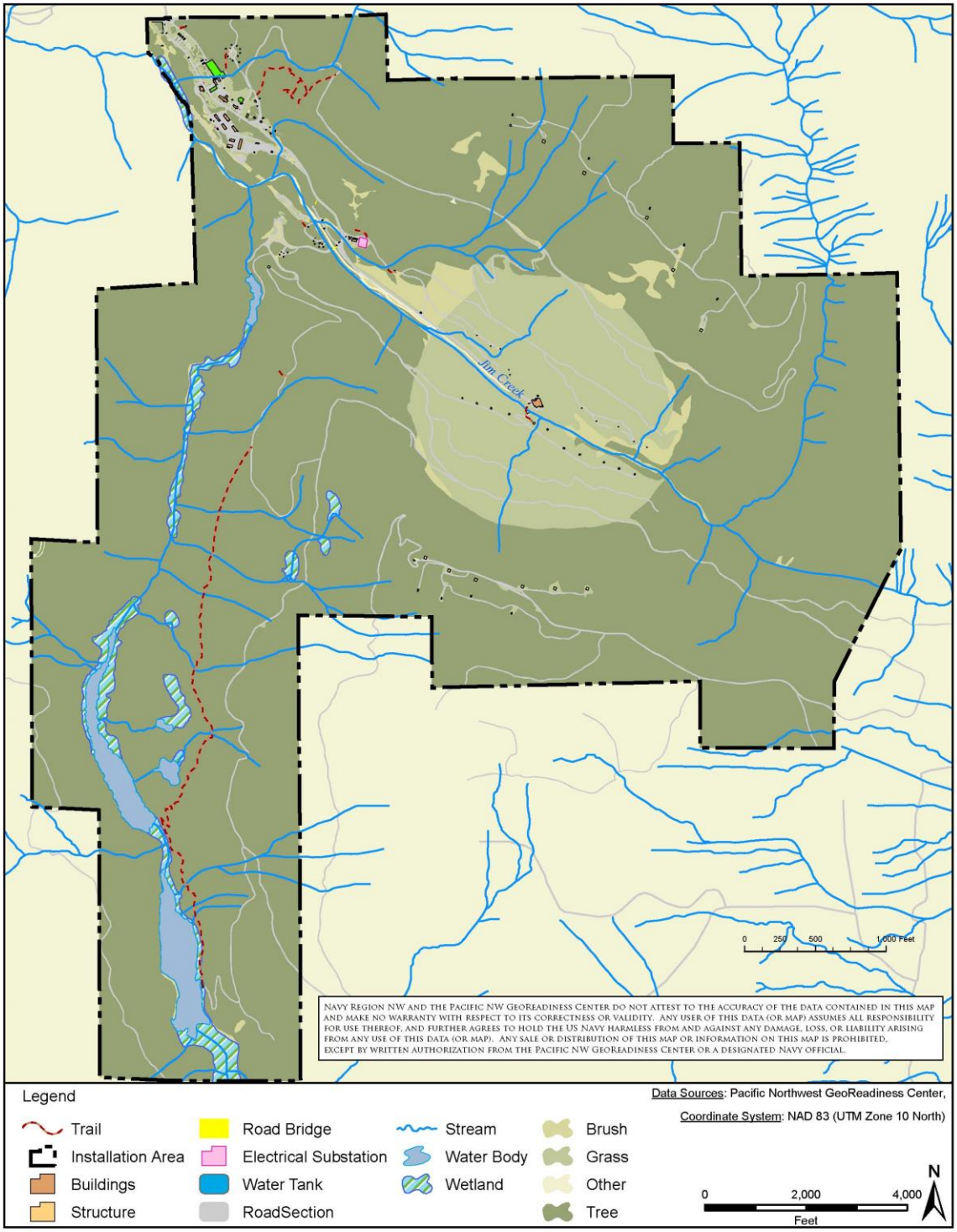

ES 2. NRS(T) Jim Creek Installation Map.

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TABLE OF CONTENTS

Note – Appendix C contains a crosswalk between this INRMP's organization and the Department of Defense Template

LIST OF FIGURES

LIST OF TABLES

APPENDICES

ABBREVIATIONS AND ACRONYMS

CERCLA	Comprehensive Environmental Restoration & Compensation Liability Act
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CNRNW	Commander Navy Region Northwest
DoD	Department of Defense
DODINST	Department of Defense Instruction
DON	Department of the Navy
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	Environmental Protection Agency
EPR	Environmental Program Requirements
ERL	Environmental Readiness Level
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
GRC	GeoReadiness Center
GRX	GeoReadiness Explorer
INRMP	Integrated Natural Resources Management Plan
MILCON	military construction
MOU	Memorandum of Understanding
MWR	Morale, Welfare and Recreation
NAVFAC NW	Naval Facilities Engineering Command Northwest
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRM	Natural Resources Manager
NRNW	Navy Region Northwest

NW	Northwest
O&MN	operations and maintenance - Navy
OPNAV	Office of the Chief of Naval Operations
PARC	Partners in Amphibian and Reptile Conservation
PIF	Partners in Flight
RCRA	Resource Conservation and Recovery Act
RPM	Real Property Maintenance
SECNAV	Secretary of the Navy
SPCC	Spill Prevention, Control, and Countermeasures
T&E	threatened and endangered
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WDOE	Washington Department of Ecology
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WNHP	Washington Natural Heritage Program

1 Overview

Note on Naming Convention - The term "Jim Creek" is used to refer to both Naval Radio Station (Transmitter) Jim Creek and to the stream from which the installation derives its name. In this document, the installation is referred to as "NRS(T) Jim Creek", "installation" or "the installation." In all other instances "Jim Creek" refers to the stream.

This Integrated Natural Resources Management Plan (INRMP) revision is consistent with guidance and regulations provided in the Department of Defense (DoD) Instruction 4715.03 (*Natural Resources Conservation Program*), DoD Manual 4715.03 (*Integrated Natural Resources Management Plan (INRMP) Implementation Manual*), Chief of Naval Operational Instructions (OPNAVINST) 5090.1D *(Environmental Readiness Program),* OPNAV M-5090.1 (*Navy Environmental and Natural Resources Program Manual*), and more recent Department of Navy (DON) and DoD Sikes Act and INRMP guidance memoranda (e.g., July 20, 2015 DoD Memorandum: *Guidelines for Streamlined INRMP Review*; June 9, 2017 DON Memorandum: *Sikes Act Implementing Procedures – Clarifying the Role of Federal and State Agencies to Implement Sikes Act Activities*; August 18, 2017 DoD Memorandum: *Guidance for Addressing Migratory Bird Management in Integrated Natural Resource Management Plans)*. These guidance and policy documents collectively require a plan and management approach that integrates mission support, multipurpose use, ecosystem or landscape-level management, and environmental compliance and stewardship.

1.1 Purpose

This INRMP will identify and evaluate natural resources at NRS(T) Jim Creek, and integrate the management of natural resources with the military mission, so that mission activities are not constrained. This INRMP was developed separately from the NSE INRMP as a stand-alone document to inform and assist the NSE Command in the management of natural resources at NRS(T) Jim Creek.

In addition to the military mission, NRS(T) Jim Creek supports a robust recreational program operated by Morale, Welfare, and Recreation (MWR). Integration with this program is a secondary intent to ensure proper management and protection of natural resources while carrying out the recreation program.

Through implementation of this INRMP, natural resources management will be consistent with the military mission and the recreational program, will ensure activities are conducted in compliance with legal requirements, and will promote environmental stewardship.

This INRMP revises and replaces in their entirety previous versions, including the INRMP most recently signed in 2009. It reflects the mutual agreement of the cooperating agencies identified on the signature pages concerning the conservation, protection, and management of the installation's natural resources.

This revised INRMP was developed after a thorough review of the 2009 INRMP, a review of new data available since the last INRMP, new and updated INRMP and NEPA guidance, as well as detailed discussions with Naval Facilities Engineering Command Northwest (NAVFAC NW) natural resources staff and INRMP stakeholders. This INRMP strives to integrate natural resources activities with other installation activities, and provides explicit goals and objectives to which natural resources projects and initiatives 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. It is vital that all concerned have a clear understanding and appreciation of the installation's mission, how the INRMP supports that mission, and the importance of natural resources stewardship in order for the INRMP to be effective. Navy natural resources managers cultivate these relationships and promote this awareness among interested parties and regulatory agencies.

1.2 Scope

This INRMP considers lands owned by the Navy within the boundary of NRS(T) Jim Creek, and the lands within this boundary that are used under special use permit from the U.S. Forest Service. This totals approximately 4,827 acres. The installation is near Arlington, Washington in Snohomish County, Washington (Figures ES 1 and ES 2).

There are other installations and facilities within the Area of Responsibility (AOR) of Naval Station Everett. Separate INRMPs have been developed for Naval Station Everett and Navy Support Complex Smokey Point; the Pacific Beach Annex; and the Acoustic Research Detachment, Bayview, Idaho. An INRMP is being developed for the Naval Radio Transmission Facility, LaMoure, North Dakota, which also is within the NSE command's AOR. All of these facilities operate under the control of Commander, Navy Region Northwest.

1.3 Goals and Objectives

A successfully implemented natural resources program at NRS(T) Jim Creek will meet two basic goals which are closely related and not mutually exclusive:

- Ensure the sustainability of ecosystems that encompass the installation; and
- Ensure no net loss in the capability of installation lands to support the military mission at NRS(T) Jim Creek.

The NRS(T) Jim Creek natural resource program objectives are to:

- Meet the general Navy INRMP goals stated above.
- Protect, conserve, and manage watersheds, wetlands, natural landscapes, soils, forests, fish and wildlife, and other natural resources on the installation thereby ensuring continued function of the ecosystem services they provide.
- Provide natural resource oversight and input to MWR-managed programs, activities, and projects.
- Contribute to the conservation of threatened and endangered species, sensitive species, and critical habitats regulated under the Endangered Species Act (ESA).
- Protect and conserve the old growth forest and manage adjacent second growth stands to enhance structural diversity.
- Manage natural resources in a combination best serving present and future installation needs.
- Provide for the optimum use of land and water areas while maintaining safety, security, ecological integrity, and ecosystem services.
- Ensure installation land-use planning is synchronized with this INRMP. Use the results from natural resource surveys and assessments in the development of installation land-use and activity siting criteria.
- Assign professionally-trained personnel to the Natural Resources program and provide these personnel the opportunity to participate in natural resources job-training activities and professional meetings.
- Implement projects that promote the maintenance and restoration of natural conditions and maintain ecosystem services.

1.4 Responsibilities related to this INRMP

1.4.1 Chief of Naval Operations, Environmental Readiness Division

The 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.
a) Represent the Navy on issues regarding development and implementation of INRMPs and delegate responsibility in writing.
b) Resolve high-level conflicts associated with development and implementation of INRMPs.
c) Approve all INRMP projects before INRMPs are submitted to regulatory agencies for signature.

1.4.2 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 and endorsement of projects recommended for INRMP implementation prior to submittal for signature. These projects are identified in Appendix A.
   2) The evaluation and validation of Environmental Program Review (EPR)-web project proposals.
d) Participate in the development and revision of INRMPs, which involves the maintenance of a close liaison with N45, NAVFAC and other budget submitting offices (BSOs).
e) Provide overall program management oversight for all natural resources program elements.

1.4.3 Regional Commander

The Regional Commander 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 installation 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 EPR-web 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.

1.4.4 Commanding Officer

The Commanding Officer, Naval Station Everett, oversees the operations occurring at NRS(T) Jim Creek and shall ensure the preparation, completion and implementation of the INRMP and associated NEPA documentation for this installation. The Commanding Officer should systematically apply the conservation practices set forth in the Plans. The Commanding Officer role includes:

a) Act as stewards of natural resources under their jurisdiction and integrate natural resources requirements into the day-to-day decision-making process.
b) Ensure that natural resources management and the INRMP comply with all natural resources-related legislation, Executive Orders 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, a Natural Resources Manager (NRM) responsible for the management efforts related to the preparation, revision, implementation, and funding for the INRMP.
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 the INRMP via Commanding Officer signature.

The Naval Station Everett Commanding Officer 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 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 NRM, NCTAMS personnel performing mission-related activities and MWR staff; and ensuring that natural resources management is integrated with mission-related military operations, training, and other activities at NRS(T) Jim Creek.

1.4.5 Natural Resources Manager

The NRM is responsible for natural resources management at NRS(T) Jim Creek. The NRM is designated in writing by the Commanding Officer (Appendix D). 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 NSE Public Works Department – Environmental Division and is administratively a NAVFAC employee. The NRM is primarily responsible for the preparation, revision, and implementation of this INRMP and coordinating with other personnel on the

installation as necessary to implement the INRMP and meet the goals and objectives. The NRM is 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.

1.4.6 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.

1.4.7 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 resources program. NAVFAC NW's role in natural resources management is to:

a) Provide technical and contractual support to NRS(T) Jim Creek for the preparation, development, and implementation of the INRMP 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 Navy Conservation Website.

In addition to the installation NRM, NAVFAC NW has professionally qualified foresters, botanists, fisheries specialists, marine mammal experts, marine and terrestrial bird specialists, 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.

1.4.8 Public Affairs Office

Public Affairs Office (PAO) at NSE provides a significant link between the INRMP and the on- and off-installation communities. The PAO can facilitate communication between offices across the installation, tenant commands, and nearby communities as well as the general public regarding environmental management initiatives. Any proposed communications outside the installation should be discussed in advance with the PAO.

1.4.9 Morale, Welfare and Recreation

The Commander, Navy Installations Command establishes, executes, and oversees the Navy's military Morale, Welfare and Recreation (MWR) program. At NRS(T) Jim Creek, the MWR program operates all aspects of a robust recreational program and provides a daily presence for visitors. The Morale, Welfare, and Recreation staff is the interface with the military and civilian personnel that use the cabins, RV sites, campgrounds, hiking trails and rental equipment (e.g., canoes, fishing gear) available at NRS(T) Jim Creek. Since there is not a NRM on site, coordination between MWR staff and the NRM is important in communicating natural resource concerns and promoting specific projects or events. The Jim Creek site manager and staff will become familiar with this INRMP and are expected to contact the NRM concerning projects that might impact natural resources. The Jim Creek MWR staff communicates with visitors regarding specific natural resource topics as provided by the NRM.

1.4.10 Transmitter Officer-In-Charge

The VLF communications mission is carried out by the Naval Computer and Telecommunications Area Master Station (NCTAMS), Pacific Detachment Puget Sound. NCTAMS is a tenant command at NRS(T) Jim Creek staffed by an officer-in-charge (OIC) that is usually a Chief Warrant Officer. This individual is in charge of the mission and oversees civilian and military NCTAMS staff, and is an Echelon IV Command. Being a tenant command, the OIC coordinates required support through the NSE Commanding Officer, or his/her designee. Since there is not a NRM on site, coordination between the NRM and NCTAMS OIC and staff is important in communicating natural resource concerns and providing awareness of specific projects or events. The OIC is responsible for communicating with NCTAMS staff regarding specific natural resource topics provided to them by the NRM. The OIC will become familiar with this INRMP and is

responsible for informing the NRM of conditions or situations that have a natural resources component, and informing the NRM of activities that have the potential to impact natural resources.

1.5 External Stakeholders

1.5.1 U.S. Fish and Wildlife Service

The Sikes Act directs DoD to prepare INRMPs in cooperation with the U.S. Fish and Wildlife Service (USFWS). The goal is to gain mutual agreement with respect to the entire INRMP, but agreement is only required with respect to conservation, protection, and management of fish and wildlife resources. The USFWS indicates mutual agreement and endorsement of this INRMP via signature. U.S. Fish and Wildlife Service biologists may be called upon to provide assistance and support to the NRM through interagency agreements, if necessary.

1.5.2 National Marine Fisheries Service

The Sikes Act does not require NMFS to participate in the development of INRMPs but coordination with this agency may be appropriate when listed species under NMFS jurisdiction would benefit from INRMP implementation. In the case of NRS(T) Jim Creek, salmon species and habitat for ESA-listed salmon and steelhead are found on the installation and in downstream waters, so involvement of this agency is important in gaining benefits for these species through implementation of the INRMP. The National Marine Fisheries Service indicates mutual agreement and endorsement of this INRMP via signature. National Marine Fisheries Service biologists may be called upon to provide assistance and support to the NRM through interagency agreements, if necessary.

1.5.3 Washington Department of Fish and Wildlife

The Sikes Act also directs DoD to prepare INRMPs in cooperation with the appropriate state fish and wildlife office; in this case the Washington Department of Fish and Wildlife. The goal is to gain mutual agreement with respect to the entire INRMP, but agreement is only required with respect to conservation, protection, and management of fish and wildlife resources. The Washington Department of Fish and Wildlife indicates mutual agreement and endorsement of this INRMP via signature. Washington Department of Fish and Wildlife biologists may be called upon to provide assistance and support to the NRM if necessary.

Commitment of Cooperating Agencies - The USFWS, NMFS and WDFW agree to cooperate in the development of the INRMP, to review the INRMP as to operation and effect at least once every five years, and to participate in the Annual INRMP Review and Conservation/ INRMP Metrics (Section 1.10.1). No element of the Sikes Act is intended to either enlarge or diminish the existing

responsibility and authority of the USFWS, NMFS, or WDFW concerning fish and wildlife responsibilities on military lands. An INRMP reflects a mutual agreement of the parties concerning the conservation, protection, and management of fish and wildlife resources.

Per the Memorandum of Understanding (MOU) between the U.S. Department of Defense, U.S. Fish and Wildlife Service and the Association of Fish and Wildlife Agencies (July 29, 2013), a comprehensive, joint review by all parties as to operation and effect will be conducted no less often than every five years. While once every five years is required, DoD policy calls for an annual review to be conducted in coordination with the Sikes Act partners.

1.6 Tribal Governments

Pursuant to SECNAVINST 11010.14A, COMNAVREGNWINST 11010.14, and OPNAV M-5090.1, the Navy consults with federally-recognized tribes on a Government-to-Government basis as provided by law on all Navy proposed actions that may have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands within the COMNAVREG NW AOR. The Navy consults on the development of INRMPs where treaty rights, sacred sites, burial sites, or other rights to natural resources may be affected by the INRMP. The Stillaguamish Tribe (under the spelling Stoluck-wa-mish) that resided on the Stillaguamish River were a party to the Treaty of Point Elliot of 1855 and have adjudicated Usual and Accustomed (U&A) Areas in the vicinity of NRS(T) Jim Creek. Invitations to conduct Government-to-Government consultations are extended to the Stillaguamish Tribe when proposed projects have the potential to impact treaty resources. Also, in accordance with Navy policy, the Stillaguamish Tribe will be invited to review and comment on this INRMP and subsequent annual updates.

1.7 Authority

The Sikes Act (16 U.S.C. 670a *et seq*., as amended) is the primary driver behind development and implementation of this INRMP. According to the Sikes Act, the purposes of a military conservation program are conservation and rehabilitation of natural resources consistent with the use of military installations to ensure the preparedness of the Armed Forces, and to provide sustainable multipurpose use of the resources on such installations, which shall include hunting, fishing, trapping, and non-consumptive uses; and subject to safety requirements and military security, public access to military installations to facilitate the use. The conservation program must be consistent with the mission-essential use of the installation and its lands. The Sikes Act requires the preparation of an INRMP to facilitate the conservation program, stating as follows: "To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation in the United States under the jurisdiction of the Secretary, unless the Secretary determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate." 16 U.S.C. 670a.

In addition to the Sikes Act, this INRMP has been prepared consistent with guidance and regulations provided in DoD Instruction 4715.03, OPNAVINST 5090.1D, OPNAV M-5090.1, associated Navy Guidance (U.S. Navy 2006), and a series of DoD and DON guidance memoranda on the Sikes Act and Integrated Natural Resources Management Plans. Collectively these guiding documents require a management approach that integrates mission support, multiple use, natural resource conservation, ecosystem management and environmental compliance and stewardship:

- ***DODINST 4715.03, Department of Defense Instruction (18 March 2011, Incorporating Change 1 dated 5 October 2017)***. Reissues and renames Department of Defense Instruction (DoDI) 4715.3 in accordance with the authority in Department of Defense Directive (DoDD) 5134.01 and the guidance in DoDD 4715.1E and DoDI 4715.5 to establish policy and assign responsibilities for compliance with applicable Federal, State, and local statutory and regulatory requirements, Executive Orders (EOs), Presidential memorandums, and Department of Defense (DoD) policies for the integrated management of natural resources including lands, air, waters, coastal, and nearshore areas managed or controlled by DoD. In addition, develops new policy and updates policy for the integrated management of natural resources (including biological and earth resources) on property and lands managed or controlled by DoD, implements new Natural Resources Conservation metrics, and provides procedures for DoD Components and installations for developing, implementing, and evaluating effective natural resources management programs.
- ***DOD Manual 4715.03, (25 November 2013, Incorporating Change 1 dated 13 December, 2017) INRMP Implementation Manual.*** Provides procedures to prepare, review, update, and implement INRMPs in compliance with sections 670-670o of the Sikes Act. Exhibit 1–1 of this manual lists the specific contents required in an INRMP document.
- ***Memorandum of Understanding (MOU) between the U.S. Department of Defense, U.S. Fish and Wildlife Service and the Association of Fish and Wildlife Agencies. (July 29, 2013).*** The purpose of this MOU is to further a cooperative relationship between DoD, USFWS, and state fish and wildlife agencies acting through the Association of Fish and Wildlife Agencies in preparing, reviewing, revising, updating and implementing INRMPs for military installations.
- ***USFWS Guidelines for Coordination on Integrated Natural Resource Management Plans (June, 2015).*** This document provides guidance to USFWS personnel for implementing the requirements of the Sikes Act and addresses USFWS program responsibilities, INRMP contents and requirements, reviews and mutual agreement, interagency agreements, reporting, and other items.
- ***Mutual DoD & USFWS Guidelines for Streamlined Review of Integrated Natural Resources Management Plan Updates (July 20, 2015).*** These guidelines clarify and describe a process for cooperating agencies to review and concur specifically

on updates to existing Integrated Natural Resource Management Plans (INRMPs); not revisions or new documents. To more effectively respond and rapidly adapt to ongoing natural resource activities (e.g., monitoring, recreational fishing) and to changes that are administrative, process-oriented, or minor (e.g. expanding an existing trail, conducting biological surveys), the USFWS, DoD, and the state fish and wildlife agencies as represented by the Association of Fish and Wildlife Agencies included a provision in the Tripartite MOU to streamline the review process. Such updates do not result in new biophysical effects, do not change the management prescriptions set forth in the INRMP, and do not require analysis under the NEPA nor associated public review. The guidelines provide guidance on format, coordination and responsibilities for submitting draft and final updates. These guidelines are not a required process, and need not apply to DoD components or installations that have already implemented a successful method for updating INRMPs with their USFWS field offices and state agencies.

- ***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 DoD and replaces the 21 September 1998 guidance. 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 the INRMP review process.
- ***The Implementation of Sikes Act Improvement Amendments: Supplemental Guidance Concerning Leased Lands.*** This Memorandum of the Under Secretary of Defense, issued 17 May 2005 states that INRMPs must address resource management on all of the lands for which the subject installation has real property accountability, including 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. Installation Commanding Officers may require tenants, lessees, permittees, and other parties that request permission to occupy or use installation property to accept responsibility, as a condition of their occupancy or use, for performing appropriate natural resource management actions. This does not preclude the requirement to address the natural resource management needs of any such lands in the installation INRMP.
- ***OPNAVINST 5090.1D, Environmental Readiness Program (January 10, 2014).*** Contains instructions on the implementation of the OPNAV M-5090.1 Environmental Readiness Program Manual.

- ***OPNAV M-5090.1, Environmental Readiness Program Manual (January 10, 2014).*** This manual discusses requirements, delineates responsibilities, and issues implementing policy guidance for the management of the environmental, natural and cultural resources for all Navy ships and shore activities. It discusses Federal environmental laws and regulations, executive orders, and DoD and DON environmental policies applicable to Navy installations, organizations, and platforms. This manual establishes broad policy and assigns responsibilities for the Naval Natural Resources Program. Chapter 12 of this Manual establishes Navy policy guidance and requirements to ensure sustainable military readiness through compliance with all applicable laws and regulations related to the conservation of natural resources.

*******Guidance in OPNAV M-5090.1 that is pertinent to this INRMP in incorporated herein by reference.

- ***Guidelines for Preparing Integrated Natural Resources Management Plans for Navy Installations (April 2006).*** This guidance provides natural resources managers at Navy installations with an interpretation of what processes are needed to prepare INRMPs, including the INRMP template. This document is divided into three sections. The first section suggests a process to develop an INRMP. The second section addresses traditional technical areas to be included in the INRMP. The third section includes a discussion on implementing the INRMP. Of particular value within this guidance is a comprehensive list of Laws, Regulations, Executive Orders, templates and instructions applicable to this INRMP.
- ***DOI Secretarial Order 3289 (September 14, 2009).*** This Order establishes Landscape Conservation Cooperatives, which focus on on-the-ground strategic conservation efforts at the landscape level. Landscape Conservation Cooperatives (LCCs) are management-science partnerships that inform integrated resource management actions addressing climate change and other stressors within and across landscapes. They link science and conservation delivery. LCCs are true cooperatives, formed and directed by land, water, wildlife and cultural resource managers and interested public and private organizations. Federal, State, tribal, local government and non-governmental management organizations are all invited as partners in their development.
- ***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.

1.8 Military Mission

The NRS(T) Jim Creek mission is provide Very Low Frequency (VLF) radio transmitting capabilities for the Pacific. This is the sole military mission at the 4,827-acre installation. The transmitting facility, an antenna array constructed between 1948 and 1953, was the world's first high-powered VLF transmitting station. It is a fourth echelon command operating under the control of Commander, U.S. Pacific Fleet and Naval Communications Station, Puget Sound (NCTAMS). It operates with a staff of about 35 year-round civilian and military personnel, with additional staff added during the summer. The transmitting facility has been in operation since 1953. The transmitter itself and the appurtenant antenna system are maintained by the NCTAMS. Additional details and mission-related operations are described in Section 2.1.4.

1.9 Stewardship and Compliance

The Navy is responsible for complying with all applicable environmental laws, regulations, and policy. OPNAV M-5090.1 identifies the requirements and provides policy guidance on Navy environmental compliance and programs. NSE staffs an environmental program that includes responsibilities at NRS(T) Jim Creek. This program is administered through the NAVFAC Northwest Public Works Department Everett, Environmental Division. Environmental compliance staff at CNRNW also provides support to the installation in meeting the requirements of applicable environmental law, regulation, and policy compliance.

Stewardship goes beyond regulatory compliance. As a steward of military lands, the Navy recognizes that Navy Region Northwest installation lands are part of diverse, functioning ecosystems. Natural resource stewardship considerations are integrated into the planning phase of projects through environmental review of major federal actions proposed at NRS(T) Jim Creek.

Sustainability ensures the continued functioning and integrity of natural ecosystems over time while meeting the needs of the military mission. The Navy has a mandate to implement programs for the conservation of natural resources. To be successful, natural resource programs must integrate with military activities to ensure there is no net loss to the military mission; sustain natural resources; provide public access when appropriate; and develop positive community involvement, participation, and education opportunities with the surrounding communities.

Recognizing the importance of the ecosystem services provided by installation lands when making land management decisions is an important part of stewardship and sustainability. NRS (T) Jim Creek contributes to a number of ecosystem services on and off the installation. These are addressed in Chapter 3.

The installation Commanding Officer, operational personnel, and other installation personnel have an influence on environmental conditions. At NRS(T) Jim Creek they contribute to environmental stewardship by working with the NRM and integrating their perspectives into the management process of the installation and through implementation of this INRMP.

1.10 Review and Revision Process

An evaluation of natural resource management at NRS(T) Jim Creek will be performed each year using this INRMP as the basis for the evaluation, and a review for operation and effect will be performed at least every five years (EPR# 61135B952A; CHE/D NW NRS(T) Jim Creek INRMP). These reviews will include participation by representatives from USFWS, NMFS, and WDFW, and will use the Navy's internal Conservation Website and Metrics tool (see below) to evaluate the plan's relevance, operation, and effectiveness. These evaluations are the venue for assessing the effectiveness of the INRMP, and promote regular interagency coordination.

1.10.1 Annual INRMP Review and Conservation/INRMP Metrics

Pursuant to DODI 4715.03 Department of Defense Manual (2013) and OPNAV M-5090.1, Natural Resources Conservation/INRMP Metrics (metrics) must be completed by each Navy installation with natural resources. The metrics ensure that Navy installations are in compliance with the Sikes Act and that each region or installation is preparing, maintaining, and implementing its INRMP. The metrics also support Endangered Species Act (ESA) expenditure reporting to Congress by the USFWS. Furthermore, the metrics contribute to information collected for the Defense Environmental Program Annual Report to Congress (DEPARC) and the Office of Secretary of Defense's (OSD) Environmental Management Review (EMR). Data collected during the metrics exercise also supports briefings up the DoD and Navy chains of command regarding the status of the Navy's Natural Resources Programs. As required by DoD and Navy policy, the metrics are to be completed with the U.S. Fish and Wildlife Service, state fish and wildlife agencies, and, when appropriate, National Marine Fisheries Service and other stakeholders and partners. For the Jim Creek INRMP, the USFWS, WDFW and NMFS participate in this annual review.

Installation COs participate in the annual NRC program and INRMP metrics review because INRMPs are prepared to assist the installation commander with his or her natural resources responsibilities and to ensure adequate and appropriate conservation support for operational requirements. The annual INRMP review considers seven focus areas documented within the Navy's internal Conservation Website that can be accessed via the Navy Environmental Portal (https://eprweb.cnic.navy.mil). Access requires a Common Access Card and login permissions (not available to non-NAVFAC personnel):

1) Ecosystem Integrity
2) Listed Species and Critical Habitat
3) Recreational Use and Access
4) Sikes Act Cooperation (Partnership Effectiveness)
5) Team Adequacy
6) INRMP Implementation

7) INRMP (Natural Resource Program) Support of the Installation Mission

Use of the Conservation Website evaluation tool generates Navy conservation program metrics which annually provide information on the status of the installation's Natural Resource Program, and the status of the Navy's relationship with USFWS, NMFS, and WDFW.

The annual evaluation measures successes and identifies issues resulting from INRMP implementation. The NRM at Naval Station Everett will maintain the controlled version of this INRMP and associated data, and INRMP metrics supporting documentation within the installation's electronic and hardcopy file system.

1.10.2 Review for Operation and Effect

Consistent with guidance and references in the Sikes Act, DODI 4715.03 (Natural Resources Conservation Program) (2013) and Chapter 12 (Natural Resources Conservation) of OPNAV M-5090.1, the NRM will review this INRMP for operation and effect cooperatively with USFWS, NMFS, and WDFW at least once every five years. This review is the statutory responsibility of these agencies and Navy funds may not be used to pay for their participation in this requirement. The review for operation and effect is conducted during the annual INRMP review. Mutual agreement on operation and effect will be documented in writing in the form of a new signature page. The new signature page will be appended to this INRMP and uploaded to the Navy's internal Conservation Website accessed via the Navy Environmental Portal: https://eprweb.cnic.navy.mil.

1.11 Management Strategy

Ecosystem management is a process that considers the environment as a complex system functioning as a whole; 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. To the extent possible while supporting the installation mission, natural resource management at NRS(T) Jim Creek will contribute positively to the larger ecosystems of which the installation lands are a part.

Forest Ecosystems - The Federal lands adjacent to NRS(T) Jim Creek are managed consistent with the Northwest Forest Plan (NWFP). The NWFP is a series of federal policies and guidelines governing land use on federal lands, including military lands, in the Pacific Northwest.

The NWFP focuses on ecosystem management and conservation of biodiversity. It was established to protect threatened and endangered species associated with late successional and old-growth

forest habitats while still contributing to social and economic sustainability. In Washington State, about 7 million acres of mostly forested land are managed under this plan.

Monitoring efforts under the NWFP include the Pacific Northwest unit of Forest Inventory and Analysis (FIA); a program that collects data on all public and private forests. The FIA collects, analyzes, reports, and distributes forest inventory data. Among other topics, the Pacific Northwest FIA assesses the current condition of Pacific Northwest forests, and examines how they have changed.

Interagency Regional Monitoring under the NWFP is a regional interagency effectiveness monitoring framework that has been implemented to assess Federal-Tribal relationships, and to track the status and trend of watershed condition, late-successional and old-growth forests, socioeconomic conditions, and population and habitat for marbled murrelets and northern spotted owls.

The Stillaguamish Watershed - Seven miles of main stem Jim Creek and tributaries on NRS(T) Jim Creek are within the Stillaguamish watershed. The Department of Ecology (DOE) manages water resources and water programs in Washington and compiles and maintains data on the Stillaguamish watershed. This includes extensive and long-term monitoring to identify background conditions or trends. Parameters measured include coliform, pH, oxygen, suspended solids, temperature and others. These data are used to generate water quality index scores for the watershed that indicate the health of the watershed. The DOE also maintains an online Environmental Information Management System which houses numerous ecological studies conducted in the watershed.

The Northwest Indian Fisheries Commission produces a State of Our Watersheds report, which compiles data tracking indicators on habitat quality and quantity that directly tie to salmon productivity.

Within the NRS(T) Jim Creek boundary there are small land and water components of these large-scale areas that are under study. There may be opportunities to collect and compile data on the installation that can contribute to the monitoring efforts above, and other large-scale evaluations.

Natural Resources Management Strategy - The natural resources management strategy at NRS(T) Jim Creek will consist of:

- Recognizing that the NRS(T) Jim Creek lands contribute to larger ecosystems made up of many parts that are inter-dependent, and that these ecosystems provide ecosystem services both on and off the installation.
- Knowing what natural resources are present, where they are, and when they are there.
- Reviewing planned actions, assessing risk, and developing alternatives at the early stages of project development.

- Effectively communicating with action proponents, the Navy, and cooperating agencies at an early stage; well before full project development to develop ways to minimize or eliminate risks to natural resources and therefore to the greater ecosystems of which they are a part.
- Identifying restoration or enhancement opportunities, planning and prioritizing the opportunities to maximize ecosystem benefits, and seeking the funding to carry out them out within the constraints of the military mission of the installation. Monitoring the success of such endeavors should be a key component of restoration activities.
- Exploring opportunities to contribute to watershed and forest ecosystem-level long term monitoring efforts and evaluations. This could include development and integration of geospatial data of forest vegetation layers from forest inventory data.

1.12 Integration with Other Plans

In accordance with DoD Manual 4715.03 Enclosure (3): *Integrating Other Plans, Programs and Policies* and the Navy's INRMP Guidance for Navy Installations (April 2006), this INRMP has been prepared in coordination with other planning documents. Information from an INRMP is incorporated into other plans and other plans help identify management priorities and potential impacts to natural resources that are incorporated into the INRMP. These include the following DoD, Navy and installation plans:

1.12.1 Base Master Plan/Installation Development Plan

NRS(T) Jim Creek does not have a stand-alone master plan. There is an Installation Development Plan for NSE, the official planning document that guides installation physical development activities. Since NRS(T) Jim Creek is under NSE's AOR, new physical development proposals at NRS(T) Jim Creek would be referred to NSE for planning and development and to achieve plausible, feasible, and implementable planning solutions. Any such proposals would require review by the PWDE Environmental Division office including the NRM to ensure they don't put natural resources or INRMP goals and objectives at risk. The INRMP helps identify constraints important in planning new developments.

1.12.2 Encroachment Action Plan

NSE has an Encroachment Action Plan (2008) that includes encroachment concerns at NRS(T) Jim Creek. This plan identified a potential issue with the U.S. Forest Service (USFS) property which is used at NRS(T) Jim Creek under special use permit which has been in place since 1949. It noted there may be a risk of maintaining long-term assurances of the Navy's use of the property, although the permit states "as long as the defense necessity exists." The land permitted for use by the USFS includes 396 acres within the antenna field; crucial to mission operations (Figure 1).

Another encroachment situation identified was trespassing at multiple access points. This could include non-Navy personnel using forest roads near the installation to gain entry, and recreational visitors inadvertently entering restricted portions of the installation. These situations could increase as recreational use and development of the surrounding land increases. The Encroachment Action Plan did not identify situations that would impact natural resources managed under this INRMP, or that would affect achievement of the INRMP goals and objectives.

1.12.3 Installation Integrated Cultural Resources Management Plan (ICRMP)

An Integrated Cultural Resources Management Plan (ICRMP) for NSE includes NRS(T) Jim Creek (U.S. Navy 2014, revised 2016). The ICRMP outlines policies, procedures, and responsibilities for meeting cultural resources compliance and management requirements at NRS(T) Jim Creek and other locations within NSE's AOR. It provides an inventory of the installations' significant cultural resources, provides specific guidance for their management, and ensures their consideration during the development and execution of projects at the installation. The ICRMP also sets forth specific goals and objectives for the installation's historic preservation program.

The NSR(T) Jim Creek property and surrounding lands retain importance to the Stillaguamish Tribe; particularly concerning salmon and native plants, therefore cultural and natural resource concerns and management overlap to a large extent, requiring coordinated, integrated management. The NSE Cultural Resources Manager and NRM also both have responsibility for NRS(T) Jim Creek and are able to coordinate on management of cultural and natural resources. Implementation of this INRMP contributes to maintaining cultural resources important to the Stillaguamish Tribe as described in the ICRMP. The ICRMP and management of cultural resources rely on the INRMP for information concerning installation natural resources and demonstrates the Navy's commitment in managing resources of cultural importance.

1.12.4 Oil Spill Prevention, Control and Countermeasure Plan

NSE maintains an Oil Spill Prevention, Control, and Countermeasure Plan (SPCC Plan) signed by the installation Commanding Officer that includes NRS(T) Jim Creek. The SPCC Plan complies with 40 CFR 112, "Oil Pollution Prevention."

The total oil storage capacity at NRS (T) Jim Creek is 23,475 gallons. Diesel, lubricating oil, transformer cooling oil, and used oil are stored. Storage is in underground tanks, above ground tanks, and steel drums. The SPCC Plan addresses oil storage and management and describes standards and operating procedures to reduce the potential for discharges. In addition, the SPCC Plan documents measures to be taken to prevent the discharge of oil into waters of the United States. To reduce the risk of spills, the storage, handling, and transfer of oil (including petroleum

oil, mineral oil, cooking oil, waste oil, etc.) must adhere to a number of procedures identified in the SPCC Plan.

Because NRS(T) Jim Creek contains many acres of undeveloped land, streams, and habitat for fish and wildlife, implementation of the SPCC Plan contributes to protection of natural resources through spill prevention; contributing to natural resources management and to INRMP goals and objectives.

1.12.5 Antenna Ground Field Vegetation Management Plan

This plan addresses vegetation management specifically within the boundary of the 587-acre antenna ground field. The goal of the vegetation management program is to target and control vegetation that can reach heights that interfere with efficient operation of antenna system transmissions. The Vegetation Management Plan identifies requirements for mechanical control, biological control, and chemical (herbicide) control, including aerial spraying. Vegetation growth monitoring and protection of natural resources are also addressed in the plan.

One principal goal of the Antenna Ground Field Vegetation Management Plan (NAVFAC 2008a) is to remove as much Scotch broom *(Cytisus scoparius)* as possible, including viable seeds in the soil. Actions undertaken to control Scotch broom have been selected and are designed to be effective on other woody, broad-leaved species as well. Vegetation management under this plan contributes to the INRMP by impairing growth of invasive Scotch broom. Avoidance and minimization measures, and Best Management Practices (BMP) are employed under the Vegetation Management Plan so that the risk of herbicide discharge to water is reduced and the goals and objectives of the INRMP are not impaired.

1.12.6 Integrated Pest Management Plan

NRS (T) Jim Creek is included in the 2014 Integrated Pest Management Plan (IPMP) for NSE (NAVFAC, 2014). The integrated approach to pest management is a planned program incorporating education, continuous surveillance, record keeping, 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 (effective, economical, environmentally sound) methods.

The IPMP identifies four potential pest problems at Jim Creek: 1) invasive aquatic weeds at the Twin Lakes area, 2) rodents in and around buildings and picnic/camping areas; 3) insects in and around buildings and picnic/camping areas; and 4) feral cats and dogs.

The installation has not had major pest problems. This may be attributed to diligence on the part of the MWR and Public Works staffs that are in charge of cleaning and removing trash and food from the facilities and recreational areas. Wasps, hornets, bees, and other insects are occasional

problems, but nests and hives are removed before they grow too big. Occasionally, mice get into buildings, but trapping has controlled them and minimized problems. Rodents are also preyed upon by other animals, and this has helped keep rodent populations from expanding beyond their natural foraging sources.

There has been a long-standing ban on the use of private recreational boats on Twin Lakes. This has prevented the introduction of Eurasian watermilfoil (*Myriophyllum spicatum*) and other invasive, non-native aquatic plants into the lake system.

The IPMP requires review and signed approval by the Installation Environmental Program Director and the NRM, providing a mechanism for maintaining awareness of the program and integrating specific natural resource content or needs so that the IPMP and the INRMP are consistent. The INRMP and the IPMP both recognize the need to prohibit private watercraft at Twin Lakes to avoid introduction of aquatic invasive species. Judicious pest control under the IPMP is consistent with management of natural resources under the INRMP.

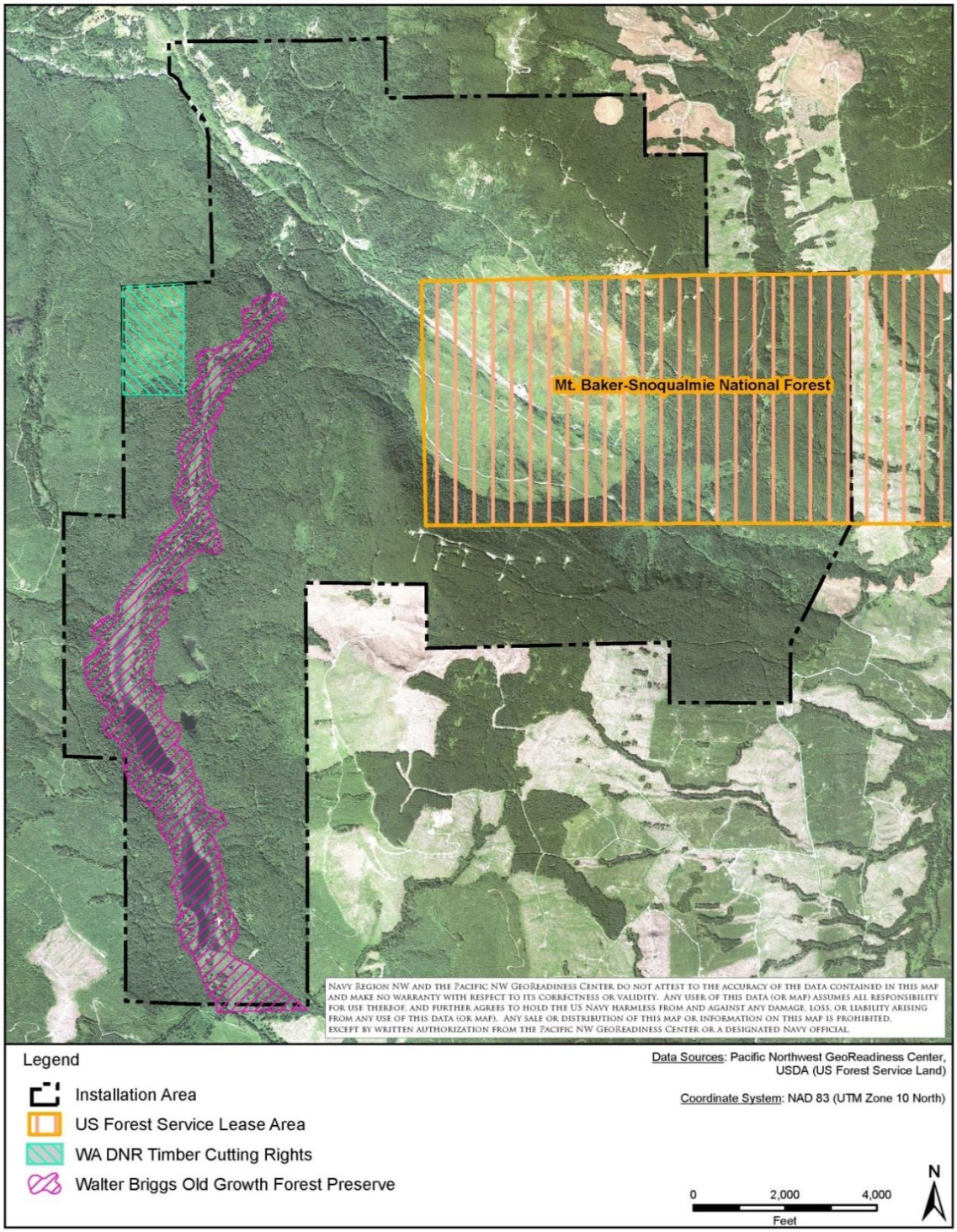

Figure 1. Forest Service; Mt. Baker-Snoqualmie lands under special use permit.

1.12.7 Amphibian and Reptile Strategic Plan

In 2015, DoD released the *Strategic Plan for Amphibian and Reptile Conservation and Management on Department of Defense Lands (Strategic Plan)***.** This plan identifies threats to amphibian and reptile habitats and populations at a broad scale, strategic objectives for conservation activities, and roles and responsibilities to guide herptofauna conservation. The plan summarizes challenges and concerns on DoD lands and provides a framework for accomplishing DoD-wide conservation objectives related to the protection of amphibians, reptiles, and their habitats as part of a comprehensive effort to manage natural resources in ways that preclude mission conflicts and loss of training capabilities that can result from conservation-based regulatory restrictions.

NRS(T) Jim Creek is inhabited by a number of amphibian and reptile species. Management of these species as described in this INRMP will be consistent with guidance in the *Strategic Plan*. Both plans promote management for the conservation of amphibian and reptiles and habitat protection. Presently there are no constraints on mission activities at NRS(T) Jim Creek related to amphibian or reptile regulatory restrictions. Results of past surveys and future data collected on the installation will be used in conservation management of amphibians and reptiles on the installation. The NRM will maintain contact with Navy members of the Partners in Amphibian and Reptile Conservation (PARC) in order to stay current on project and program opportunities that could be implemented through this INRMP.

1.12.8 DoD Partners in Flight (PIF) Strategic Plan

This plan identifies actions that support and enhance military missions while working to secure bird populations. It also provides a scientific basis for maximizing the effectiveness of resource management, enhancing the biological integrity of DoD lands, and ensuring continued use of these lands to fulfill military training requirements (https://www.partnersinflight.org/).

The PIF Strategic Plan presents a compilation of best management practices and suggested focus areas to assist in compliance with the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act, Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) and its associated Memorandum of Understanding, and the Final Rule on Take of Migratory Birds by the Armed Forces. The PIF Strategic Plan recognizes that one of the best ways to comply with the above legal requirements is to continue ongoing conservation efforts at the installation level. This helps protect and conserve birds and their habitats via implementation of INRMPs, as well as to build and maintain partnerships with other agencies and conservation entities.

In the PIF Strategic Plan, DoD established goals to identify key bird conservation priorities and guide the actions of its natural resource management activities, including:

- Bird/Animal Aircraft Strike Hazard (BASH)
- Encroachment Minimization
- Stewardship
- Habitat and Species Management
- Monitoring
- Research
- Partnership/Cooperation
- Communication and Education
- Enhancing the Quality of Life

These goals will be pursued to the extent they are applicable for conservation of birds at NRS(T) Jim Creek. Presently there are no constraints on mission activities at NRS(T) Jim Creek related to bird regulatory restrictions. The NRM will maintain contact with the PIF program staff in order to be aware of project and program opportunities as they develop that could be implemented through this INRMP.

Landbird Conservation Plan - In 2016, PIF released a revision of its Landbird Conservation Plan (first published in 2004), which considers landbirds across the U.S and Canada (http://www.partnersinflight.org/wp-content/uploads/2016/08/pif-continental-plan-final-spread-double-spread.pdf). The plan recognizes that conservation of landbird populations can only be addressed through strong and sustainable partnerships among the public, private, and industrial sectors. It identifies a number of PIF Recommended Actions. The plan recognizes the importance of landscape level conservation in retaining abundance of bird species. Opportunities to protect habitat and conserve species at a local level will be evaluated and implemented to contribute to this plan.

1.12.9 Installation Restoration Program (IRP)

The DON IRP is responsible for identifying Comprehensive Environmental and Compensation Liability Act (CERCLA) releases, Resource Conservation and Recovery Act (RCRA) releases, and releases under related provisions; considering risks and assessing impacts to human health and the environment; and developing response actions when a release may result in an unacceptable risk to human health and the environment. Presently there are no IRPs at NRS(T) Jim Creek. Adverse impacts to natural resources could occur if there was a release of a hazardous substance, pollutant, or contaminant. When appropriate, the regional or installation's natural resources management staff will help the Installation Restoration Program Remedial Project Manager identify potential impacts to natural resources caused by the release of contaminants.

2 Current Conditions and Use

2.1 Installation Information

2.1.1 Location

NRS (T) Jim Creek is located in rural Snohomish County, Washington, in the western foothills of the Cascade Mountains. It is approximately 60 miles northeast of Seattle, and 12 miles (by road) east of the city of Arlington (Figures ES 1 and ES 2).

The installation encompasses approximately 4,827 acres in a largely undeveloped, forested area (Table 1), and shares boundaries with the Mount Baker-Snoqualmie National Forest, state-owned forested lands, and private land. Installation lands can be delineated into three general land use types (Table 1).

TABLE 1. LAND USE AND ACRES AT NRS(T) JIM CREEK.

Land Use Type	Acres	Acre subset
Administrative Area: Developed administrative and recreation areas (includes Twin Lakes shoreline)	11	
Operational Area: Antenna field, ground field, towers, access roads, (occurs upon a portion of United States Forest Service lease area).	980	
Ground field (Copper wire grid within the antenna field)		587
Undeveloped Land: Forested land, remote areas, and all non- administrative and non-operational areas.	3,836	
USFWS marbled murrelet designated critical habitat.		1,840
Protected old growth forest (within designated critical habitat boundary)		225
Lakes (all are within designated critical habitat boundary)		72
Total	**4,827**	

The Administrative Area is concentrated in the northwest portion of the installation and contains office buildings, public works/supply facilities, a guard station, and MWR recreation facilities. This is a graded, modified area with lawn grass, ornamental trees and shrubs, and fruit trees similar to a low density, park-like area. This area is accessible to service members, DoD personnel, retirees and their guests.

The Operational Area includes the antenna field, a 980-acre area encompassing all areas associated with the antenna array, from the ridge of Blue Mountain to the ridge of Wheeler Mountain. The transmitter building, steel towers that support aerial cables, the 587-acre ground field, and service roads, gates and security structures are all in the Operational Area. This is the area used in support of the mission and is highly modified in that the vegetation within the 587-acre ground field is maintained to keep growth below six feet tall in order to obtain the best signal strength for communications.

The Undeveloped Area includes everything outside of the administrative and operational areas. It encompasses approximately 3,836 acres and is managed for forestry, wildlife, and outdoor recreation purposes. Open space areas are located generally toward the western portions of the installation, including a substantial area encompassing the Twin Lakes system.

U.S. Forest Service lands - Within the installation boundary, 958 acres are U.S. Forest Service land, administered by the Mount Baker-Snoqualmie National Forest (Figure 1). The Navy received a special use permit in 1949 from the Forest Service to operate on these lands (Appendix E). The land used under special use permit includes approximately half of the land comprising the antenna transmitting system and about 396 acres within the ground field.

2.1.2 Regional Land Uses

Surrounding lands are used primarily for commercial timber harvest, with timber sale area boundaries and clear cuts often bordering the installation (Figure 1). Rural farms and residential developments also exist nearby, primarily north and west of the installation.

Jim Creek, which flows through the installation, is a tributary of the South Fork Stillaguamish River, within the Stillaguamish watershed. The main stem Stillaguamish River is the fifth large tributary flowing into Puget Sound and the watershed drains an area of approximately 700 square miles. The watershed is recognized as an important salmon producer and supports eight salmon and trout species.

Main stem Jim Creek downstream of the installation is classified as Conservancy Shoreline per the Washington State Shoreline Management Act (RCW Chapter 90.58). Conservancy Shorelines are intended to be maintained in a near natural state and are afforded a high level of protection against uses and developments that may negatively impact their ecological function and aesthetic qualities.

2.1.3 Abbreviated History and Pre-Military Land Use

Native Americans; The Stillaguamish Tribe - The Stillaguamish Tribe is composed of descendants of the Stoluck-wa-mish River Tribe. In 1855 the Tribe resided on the main Stillaguamish River, as well as on the North and South forks. The name Stillaguamish, under

various spellings, has been used since around 1850 to refer to those Indians who lived along the Stillaguamish River and camped along its tributaries. They were a party to the Treaty of Point Elliott of January 22, 1855 (NWIFC, 2016).

NRS (T) Jim Creek is within the aboriginal territory of the Stillaguamish Tribe (Iverson et al., 2001 citing others). The Stillaguamish Tribe (also historically known as the Stil-la-qua-mish, Sto-luckwha- mish, Stolucwamish, and stulagwábc) claimed the entire Stillaguamish River basin, from its headwaters to its mouth, as their home territory. Historical records indicate that there were 26 villages and camps along the Stillaguamish River and its tributaries (Stell, 2013). The name of the Stillaguamish means "people of the river" (Iverson et al. 2001, citing others).

The Stillaguamish were Salishan speakers that lived in winter houses on the banks of the rivers, and on at least one place on the South Fork of the Stillaguamish River. A permanent village was located near the confluence of Jim Creek and the South Fork Stillaguamish River (Stell, 2013).

The Stillaguamish regularly traveled to the areas around the Upper Forks of the Stillaguamish River and their tributaries, including Jim Creek, to hunt upland game and gather plants. Stillaguamish groups poled up the Stillaguamish River each year to establish seasonal camps at Arlington and other places above the confluence of the North and South Forks (Iverson et al. 2001, citing others). The Stillaguamish Tribe was economically oriented toward salmon fishing (Tweddell, 1974). Salmon were important as food, as were seasonally available food plants such as berries and roots. According to Baenen (1981) Jim Creek and Blue Mountain were popular places to hunt deer and elk, and bracken fern was collected on Jim Creek.

In addition, the NRS(T) Jim Creek property is known to contain at least one cedar peel tree. Cedar bark is durable, flexible and water resistant. It is peeled from trees with straight trunks by making a single horizontal cut and pulling the bark upward from the trunk. The bark fibers have been used by Native Americans for clothing, mats, baskets, and other items. Protocols for gathering during the correct season, methods for gathering, and ways to honor the tree are still practiced. Cedar peel trees are rare and are significant within the Stillaguamish culture.

Pre-military use and history: Pre-military use of installation lands and the surrounding area was commercial timber harvest. The first "modern" incursion into the area now occupied by the installation was in the early 1920s, when loggers sought to harvest the large expanses of old growth western red cedar, Douglas fir and Sitka spruce (Iverson et al., 2001). The area was logged extensively by Soundview Pulp Company, a predecessor to Scott Paper Company.

In the 1940s, the Navy began planning the NRS(T) Jim Creek VLF radio transmission facility. The construction was deemed necessary in order to better communicate with the submarine fleet in the Pacific. While initially envisioned as a temporary facility, NRS(T) Jim Creek would end up in permanent service after another VLF facility under construction in Hawaii encountered technical problems. The Navy procured land from the U.S. Forest Service (via special use permit),

private paper companies, and private land owners and eventually acquired enough land for the radio transmission facility and support structures.

Logging continued within the installation boundary after the Navy took ownership in the 1940's. Many of the roads that are presently used throughout the installation are legacy roads originally constructed to access timber.

In the 1950s the installation was staffed by roughly 150 on-site personnel with housing, dining, recreation and working facilities. Over time, staffing and the need for support functions decreased and are now consolidated with NSE. As of 2017 there is no housing on the installation and there are 35 full time staff; mostly Department of the Navy (DON) civilian employees and a few service members.

2.1.4 Mission Operations and Activities

Mission-related activities include maintenance of the antenna array and its towers, cables and ground field copper wires; vegetation maintenance within the ground field; and road maintenance for access to the towers and ground field. Activities can include aerial antenna cable replacement, ground field wire repair, vegetation cutting and herbicide treatment, tower painting; and road grading and culvert replacement.

The antenna field area was cleared around 1951 and much of the valley floor was significantly altered in order to install the narrow gage copper conduit which functions as the ground field, as well as supporting facilities (Figure 2 and 3). At a later time, another 2500 feet of main stem Jim Creek were relocated to the southwest side of the valley floor, the channel straightened, and the banks reinforced with riprap.

Figure 2. Initial grading for public works area, approximately 1951.

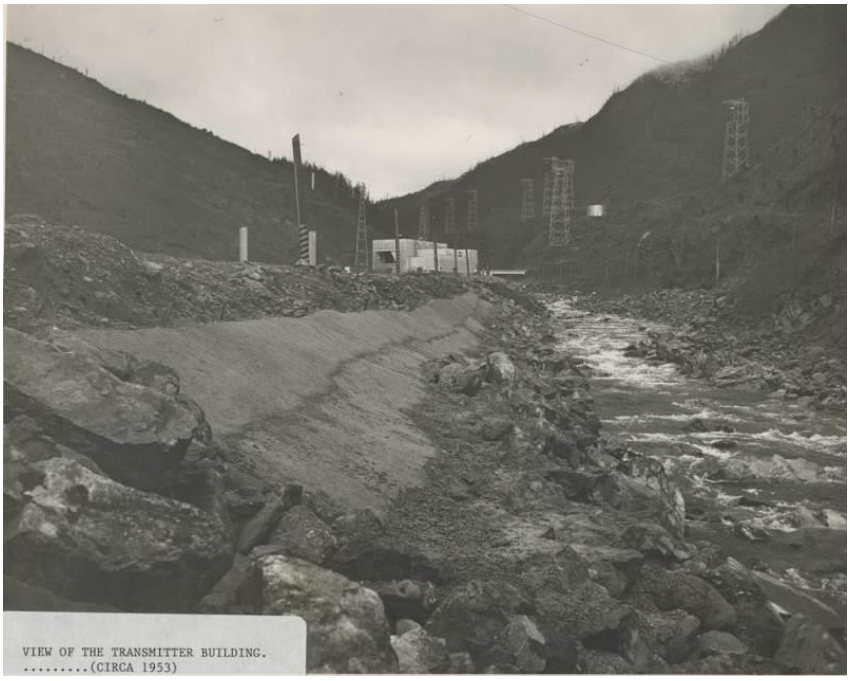

Figure 3. Berm created along Jim Creek during construction. Looking southeast (upstream).

The antenna array is suspended across the valley between Wheeler Mountain (elevation 3,200 feet) to the north and Blue Mountain (elevation 2,900 feet) to the south. Wheeler and Blue Mountains, with their extremely steep slopes, create a natural bowl shape ideal for the antenna system. The cables attached to the towers on Blue and Wheeler mountains are suspended about 1000 feet above the valley floor. Jim Creek flows northwest between the two mountain ridges.

The ground field contains about 325 miles of copper wire installed in a grid pattern across the valley floor, radiating out from the transmitter building (B1). Portions of the ground wire grid lie directly on the ground, and parts of it are buried a few inches below the surface. The wires are suspended across Jim Creek above the water surface (Figure 4).

Figure 4. Antenna wires extending across Jim Creek within operational area.

Antenna System Maintenance - Routinely controlling vegetation and maintaining the ground field are required for effective and efficient operation of the radio transmitter in order to provide continuous, reliable broadcasts. A vegetation management study was conducted for the Navy in 1960 and since that time there has been an on-going maintenance and vegetation management program.

Vegetation growth has a direct effect on transmitter performance. Tall vegetation absorbs transmitter energy and as a result more electrical power is required to maintain the required radio signal strength. The objective of vegetation control is to keep brush under six feet in height. Vegetation is controlled using several methods and follows an Antenna Ground Field Vegetation Management Plan specific to the installation.

Manual Treatment: Manual control involves the use of chain saws and other hand-held equipment. Vegetation is typically cut at ground level and left in place, hauled (by hand) to designated stockpiling areas for chipping, or disposed of at a designated site.

Herbicide Application: Occasionally Garlon 3A® (triclopyr) is used. Application includes ground and aerial methods. The herbicide applications target specific plant species, including woody stem and broadleaf herbs that grow prolifically. The timing, method, and rate of herbicide application are performed in accordance with Best Management Practices (BMPs), applicable federal and State laws and regulations, and manufacturer's label information as specified in the Antenna Ground Field Vegetation Management Plan.

On lower slopes between the lower tower sets and along roads herbicide is applied with backpack sprayers or truck-mounted sprayers. Direct application of herbicide to cut stems and stumps occurs throughout the ground field and is a focused effort on Wheeler Mountain, targeting Scotch broom, an invasive weed. The direct herbicide application occurs immediately following cutting (within approximately one hour) to maximize effectiveness.

Aerial herbicide application occurs in the late summer or fall about every three to five years and is a targeted effort to treat Scotch broom on Wheeler mountain. Due to the steep terrain and the need to fly under the antenna wires, only helicopters can be used. The terrain, physical obstacles (i.e. antenna wires and towers), and several small streams that must be avoided limits the amount of area available for aerial spraying so that it is limited to the steep upper slopes. Garlon 3A® (triclopyr) is the only herbicide used in aerial applications.

As part of every aerial spray event, water quality sampling is performed before, during, and after the treatment at established sample sites. This is required in the installation's Antenna Ground Field Vegetation Management Plan, an Environmental Assessment (U.S. Navy, 1997), and ESA consultations. Water quality parameters (temperature, pH, etc.) are measured as well as levels of residual tryclopyr. Samples indicate residual tryclopyr levels are several orders of magnitude below toxic levels after the spray event (reports on file, PWDE Environmental Division). Additionally, potential impacts to ESA-listed species are considered prior to herbicide use.

Other BMPs identified in the Vegetation Management Plan related to aerial treatment are:

- Apply during appropriate weather conditions: no precipitation, low wind velocity, and no air inversion in target area.
- Avoid applying during hot dry weather which increases the risk of herbicide volatilization.
- Use drift-reducing nozzles and reduce pressure to produce course droplet size.
- Use an agriculturally labeled drift control additive or thickening agent to the mix.
- Spray boom should be no longer than ¾ of the rotor length.
- Nozzles must always point backwards parallel with the air stream and never pointed down more than 45 degrees.
- Apply at lowest height above ground as possible without compromising safety.
- Clearly delineate spray area boundaries and use GPS navigation to ensure application only to target area.
- Establish and mark 100 foot buffers around sensitive areas such as creeks and streams.

Ground wire grid maintenance involves the repair and replacement of wires within the ground field. The copper wire grid was installed more than half a century ago and over time wires have become brittle and broken as a result of exposure, landslides, erosion, trampling, and other forces. The wire grid in the ground field must be inspected and damaged wires are difficult to detect if hidden beneath dense vegetation.

Dedicated powerline - The installation has a dedicated powerline originating in Arlington, WA and terminating at a substation on the installation. As with any commercial powerline, the powerline corridor is kept clear of vegetation that could impact power transmission function, potentially damage poles or powerlines, or impede access to the poles and lines for maintenance. On the installation, the cleared powerline corridor is just over one-mile long.

Antenna Tower Maintenance - The maintenance and repair of suspended antenna cables require that the cables be lowered to the ground. Consequently, vegetation has been cleared below each tower to create corridors to allow access to the lowered cables on both Blue and Wheeler Mountains. These cleared corridors are maintained to prevent growth of tall vegetation and to provide ease of access to towers and cables for maintenance.

Tower painting takes place about once every 10 years as needed. Rust and old paint are chipped, blasted, or scraped off and suitable paint coatings are applied. Since the 1970s paint materials used on the installation have been required to be lead free, but paint applied earlier did contain lead. An analysis of the existing tower coatings is performed each time the towers are painted to determine lead content prior to paint and rust removal. Containment and capture of the removed rust and

paint materials is required by PWDE Environmental Division, and the material is disposed of as hazardous waste in an appropriate and approved manner.

Fording Jim Creek – The heavy equipment that transports spools of cable wire is too wide to cross the bridge on Jim Creek (#43), and structurally the bridge cannot support the equipment. Options are to access the towers from surrounding roads off the installation, or to ford Jim Creek with the equipment. Fording has occurred in the past, but the recent preference has been to find alternate routes off the installation because restrictions are imposed on fording. Proposed fording requires coordination with the NRM and is limited to one crossing; over and back. Fording should only occur between 1 July and 15 August, the in-water work window established by the U. S. Army Corps of Engineers (USACE) to protect ESA-listed fish species.

Roads and road maintenance - The history of road construction in the area likely dates to the late 1920s when much of the land was logged for the first time (Iverson et al., 2001), and from the late 1940s when NRS(T) Jim Creek was established. Many of the roads used today were originally constructed to reach merchantable timber for harvesting.

NRS(T) Jim Creek has paved and unpaved roads. The four miles of paved roads are in the developed administrative area. These roads are more frequently used than those within the operational area but require less maintenance.

The over 40 miles of unpaved roads require continual maintenance. They provide access to the ground field, antenna towers and power lines (Twin Lakes and campgrounds are also accessed via unpaved roads). Work on these roads includes surface graveling, grading, ditchline cleaning, removal of fallen rocks and small landslides, road failure repairs, and culvert maintenance and replacement.

Many of the unpaved roads intercept small natural springs and surface drainage; creating continual maintenance challenges. Surface water management gained through properly graded road surfaces, functioning drainage ditches, and culverts is an important focus of road maintenance. In addition, there are several large rock outcrops that periodically release boulders downslope onto roads. Some locations continually unravel, depositing rocks, soil and debris onto the road surface that requires removal. Intercepted water that collects in roadside ditches, water pooled on road surfaces and standing water resulting from plugged culverts can seep into the road surface and into the permeable subgrade under the road prism, saturating the road and creating potentially unstable conditions and road failures.

There is a mile-long native surface road adjacent to Jim Creek which was used by the antenna maintenance crew to access hillsides for vegetation treatment and copper wire ground field maintenance. A section of this road has been eroded by main stem Jim Creek to the point that it failed completely and the road is not passable. In addition, this creates a continual source of sediment input to Jim Creek.

On Wheeler Mountain, to further control runoff, reduce erosion on steep slopes, and reduce damage to roads and antenna system components, a system of concrete-lined road ditches and catch basins was installed.

Maintenance activities require the use of heavy equipment, such as road graders, bulldozers, and backhoes. Road grading and roadside ditch maintenance can cause sedimentation in streams unless care and BMPs are employed. Road grading and ditch maintenance BMPs include:

- when possible, conduct road grading and earth moving during dry periods of the year;
- use silt fence to control soil erosion and deposition of sediments into streams;
- use jute matting/sod or re-seed ditches and bare dirt areas immediately with a native grass mixture;
- cover soil piles if left for more than two days during the wet season, seven days during the dry season;
- when grading large areas: create temporary sediment traps or ponds and direct runoff into them;
- use temporary check dams when working in ditches around streams: use straw bales, silt fences, rocks to slow velocities and trap sediments;
- install permanent check dams in long ditches to slow runoff velocities and minimize erosion.

Culverts and Culvert Maintenance **-** There are culverts in the roads on NRS(T) Jim Creek of various sizes that conduct streams, road ditch water, and surface runoff under the installation's roads. Most of the culverts are on the steep slopes of Blue and Wheeler Mountains. Fish passage is not an issue due to the inaccessibility of the streams (because of the steep gradients and small channel sizes), however properly functioning culverts contribute to overall hydrology and flow patterns within the watershed. Continuous effort is made to route water away from roads and antenna towers via culverts, roadside ditches, and on Wheeler Mountain, through a series of constructed concrete canals. Indicating the scale of hydrologic alteration, a NAVFAC Department of Public Works inventory identified 233 culverts on the installation, or roughly five culverts per road mile.

Almost all culverts are corrugated metal pipe, in diameters ranging from 12 to 36 inches. Replacement culverts are generally corrugated or smooth-walled HDPE plastic. There are several old wooden culverts that may have been installed when the area was first logged. When replaced, the new culverts are generally larger diameter. The replacement, repair and maintenance of culverts can deliver sediment downslope and eventually into streams unless proper assessments, designs, and BMPs are implemented.

The discharge ends of some culverts on Wheeler and Blue Mountains spill the water onto the slopes below. This returns the water to an unmanaged overland and subsurface flow where it can

exacerbate surface erosion and saturate unstable ground. Rock placement at the discharge end has been used to alleviate or lessen this situation.

Culvert BMPs include:

- when possible, repair or replace culverts during dry periods of the year;
- divert flowing streams around the repair site: use temporary splash blocks or other methods to dissipate energy and minimize erosion;
- use silt fence to control soil erosion and deposition of sediments into streams;
- use jute matting/sod or re-seed bare dirt areas immediately with a native grass mixture;
- use a culvert diameter that is wider than the natural bank-to-bank width immediately adjacent to the culvert location;
- set culvert grade to match the natural streambed grade, or, on steeper stream grades, set the culvert at a lower grade (to slow velocity);
- keep debris out of culverts and away from the upstream end of the culvert.

Hazard tree removal - Hazard trees can occur along roads, within campgrounds, and in other areas where people and equipment are exposed to risk from a falling tree. Individual trees that pose a hazard to personal safety and road access are cut down. Coordination with the NRM and Region Forester is required prior to hazard tree removal actions in order to evaluate the trees and verify they pose a risk, determine merchantable timber value, and to evaluate trees for potential marbled murrelet (*Brachyramphus marmoratus)* nesting habitat. Hazard trees can occur within the USFWS-designated critical habitat for marbled murrelets, so consultation under the ESA may be needed.

Transmitter building cooling water - Small surface channels on the steep slopes of Blue Mountain provide cooling water to the transmitter. Surface water is collected in a series of gated catchments and piped to a storage tank. From this tank the untreated water is metered into Building 1 where a no-contact heat exchange process takes place to cool the transmitter. The water is then routed out of the building and discharged into a constructed infiltration pond near Flats Road, where it soaks into the ground upon NRS(T) Jim Creek. The discharged cooling water does not return directly to Jim Creek.

NSE received a National Pollutant Discharge Elimination System (NPDES) permit in 2015 for discharging the cooling water. Monthly discharge monitoring, temperature monitoring, a quality assurance plan for the monitoring and other items are required. Effluent (temperature) limitations were established in the permit. This project is the subject of on-going evaluation and consultation with the EPA in order to determine if modifications to the project are required or if additional monitoring is warranted. The PWDE environmental engineer at NSE in charge of water quality is responsible for administering and ensuring compliance with the NPDES permit.

2.1.5 Non-Mission Activities

Land Navigation Training - U.S. Marines from Naval Air Station Whidbey Island, U.S. Marine Reserves, the National Guard, and other military units conduct land navigation, orienteering and other types of field training exercises on the installation. Training can take one day or multiple days; generally three to four. Forty to eighty individuals participate in the training drills. The training units use established campgrounds and other MWR facilities. Training can occur on any part of the installation outside of the operational area. No ground disturbance or land alterations occur, vehicles use existing roads, and the training exercises are conducted on foot. The NRM should be notified prior to training exercises, to ensure no specific natural resource protection measures are needed.

Morale, Welfare and Recreation Outdoor activities - Much of the installation is undeveloped and supports an active outdoor recreation program. As part of CNIC's Fleet and Family Readiness, the MWR program operates all aspects of recreational at NRS(T) Jim Creek. MWR creates and manages recreational programs and is also responsible for housekeeping and maintenance of the cabins and lodge, and trash pick-up at the campgrounds and picnic areas.

A "Five Year Recreation Plan, Fiscal Years 2004-2008," developed by MWR, is the most current recreation plan on record. This plan requires an update to take into account the recreation development that has occurred in the following years, and to project potential recreational development into the foreseeable future.

Campgrounds, cabins, picnic areas, and other amenities are located in the developed administrative area (Appendix F). Hiking trails, boating and fishing are about six miles from the main area, at Twin Lakes, and are accessible via a gravel road.

Amenities include:

- trails and roads for hiking and mountain biking (nearly 12 miles total)
- tent campsites
- hike-in campsites
- RV sites
- cabins
- a picnic pavilion
- a lodge with kitchen, dining and living rooms that can accommodate up to 56 people
- off-leash dog park

From the early 1990s to the present, recreational use on the installation has increased from a few thousand to as many as 40,000 visitors annually. Visitor use fluctuates seasonally and is highest during the summer and on weekends and holidays. There can be 200-700 people on site daily in summer and fewer than five people daily during the winter (November to February). From two to

twelve MWR employees work on the installation, with seasonal staff coming onboard from March to September.

Camping - With the exception of three remote campsites, all campers have access to toilets, either portable units with holding tanks that require pumping out or flush toilet facilities that discharge to a septic system. Drinking water is available at all campgrounds except the remote campsites.

Regulations prohibit washing dishes in streams and lakes, and injuring or destroying plants and animal life.

Cutting personal firewood is prohibited. Firewood is provided by MWR for a fee, and comes from a local firewood vendor, purchased by MWR for resale.

Bicycling - Mountain biking is allowed on the Twin Lakes Road, Blue Mountain Road, Upper Equipment Road, and Lower Equipment Road. Bicycling is allowed year-round, weather permitting.

Hiking/Snowshoeing/Skiing - Designated hiking trails are open year round, weather permitting. Snowshoeing and cross-country skiing are available during the winter, but lack of adequate snow levels and suitable areas limits the demand for these activities.

Off Road Vehicles (ORV) - Recreational ORV use is not allowed at NRS(T) Jim Creek. Such use would create soil erosion concerns and unacceptable increased noise levels, and could interfere with other recreational and mission activities.

Snowmobiling - Snowmobiles are not allowed on the installation for security reasons, and due to a lack of consistent snow pack.

Wildlife Watching and Photography - Bird watching, wildlife watching, and photography are recreational activities enjoyed by many visitors and generally have minimal impact to natural resources.

Boating - Rowboats, canoes, and kayaks are available for rent through MWR for use on Twin Lakes. Boats are only allowed on Twin Lakes, and are prohibited on Jim Creek, Cub Creek Reservoir, and Lake La Barge.

Only boats rented at NRS(T) Jim Creek from MWR are permitted on the lakes. Boats, motors, and flotation devices brought from outside the installation are strictly prohibited due to the potential for introduction of unwanted, invasive species, such as European water milfoil into the lake system. Visitors arriving with personal boats are required to leave them at the front gate.

Swimming - Swimming is not allowed in any of the waters at NRS(T) Jim Creek due to a lack of funding for lifeguards, and potential conflicts with fishing at Twin Lakes.

Pets - Pets are allowed on the installation, but they must be kept on a leash at all times. The exception is that MWR has developed an off-leash dog play area near the lodge. Pets running loose pose a risk to wildlife and other recreationists, and can become lost or injured.

Recreational Drones - Drones or unmanned aerial craft, regardless of size, are not permitted at NRS(T) Jim Creek. The use of drones will be reported to Security.

Hunting Program - In the past, hunting was allowed at NRS(T) Jim Creek for deer, coyote, grouse, and duck. The hunting program was ended in the 1990s due to safety and security concerns.

When hunting was allowed, the installation was divided into 13 hunting units for deer and coyote. Duck hunting was limited to the Upper and Lower Twin Lakes and the Cub Creek reservoir. All hunters were required to possess a valid Washington State hunting license, transport tag and deer or migratory waterfowl stamp, and a hunting permit issued by the installation.

With proper planning, engagement, staffing, and support of NSE, NCTAMS, MWR, NRS(T) Jim Creek Security, and PWDE Environmental Division it is feasible to re-establish a hunting program. This would require a NSE instruction detailing all aspects of such a program including prudent controls and limitations. In addition, an MOA with MWR would need to be established concerning the collection, management and distribution of funds in a manner consistent with the Sikes Act. Availability of adequate staffing for oversight and management of a hunting program would need to be verified before a program could be implemented. The program would be required to follow WDFW hunting regulations and be at least as restrictive as those regulations. The issuance of an installation-specific hunting permit and payment of fees would need to occur consistent with the Sikes Act. Also, the Stillaguamish Tribe must receive an invitation to engage in Government-to-Government consultation prior to the establishment of a hunting program. They have tribal treaty rights related to hunting and have expressed interest in hunting on the installation in the past.

Fishing Program - Recreational fishing occurs in the Twin Lakes system, in Upper and Lower Twin Lakes and the Cub Creek Reservoir. Fishing is not allowed in any of the streams on the installation.

The Twin Lakes system is stocked with catchable-size Rainbow Trout. The lakes are stocked six times per year with 1200 fish each time. Fish stocking extends from March through August. Native Cutthroat Trout can be caught in the lakes as well.

Anglers are required to follow Washington State fishing regulations and possess a State fishing license. In addition, anglers must purchase an installation fishing permit from MWR.

The purchase of a special fishing permit, and the collection and expenditure of the fishing fee is required to be conducted in accordance with Sikes Act regulations. This fee helps pay for the stocked fish that sustain the fishing program.

The fishing program at NRS(T) Jim Creek is strictly a put-and-take fishery operated by MWR and is not part of a larger fish management program within the NAVFAC NW Natural Resources program; its only purpose is to provide a recreational fishing opportunity. Most of the proceeds go back into supporting the continuation of the program. In this situation, a separate MOA with MWR is not necessary.

Wind evaluation for future wind energy project - The Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC) is assessing the feasibility of establishing a utility scale wind farm at NRS(T) Jim Creek in order to support the National Defense Authorization Act of 2010 which requires DoD to produce renewable energy equivalent to 25% of facility energy (electricity) by Fiscal Year 2025.

As an initial step, NAVFAC EXWC studied the wind characteristics at NRS(T) Jim Creek for two years. Passive wind data collection equipment was installed in 2015. A meteorological (MET) tower was placed on Wheeler Mountain and light detection and ranging (LiDAR) equipment was deployed on both Wheeler and Blue mountains to collect data on wind direction and speed.

Installation of the MET tower on Wheeler Mountain required clearing all trees from an eight-acre area to accommodate the equipment. A clearcut in second and third growth timber was created and merchantable timber was sold through a timber sale administered by the Region Forester. No tree clearing was needed at the Blue Mountain study site because an old logging road was used for the site that provided adequate clearance.

Prior to siting the MET tower, potential locations were evaluated to avoid removal of trees potentially containing suitable nest habitat for marbled murrelets, and to avoid sensitive wetland environments.

In 2015, areas near preliminary, tentative wind turbine locations were evaluated for possible wetland conditions (Report on file, PWDE Environmental Division). Areas exhibiting wetland-like conditions were found near most locations. A more thorough wetland delineation is needed should the project go forward.

2.1.6 Natural Resources Constraints and Encroachment

Given the nature of the mission, there are no areas where natural resources create conditions or restrictions that constrain present mission activities. Mission operations are concentrated in one

area on the installation and are limited to transmitting via VLF radio signal. Widespread military training does not occur; only occasional land navigation and orienteering exercises, which are conducted by individuals on foot using existing roads, with no alterations to the landscape.

2.1.7 Opportunities

Because of the undeveloped character of most of the installation, many acres are potentially open for low-impact training and other temporary military events that are similar in scope to those described above. There are little or no restrictions on lands available for training of this type, aside from the designated marbled murrelet critical habitat, and areas around streams and wetlands.

2.1.8 Other important requirements and conditions

Depending on the action, the following restrictions and conditions apply to individual projects, maintenance work, and other activities. These are important for hazard tree cutting, road work, bridge repairs, powerline repairs, MWR-sponsored activities and development, and proposed projects by non-mission essential programs (e.g., NAVFAC EXWC/Energy program wind study). These measures are very important for natural resource protection, but do not constrain the day-to-day mission operations.

In-water work windows – Work proposed in or near streams requires authorization from the United States Army Corps of Engineers (USACE)because streams on the installation are considered "waters of the U.S." and thus are under USACE jurisdiction. The USACE establishes in-water work windows in order to protect ESA-listed fish species. For Jim Creek and its tributaries, the work window is 1 July – 15 August.

Marbled murrelet breeding season – Marbled murrelets are protected under the Endangered Species Act and occur in the Twin Lakes vicinity. Nesting is generally considered to begin as early as 1 April, extending to 23 September (USFWS, 2012). Activities that can potentially disturb the nesting birds must be avoided during this time. The nesting habitat is not within the military mission operational area; restrictions to protect marbled murrelets and their nesting habitat have not constrained mission activities.

Marbled murrelet designated critical habitat – In 1996, the USFWS designated 1840 acres of forest land at NRS(T) Jim Creek as critical habitat for the marbled murrelet (61 FR 26256). The designated critical habitat is not within the military mission operational area and this designation has not constrained mission activities (Figure 5).

No actions should be contemplated within the designated critical habitat without first consulting with the NRM to determine if consultation with USFWS under the ESA is needed. Additionally, suitable nesting habitat may exist elsewhere on the installation outside the boundary designated by USFWS. For this reason, actions anywhere on the installation involving elevated sound levels and

alterations or removal of trees need to first be evaluated for effects to marbled murrelets and habitat in consultation with the NRM and possibly the USFWS.

Stream channels – Installation streams provide habitat for fish and other aquatic organisms. Downstream of the installation, Jim Creek is federally designated as critical habitat for several fish species. Streams on the installation contribute to the water quality of Jim Creek downstream. For these reasons, streams should not be entered, altered or otherwise modified in any way. Stream channels are not available for training or other activities.

Stream and wetland buffers – Establishing streamside and wetland buffers protects the condition and function of streams, riparian areas, and wetlands and the organisms they support. Buffers at NRS(T) Jim Creek are described in Section 4.13.1 Fish Habitat. Actions proposed within these buffers require evaluation in coordination with the NRM so that adequate protection of riparian areas and wetlands can be provided.

Encroachment - Encroachment by commercial timber harvest up to the installation boundary is evident from aerial photographs (Figures 1 and 5). Occasionally, logging companies request, and are granted, access onto the installation to reach private timber land. This is coordinated with the NCTAMS OIC and NRS(T) Jim Creek Security Department so that it does not affect mission activities.

Erosion – Erosion causes slope failures, landslides and road failures, and can threaten the integrity of the antenna towers and impair or temporarily block access on roads. Portions of the installation lands are steep, unstable and prone to slope failure. These areas overlap with the antenna system operational area. These areas are more sensitive to weather impacts (e.g., rain on snow events) than other areas. Also, there is a long history of minor seismic events very near the installation. These events have resulted in minor landslides and road section failures that temporarily block access to the antenna towers and affect the integrity of tower foundations.

Coordination with Natural Resources Manager - Because of the presence of ESA-listed species and their habitat on the installation, proposed projects anywhere on the installation need to be brought to the attention of the NRM in order to determine if there could be effects to ESA-listed species or habitat.

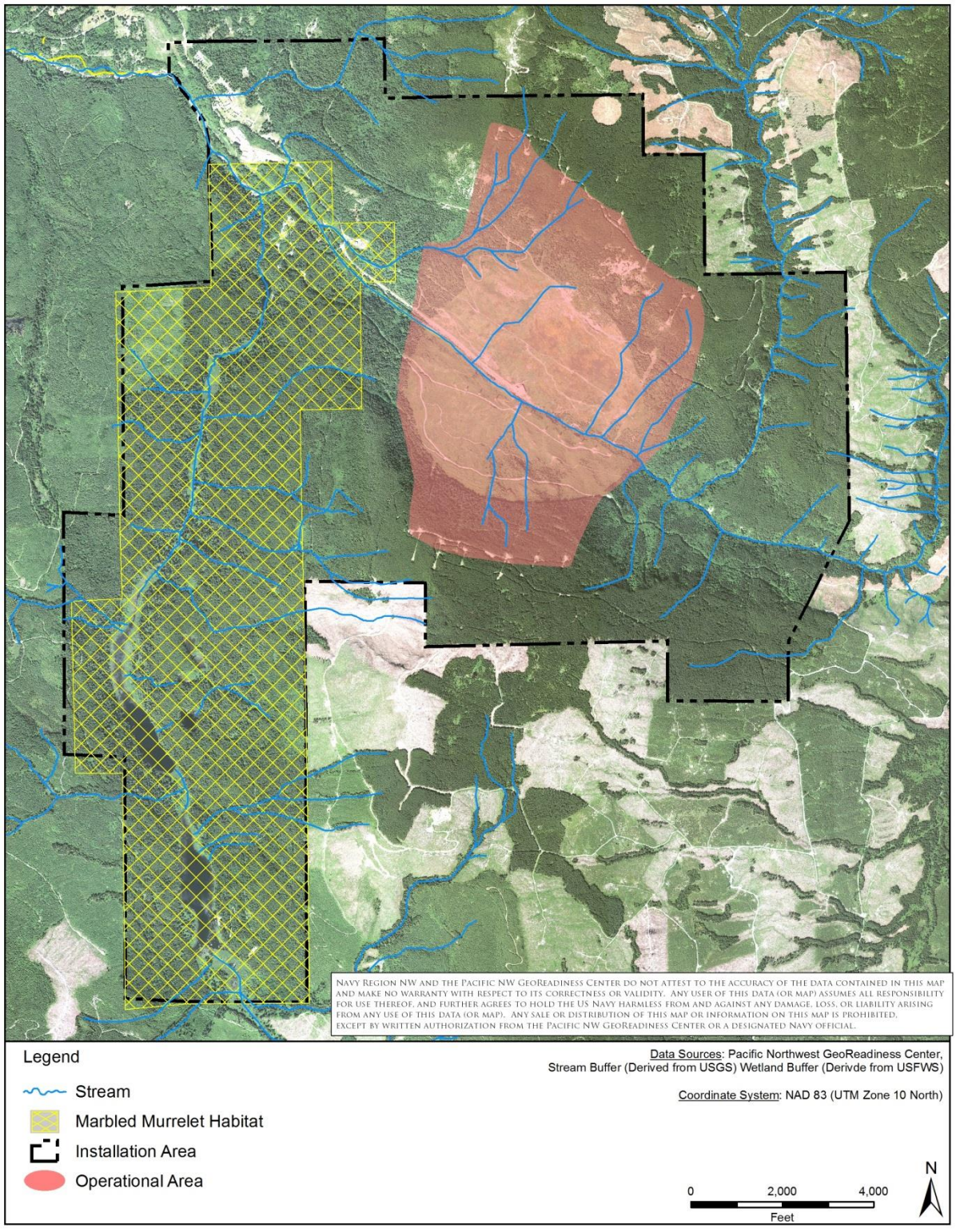

Figure 5. Constraints map; operational area and marbled murrelet designated critical habitat.

2.2 General Physical Environment

The installation encompasses two mountains of approximately 3,200 feet elevation (Wheeler Mt.) and 2,900 feet (Blue Mt.) (Figure 6). Jim Creek flows through a valley between them at an elevation of about 420-700 feet. A separate drainage, on the western side of the installation within the Twin Lakes area, occurs at an elevation of about 750 feet. The installation contains undeveloped forest land, lakes, streams and wetlands.

Figure 6. Aerial view of the NRS(T) Jim Creek operational area looking east.

2.2.1 Ecoregions

Several agencies, scientific and planning entities, and non-governmental organizations such as WDFW, the Washington Natural Heritage Program and The Nature Conservancy have adopted ecoregions for landscape-level planning and assessment. Ecoregions provide both ecologically rational and coherent units that circumscribe common habitat types, wildlife species, stakeholders, land uses, and various conservation issues across geopolitical boundaries. Local decisions with regard to preserving biodiversity can be most effective when made within the context of a broader, ecoregional-scale conservation strategy. Ecoregion mapping is based on the U.S. Forest Service ECOMAP framework (Bailey, 1995). The ecoregion concept has been adopted as the standard for Navy Natural Resource metrics and reporting.

NRS(T) Jim Creek is located within the Puget Trough Ecoregion (Figure 7, www.landscope.org). This Ecoregion extends north-south for the entire length of Washington, at elevations ranging from Mean Sea Level (MSL) at Puget Sound up to approximately 2400 feet in the Cascade mountain foothills. Encompassing about 8% of Washington State's area, the Puget Trough Ecoregion is densely populated; home to over 75% of Washington's citizens. The Puget Trough Ecoregion is part of the larger Willamette Valley-Puget Trough-Georgia Basin ecoregion that extends south into Oregon and north into British Columbia (Schaaf, et al., 2006).

Figure 7. Washington State Ecoregions.

2.2.2 Ecosystems

Freshwater Ponds and Lakes - Five named lakes are on the installation (Table 2) that range from approximately two to thirty-five surface acres.

TABLE 2. LAKES AT NRS(T) JIM CREEK.

Lake	Estimated Size (acres)
Upper Twin Lake	35
Lower Twin Lake	29
Cub Creek Reservoir	3
Lake LaBarge	3
Chain Lakes	2

There are no official bathymetric surveys of the lakes. However, surveys conducted in 1955 by the Washington Department of Game found a maximum depth of 36 feet for Upper Twin Lake and 38 feet for Lower Twin Lake.

In 2016, the lake system (Upper and Lower Twin, and Cub Creek Reservoir) was surveyed specifically for fish species composition (Garrett and Spinelli, 2017). This survey provided evidence of the importance of the lake system and beaver pond habitats to the Salish Sucker, a bottom-dwelling fish species that is a subspecies of the Longnose Sucker. The survey results indicated that macroscale habitat features, especially the multiple beaver dams and associated deep pools, in-stream vegetation and reduced flow, are key in maintaining the population of the Salish Sucker in the lake system. The unique nature of the protected, natural, undeveloped lake system creates a "hotspot" for the Salish Sucker in Washington state (Garrett and Spinelli, 2017).

Freshwater Riverine System **-** The NRS(T) Jim Creek installation is within the Stillaguamish watershed (Figure 8). The Stillaguamish River is the fifth large tributary flowing into Puget Sound, draining an area of approximately 700 square miles. The river has three main branches: the Lower Main Stem, North Fork and South Fork. Jim Creek is a tributary to the South Fork Stillaguamish River, entering the South Fork at river mile 4.4 (Figure 8).

The Stillaguamish watershed is relatively rural and undeveloped compared to other watersheds draining to Puget Sound. Timber harvest is the most extensive land use in the watershed. Key environmental indicators for the Stillaguamish watershed show that priority issues are degradation of water quantity and quality, degradation of floodplain and riparian processes, and degradation of marine shoreline habitat conditions (NWIFC, 2016).

Continued and expanding land use puts pressure on the natural ecology of this watershed, and counters restoration efforts. As of 2013, there were 52,000 residents in the watershed and over half lived outside of incorporated towns and urban growth areas (NWIFC, 2016). Rural residential

expansion, wells tapping groundwater reserves and inadequate forest cover in floodplain areas are some of the factors hindering watershed restoration.

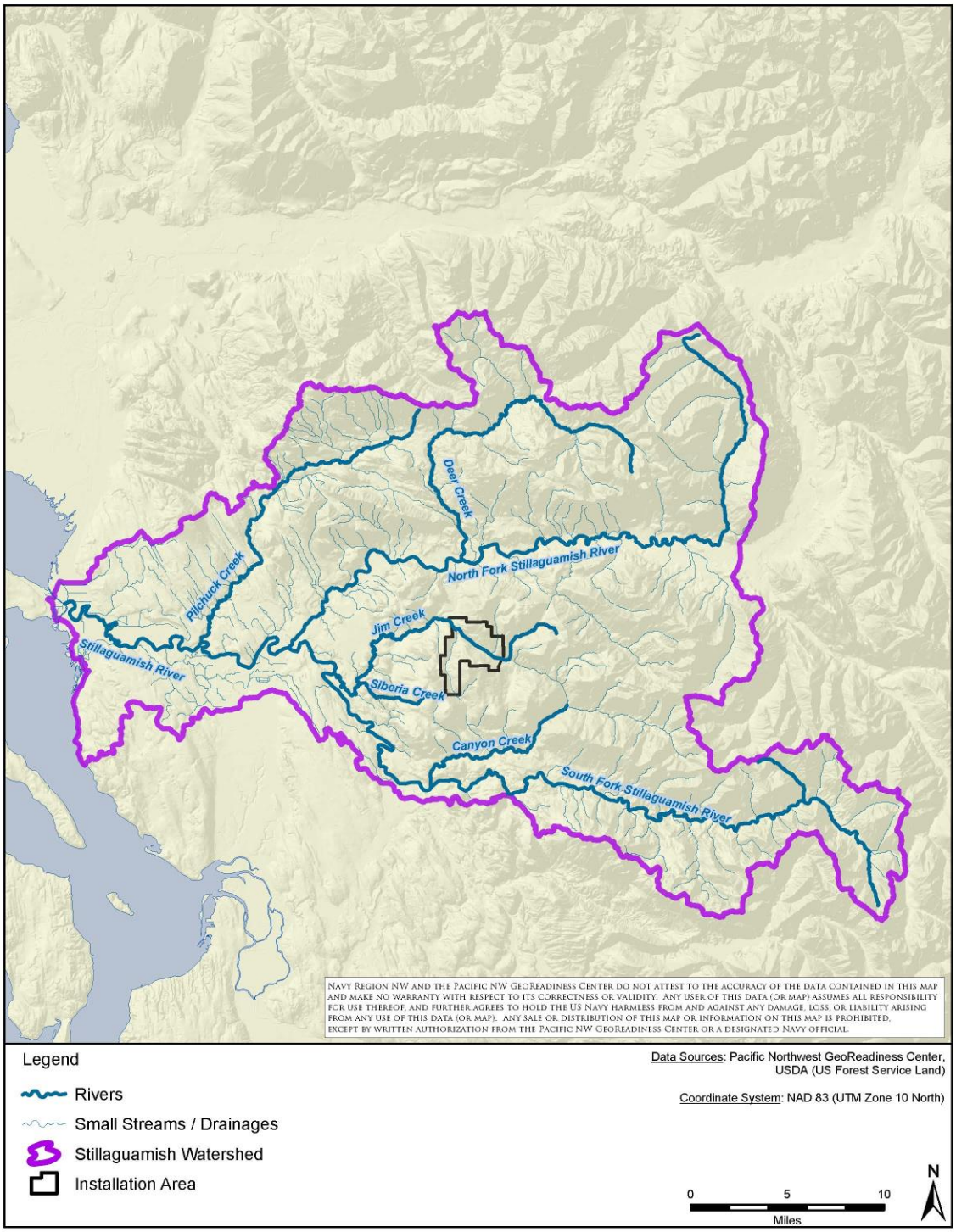

Figure 8. Stillaguamish watershed and NRS(T) Jim Creek location.

Jim Creek - Jim Creek is 14.8 miles long. The upper eight miles of the river are located on and up-stream of the installation. The headwaters originate east of Wheeler Mountain in the foothills of the Cascades.

Stream gradients in the upper reaches of Jim Creek are steep, with numerous cascades and small falls. The channel is mostly confined and there are few pools or low-gradient riffles. The stream bottom substrate is mainly rubble-boulder, with some bedrock and limited patches of cobble and gravel deposits. Banks are mainly steep, earth or rock-cut, with vegetation of scattered, low-growing deciduous trees and brush.

In the past, erosion along the banks of Jim Creek on the installation threatened the adjacent road used to access the transmitter building (B1). Starting in 1980-81, and again in 1987-88, approximately 1.1 miles of Jim Creek between the transmitter building and the Jim Creek Bridge were channelized and the banks reinforced with riprap. The north bank in this section was armored entirely, and the uppermost 0.2 mile of the south bank was also armored. The channelization and armoring confines Jim Creek to the toe of Blue Mountain, eliminates natural riparian vegetation and shading, and accelerates water velocity, causing increased erosion of streambanks and downstream reaches.

Downstream of the installation, the stream gradient decreases and the river winds generally southwest for over four miles to the South Fork Stillaguamish River.

There are two main tributaries to Jim Creek on the installation: Cub Creek and Little Jim Creek. There are also three smaller tributary streams locally known as Index Creek, Hatchery Creek and Rehab Creek (Figure 9).

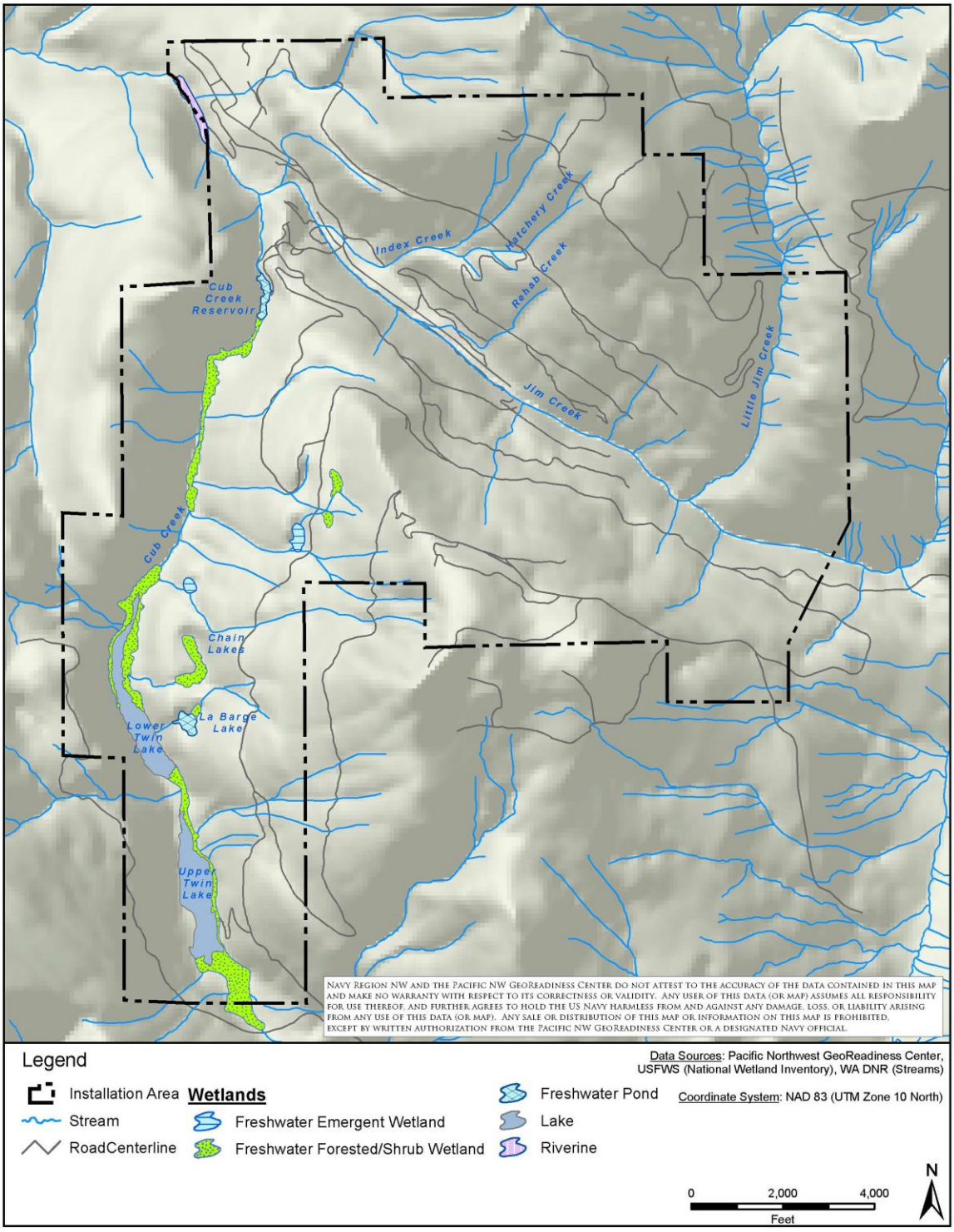

Figure 9. Surface waters and wetlands.

Cub Creek - Cub Creek originates south of the installation on Blue Mountain and enters a large wetland at the southern end of Upper Twin Lake. At the far north end of the Twin Lakes/Cub Creek Reservoir system, Cub Creek discharges out of the reservoir and flows about ½ mile down a high gradient channel before connecting with Jim Creek. This section includes a series of cascades and an estimated elevation drop of nearly 200 feet over a 2000 foot run (Figure 10).

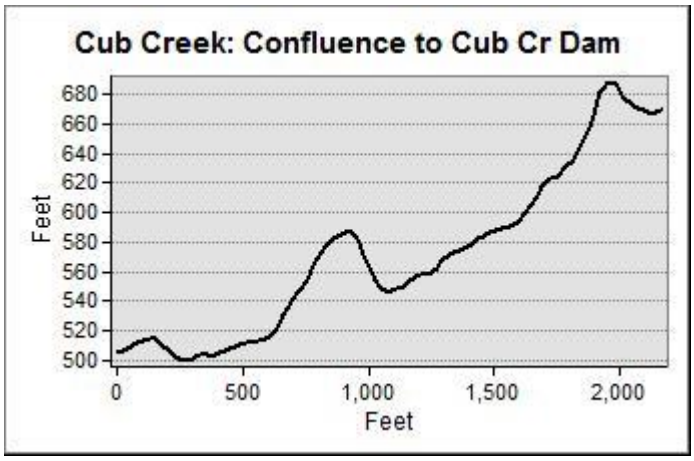

Figure 10. Elevation drop of Cub Creek.

Cub Creek Reservoir was created when a concrete dam was constructed at the outlet in the 1940s (Figure 11). A wooden footbridge crosses the dam, visible on Figure 11. At one time the impounded water was piped to a treatment plant and used as drinking water for the installation. A groundwater well now provides drinking water. The dam at the outlet of the Cub Creek reservoir is approximately 25 feet wide and is located at an elevation of approximately 690 feet. The dam was designed with a concrete pool and weir fish ladder alongside the spillway. However, due to the steep gradient of Cub Creek downstream, fish cannot travel this far upstream; the stream gradient and cascades form a blockage to fish passage. Although the dam no longer serves a purpose from a natural resources perspective, there is no compelling reason to remove it as long as it remains in safe condition and causes no downstream impacts.

Figure 11. Cub Creek dam, forming Cub Creek reservoir.

Little Jim Creek - Little Jim Creek originates in a wetland and lake complex northeast of the installation, near the top of Wheeler Mountain. The creek flows south, enters a steep canyon with high-gradient cascades, and enters Jim Creek on the installation upstream of the transmitter building. Access is very limited as this is a steep drainage and there are no roads or trails near Little Jim Creek.

Index Creek – The WDFW annually conducts Coho Salmon spawning counts in this stream from mid-October to early January.

Hatchery Creek – When in operation, the Coho Salmon rearing facility used water from this tributary in the fish rearing operation. A gravity-feed pipe was installed to bring water from Hatchery Creek into the fish rearing building.

Rehab Creek – At one time, pool habitat was created in this tributary as resting habitat for Coho juveniles. This is a dynamic, alluvial, low gradient area and in the years since the pools were created the main water flow has shifted and no longer flows through the pools.

Wetlands - Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds (EO 11990 - (*Protection of Wetlands*). Indicators of wetlands are hydric soils, hydrophytic vegetation, and hydrologic characteristics (see definitions below). Such characteristics are usually present in areas that are inundated or have soils that are saturated to the surface for sufficient duration to develop hydric

soils and support vegetation typically adapted for life in periodically anaerobic soil conditions (USACE, 1987).

> Hydric soils: soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation.
>
> Hydrophytic vegetation: vegetation that has adapted to living in aquatic environments and that occurs where at least the root zone of plants are seasonally or continually found in saturated or submerged soil.
>
> Hydrologic characteristics: areas that are periodically inundated or have soils saturated to the surface at some time during the growing season, and areas with evident characteristics of wetland hydrology, i.e., where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively.

Executive Order 11990, Protection of Wetlands, requires federal agencies to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

Wetlands and lands exhibiting wetland features exist at NRS(T) Jim Creek and over 160 acres of wetlands have been documented (Figure 9). Wetland classification utilizes a system developed by Cowardin et al. (1979) and the Federal Geographic Data Committee (2013). Fourteen classified wetland systems have been identified at NRS(T) Jim Creek (Table 3), including the five lakes (Upper and Lower Twin Lakes, Lake LaBarge, Chain Lakes and the Cub Creek Reservoir), (National Wetlands Inventory website: https://www.fws.gov/wetlands/index.html).

TABLE 3. NRS(T) JIM CREEK WETLANDS.

Location	Code *	Wetland Type	Area (acres)	% of total
Upper Twin Lake (Fringe to south and east side of Lake)	PSS/EMC	Palustrine	47.64	28
Upper Twin Lake	L1UBH	Lacustrine	24.81	15
Lower Twin Lake	L1UBH	Lacustrine	24.03	14
Lower Twin lake (Fringe north)	PSSC	Palustrine	26.37	16
Lake La Barge	PUBH	Palustrine	2.11	1
Pond (Fringe)	PSS/EMC	Palustrine	0.98	<1
Chain Lakes	PSS/EMC	Palustrine	7.58	5

Wetland (East of north end of Lower Twin Lake)	PEM/UBH	Palustrine	1.6	<1
Wetland (West of Twin Lakes Rd)	PEM/UBH	Palustrine	3.17	2
Wetland (East of Twin Lakes Rd – South)	PSS/EMC	Palustrine	1.21	<1
Wetland (East of Twin Lakes Rd – North)	PSS/EMC	Palustrine	2.11	1
Wetland (South of Cub Creek Reservoir)	PSS/EMC	Palustrine	14.62	9
Cub Creek Reservoir	PUBH	Palustrine	4.78	3
Jim Creek (@ Power Line Easement)	R3USC	Riverine	6.24	4
Total			**167.25**	

*Wetland codes are defined in Appendix G.

Lacustrine Systems include wetlands and deep water habitats: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergent, emergent mosses or lichens with greater than 30% areal coverage; and (3) having a total area exceeding 20 acres. Similar wetland and deep-water habitats totaling less than 20 acres are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 6.6 feet at low water. Upper and Lower Twin Lakes are classified as lacustrine wetlands.

Palustrine Systems are vegetated wetlands traditionally called marsh, swamp, bog, fen, and prairie. It also includes small, shallow, permanent or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers. Many palustrine wetlands are scattered throughout areas with standing water and the forested portions of the installation.

Riverine Systems include all wetlands within channels that have moving water. There is one Riverine wetland located where Jim Creek passes beneath the power line easement.

Wetland Surveys **-** Surveys to evaluate potential wetland presence at high elevation, forested areas on Blue and Wheeler mountains were conducted in 2015 (Report on file at PWDE Environmental Division). Areas exhibiting moisture, soil, and vegetation conditions indicative of wetlands were found near most surveyed locations. A more thorough wetland delineation is required should development be proposed in these areas.

Forest – The forest environment at NRS(T) Jim Creek is important to the survival of the birds, mammals, amphibians and fish considered in this INRMP. The forest is relatively untouched and has not been commercially harvested recently; providing unaltered habitat for many fish and wildlife species. For forested environments, NatureServe uses the U.S. National Vegetation

Classification (USNVC, 2016). NRS(T) Jim Creek forests fall within the following classification levels:

Vancouverian Forest and Woodland division - This division includes forests and woodlands of the lowland, montane and subalpine zones of cool maritime temperate climates of western North America characterized by conifers, broadleaf evergreen trees, and broadleaf deciduous species.

Vancouverian Lowland and Montane macrogroup - This macrogroup covers coastal and inland rainforests at low elevations. These forests and woodlands occur (in part) in the more protected areas of the west-side Cascade ranges. They may also occur on cool temperate lower montane slopes where winter snowpack typically lasts for several months, sometimes referred to as the "rain-on-snow" zone because of the common occurrence of major winter rainfall on an established snowpack. Tall evergreen and broad-leaved deciduous forests occur, dominated by one or a mix of species.

North Pacific Groups - Within the above classification levels, forested lands at NRS(T) Jim Creek are dominated by three North Pacific groups; one where hemlock primarily dominates, one where western redcedar with Sitka spruce dominates, and one where deciduous species such as red alder dominate. Within these three primary groups, multiple vegetation alliances/associations are represented at NRS(T) Jim Creek.

The vegetation overstory is dominated by Douglas fir, with western hemlock generally present in the subcanopy or as a canopy dominant in old-growth stands. Grand fir, western redcedar, bigleaf maple, and Pacific yew are also present. Salal, Cascade Oregon-grape, Rhododendron, Twinflower, and evergreen huckleberry typify the poorly to well-developed shrub layer. Soils are generally well-drained and moisture levels are moderate or well-balanced (mesic) to dry for much of the year.

Existing forests at NRS(T) Jim Creek are second growth timber, mostly 60-90 years old. Most of the acreage was harvested just prior to the acquisition of the property by the Navy in 1949. However, harvest continued so that by the mid-1950s the whole installation had been clear-cut, except for the old-growth timber in the Twin Lakes/Cub Creek corridor. The reforestation of harvested areas has been the result of natural seeding coupled with favorable environmental conditions allowing for successful establishment of new stands of timber. No active reforestation has occurred.

Since western hemlock dominates in areas adjacent to harvested areas, it is the primary seed source. In climatic conditions conducive to its growth, western hemlock produces an abundance of seed which can germinate under a wide variety of growing conditions. Naturally-established stands of hemlock therefore tend to be very dense, often containing more than 2,000 stems per acre

at an early age. Much of Jim Creek's forests are characterized by these naturally generated, dense stands of western hemlock.

There are 126 mapped forest stands on the installation, with eight predominant tree species (Figure 12). Western hemlock is the most common species and is found in 94 of the 126 mapped stands. Big leaf maple is the least common, found in 24 of the mapped stands (NRS(T) Jim Creek 2009 INRMP, tree stand data Appendix VI).

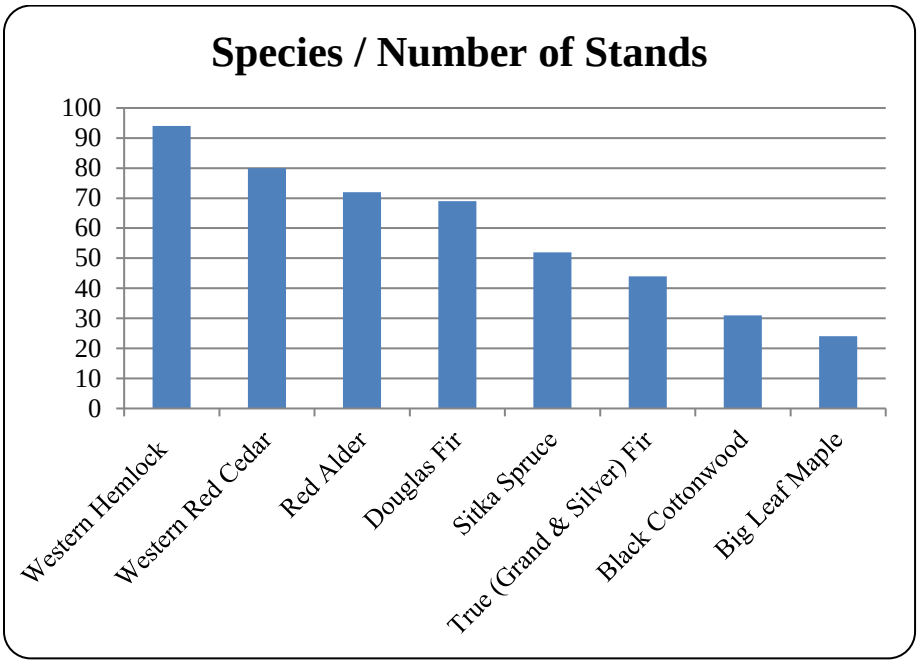

Figure 12. Tree species at NRS(T) Jim Creek (2009 INRMP Appendix VI)

Forest modifications - A portion of NRS(T) Jim Creek's undeveloped, forested land has been modified by the creation and continued maintenance of the 587-acre cleared area for the ground antenna, essential to mission operations. Ongoing brush cutting and periodic aerial spraying to control vegetation affects the natural forest ecosystem by preventing growth of the natural vegetation community.

More recently, the creation of an eight-acre clearcut for placement and operation of wind testing equipment contributed to fragmentation of the forest ecosystem, reduced the total forested area, and decreased the average forested habitat patch size. The lands around the installation have been extensively clear cut, often up to the installation boundary (Figures 1 and 5), making the maintenance of forested lands within the installation even more important to the larger forest ecosystem. Fragmentation of larger forested areas and creation of edge habitat creates situations susceptible to blowdown, which can be further exacerbated by drought due to climate change.

Rare, Vulnerable Forest Environments – Old Growth Forest - NRS(T) Jim Creek contains the only remaining low elevation, old growth Sitka spruce forest in the Northern Puget Trough. This is a unique relic forest of regional and national significance. It extends 2.75 miles in a narrow, north-south band around Twin Lakes and Cub Creek (Figure 1). This forest contains Sitka spruce, Douglas-fir, western red cedar and western hemlock trees up to 11 feet diameter at breast height (DBH), 250 feet in height, and of estimated ages between 800 to 1500 years old. Also of note is the presence of Pacific yew, the source of the cancer-fighting drug taxol, as well as numerous old bigleaf maples. The pristine, undisturbed forest and lacustrine and palustrine wetlands are some of the highest quality in western Washington and also support a healthy component of bryophytes and lichens.

The Navy purchased the land to build NRS(T) Jim Creek in the 1950's, but did not purchase the timber cutting rights at that time. In 1992, the timber cutting rights to this unique old growth area were purchased by the Navy using DoD Legacy funds. These lands will remain in a protected status permanently. The story of how the Navy came to own this unique ecosystem is in Appendix H.

Sitka spruce/Swordfern forest - Notable within the old growth forest is a smaller vegetation community recognized by the Washington Natural Heritage Program (WNHP) as rare and having limited distribution. The WNHP compiles and manages site-specific and species/ecosystem-specific information on priority species and ecosystems. The WNHP datasets identify areas of Sitka spruce/Swordfern (*Picea sitchensis/Polystrichum munitum*) forest in the Twin Lakes corridor. These areas are within the protected old-growth forest, as well as within designated critical habitat for the marbled murrelet.

The WNHP ranks the relative rarity or endangerment of species or ecosystems within Washington State. The Program classified the area at Twin Lakes as S2, meaning the Sitka spruce/Swordfern forest is Imperiled in the state because of its rarity and other factors making it very vulnerable to extirpation. The S2 classification typically means there are six to twenty occurrences, or few remaining individuals or acres.

Forested areas within the Cub Creek watershed, the Walter Briggs Old Growth Forest Area, the designated marbled murrelet critical habitat area, and areas classified as S2 by the Washington State Department of Natural Resources are considered rare or high value lands. As such they warrant a higher level of protection than other areas of the installation.

Forest Resources Damage - The U.S. Forest Service Insect and Disease Service Center in Wenatchee Washington periodically conducts over-flight surveys of the installation to evaluate insect and disease activity visible from the air. These surveys provide a valuable overview of tree damage and damaging agents. These surveys have noted black bear, Hemlock die-off and Douglas-fir beetle as agents damaging trees on the installation (surveys on file at PWDE Environmental Division).

The most consistently observed damage during the overflight surveys was from black bears. Bears have killed several hundred trees, mainly in the north half of the installation. Black bears strip the bark from trees in the spring to eat the sugary inner phloem. Extensive bark removal can kill the tree.

In 2011, an abiotic agent causing hemlock die-off was observed. Several small areas of dead and dying western hemlock located in the southwest corner of the installation west of Twin Lakes were noted. The cause of the Hemlock die-off was not determined, and may have been caused by a combination of factors.

In 2011, 2013, and 2015 mortality from Douglas-fir beetle was seen. Douglas-fir beetles prefer to attack trees that have been wind-thrown, or are damaged by fire, root disease or defoliation. Evidence of Douglas-fir beetle attack includes reddish boring dust in bark crevices and at the base of the tree, and occasionally streamers of pitch on the central trunk of the tree.

The Insect and Disease Service Center also provides other forest, insect, and disease expertise to Federal and tribal forest land managers in Washington. This service is available for NRS(T) Jim Creek. They annually offer site visits for services such as:

- Identification of forest insects and disease-causing agents.
- Recommendations for forest insect or disease management.
- Hazard tree trainings for developed recreation sites.
- Roadside danger tree training.
- Training in insect and disease recognition and management.
- Insect and disease assessments for project analyses and landscape level evaluations.

Bear damage. (USFS photo)

Special Forest Management Considerations **–** Some portions of NRS(T) Jim Creek are encumbered with special conditions:

Department of Natural Resources cutting rights. The Washington Department of Natural Resources holds perpetual timber cutting rights to approximately 74 acres on the far western corner of the property, west of Cub Creek Reservoir (Figure 1).

U.S. Forest Service Special Use Permit. In 1949 USFS granted the Navy written permission to use approximately 958 acres for the construction and maintenance of the transmitter facility. These lands are administered by the Mount Baker-Snoqualmie National Forest (Figure 1). The letter from the USFS stipulates that receipts from any timber sold from the USFS lands are to be deposited to the credit of the National Forest Reserve Fund. It is also states that it is the responsibility of the Navy to: (1) manage these lands to reduce and/or minimize soil erosion; (2) prevent and suppress fires that originate on this land; and (3) after transmitter use has

ended, remove all improvements placed on the land in connection with the construction of the transmitter (Appendix E).

Firewood purchase. Individuals can purchase firewood from the NCTAMS OIC. This wood comes from downed trees or hazardous trees that have been removed by Public Works and deposited in the designated biopit (a 1-acre upland area where downed tree branches, debris from road maintenance and culvert cleaning and other organic material is deposited), on the installation. Revenue from these firewood sales is managed through the Forestry Resource Program according to COMNAVREGNWINST 11015.1. This program is separate from firewood sold by MWR, which is purchased from an off-site vendor.

2.2.3 Climate/Weather

NRS(T) Jim Creek is within the Marine West Coast region; with moist, mild winters and cool, dry summers. The maritime air has a moderating influence on the climate in both summer and winter. Average temperatures range from 30-40 ˚F during the winter and 60-70 ˚F during the summer. With the exception of brief dry periods when easterly winds are present, the relative humidity ranges from 90% at night to 55% during the afternoon.

The microclimate at the installation is heavily influenced by the Cascade Mountains to the east. Moisture laden air masses from the Pacific Ocean are cooled as they rise over the Cascades, forcing the moisture to fall in the form of short-duration, high-intensity storms. Nearby areas west of the installation, such as Arlington, average 46.61 inches of precipitation annually (Western Regional Climate Center, 2013). Peak precipitation occurs from October to March. This amount of annual precipitation is significant and is exacerbated when precipitation is retained on the upper slopes as snow.

The rain-on-snow zone is between 1,000 and 3,000 feet in elevation and can receive frequent snow build-up and then experience substantial rain fall, causing rapid melting, surface water movement, high volume stream flows, accelerated erosion, and the potential for downstream flooding. Much of NRS(T) Jim Creek lies within the rain-on-snow zone, and both precipitation and the rapid melting of snow loads contribute to slope instability.

2.2.4 Climate Change

Climate can be considered the "average weather" in a given place, including the patterns of temperature, precipitation (rain or snow), humidity, wind and seasons. Climate patterns play a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. It is widely recognized that the earth's climate is rapidly changing, resulting in disruptive impacts, and past climate patterns are no longer reliable predictors of the future climate.

Climate change is the result of rising levels of carbon dioxide and other heat-trapping gases (greenhouse gasses) in the Earth's atmosphere. These increased levels are warming the Earth, resulting in rising sea levels; melting snow and ice; more extreme air temperature events, fires and drought; and more extreme storms, rainfall and floods. Climate change is progressing faster now than that experienced in the last 2,000 years (WDOE, 2012). Scientists project that these trends will continue and in some cases accelerate, posing significant risks to human health, Washington's forests, agriculture, fresh water supplies, coastlines, and other natural resources vital to the state's economy, environment, and quality of life (WDOE, 2012).

Some predicted impacts of climate change in the Pacific Northwest include average annual temperature increases of 3.2°F by the 2040s, a 37-44% decline in spring snowpack by the 2040s, rising stream temperatures that reduce the quality of salmon habitat, and a doubling of the area burned by fire, due to increased summer temperatures and decreased summer precipitation (Littell et al., 2009, citing others).

Increasing air temperature, reduced snow accumulation and declining summer precipitation drive changes in terrestrial ecosystems including a continued shift in the geographic distribution of species, changes in forest growth and productivity, increasing fire activity, and changing risks from insects, diseases, and invasive species. Mauger et al. (2015) recognize that such changes would have significant implications for ecosystem composition and species interactions. Changes to forests would likely be driven by increases in the frequency and intensity of fire, insect outbreaks, and disease.

In freshwater ecosystems of the Puget Sound region, continued increase in water temperatures, a shift to earlier peak streamflow, and declining snowmelt are projected. Such changes would affect ecosystem composition and aquatic species, including salmon growth and survival across many life stages, particularly juvenile development in freshwater streams. Wetland ecosystems are also projected to decline in both extent and number due to reduced water availability in summer (Mauger et al., 2015).

It can be expected that these and other climate change effects that impact the physical environment will occur at NRS(T) Jim Creek over similar timeframes. In particular drought leading to an increase in wildfire risk is of concern.

2.2.5 Geology and Topography

The landforms at NRS(T) Jim Creek reflect geologic events typical of the western Cascade Mountains. The geology in the vicinity of the installation is the result of oceanic flooding, glaciation, and volcanic activity (Alt and Hyndman, 1984). Extremely steep mountain slopes indicate that underlying parent materials of igneous and metamorphic origin have been subjected to glacial action. Glacial activity shaped the igneous and metamorphic rocks that comprise the Jim

Creek valley and deposited glacial till, alluvium, colluvium and moraine material throughout the valley (Figure 13 and WDNR 2013a).

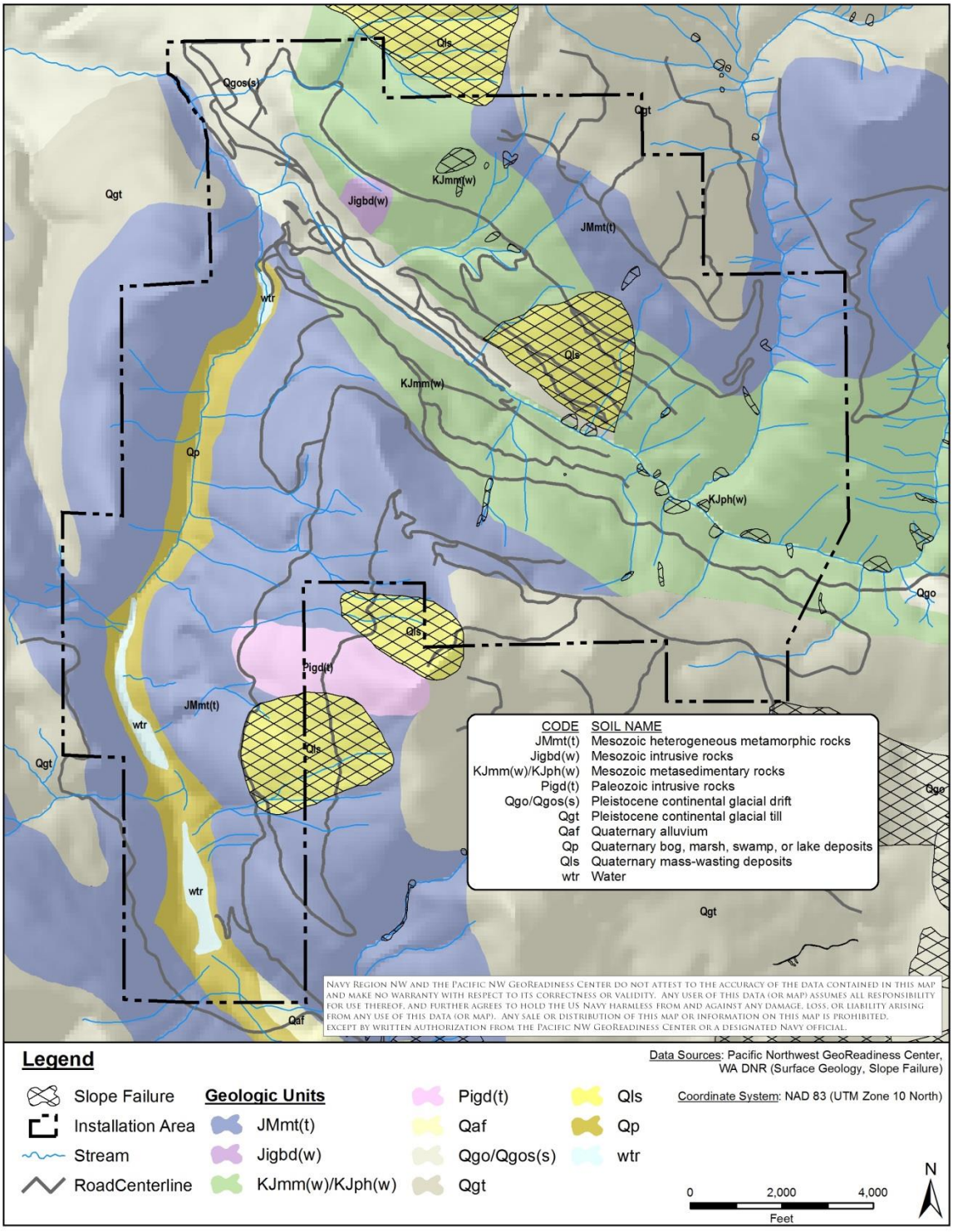

Figure 13. Geology of NRS(T) Jim Creek.

These geologic conditions contribute to land instability; the inherently erodible rock and alluvial deposits create conditions susceptible to erosion. Mountainsides at NRS(T) Jim Creek have experienced landslides and constant downslope soil movement during the last several decades. Sag ponds, land bulges, escarpments, and road cut sloughing provide evidence of the active landslide-prone and erodible character of installation lands.

Landslides and slope failures have sculpted many of the landscape features that give the installation its distinct character. Unstable areas are most evident and landslides most common around the upper boundaries of the ground field and along road cuts on both Wheeler and Blue Mountains where slopes have become over-steepened and soils exposed over time. Additionally, several large rock outcroppings periodically lose material, which travels downslope, often coming to rest on road surfaces. Despite these conditions, there is no evidence of large-scale geologic instability such as that caused by faulting or seismic activity.

The extent of unstable lands poses a risk to mission operations, and there is an extensive body of geotechnical reports, geologic surveys, boring logs, and landslide and erosion maps and inventories for the installation dating from 1949 to the present. These address stability and control measures, and the impact of erosion, landslides, and unstable lands on the mission of the installation (Documents on file at PWDE Facilities Engineering Acquisition Division, Everett).

WDNR's Natural Hazards mapping shows landslides on the west side of Wheeler Mountain at the point where the glacial till intersects the underlying rock deposits. There are two sizable failures evident on Blue Mountain above Twin Lakes, and one of these exhibits characteristics similar to those on Wheeler Mountain (Figure 13 and WDNR 2013b).

2.2.6 Soils

The USDA Natural Resources Conservation Service (NRCS) operates a Web Soil Survey which provides soil data and information produced by the National Cooperative Soil Survey https://websoilsurvey.nrcs.usda.gov/app/. The survey includes NRS(T) Jim Creek, and delineates 21 soil map units within the boundaries of the installation (Figure 14 and Table 4). Generally, loam soils with varying mixtures of clay and sand are the dominant soil types.

TABLE 4. SOIL MAP CODE AND SERIES.

Code	Series
0	Bellingham variant mucky silty clay loam
1	Elwell silt loam 3 to 30 percent slopes
2	Elwell-Olomount complex 15 to 30 percent slopes
3	Elwell-Olomount-Rock outcrop complex 30 to 60 percent slopes
4	Everett gravelly sandy loam 0 to 8 percent slopes

5	Everett gravelly sandy loam 15 to 30 percent slopes
6	Getchell-Oso complex, silt loam 3 to 30 percent slopes
7	Getchell-Oso complex 15 to 30 percent slopes
8	Getchell-Oso-Rock outcrop complex 30 to 65 percent slopes
9	Mukilteo muck
10	Olomount-Elwell-Rock outcrop complex 65 to 90 percent slopes
11	Oso-Getchell-Rock outcrop complex 65 to 90 percent slopes
12	Pilchuck loamy sand
13	Potchub silt loam 3 to 30 percent slopes
14	Potchub-Hartnit complex 15 to 30 percent slopes
15	Rober silt loam 15 to 30 percent slopes
16	Skykomish gravelly loam 0 to 30 percent slopes
17	Sultan variant silt loam
18	Tokul-Ogarty-Rock outcrop complex 0 to 25 percent slopes
19	Tokul-Winston gravelly loams 25 to 65 percent slopes
20	Verlot mucky silt loam 3 to 30 percent slopes
21	Water

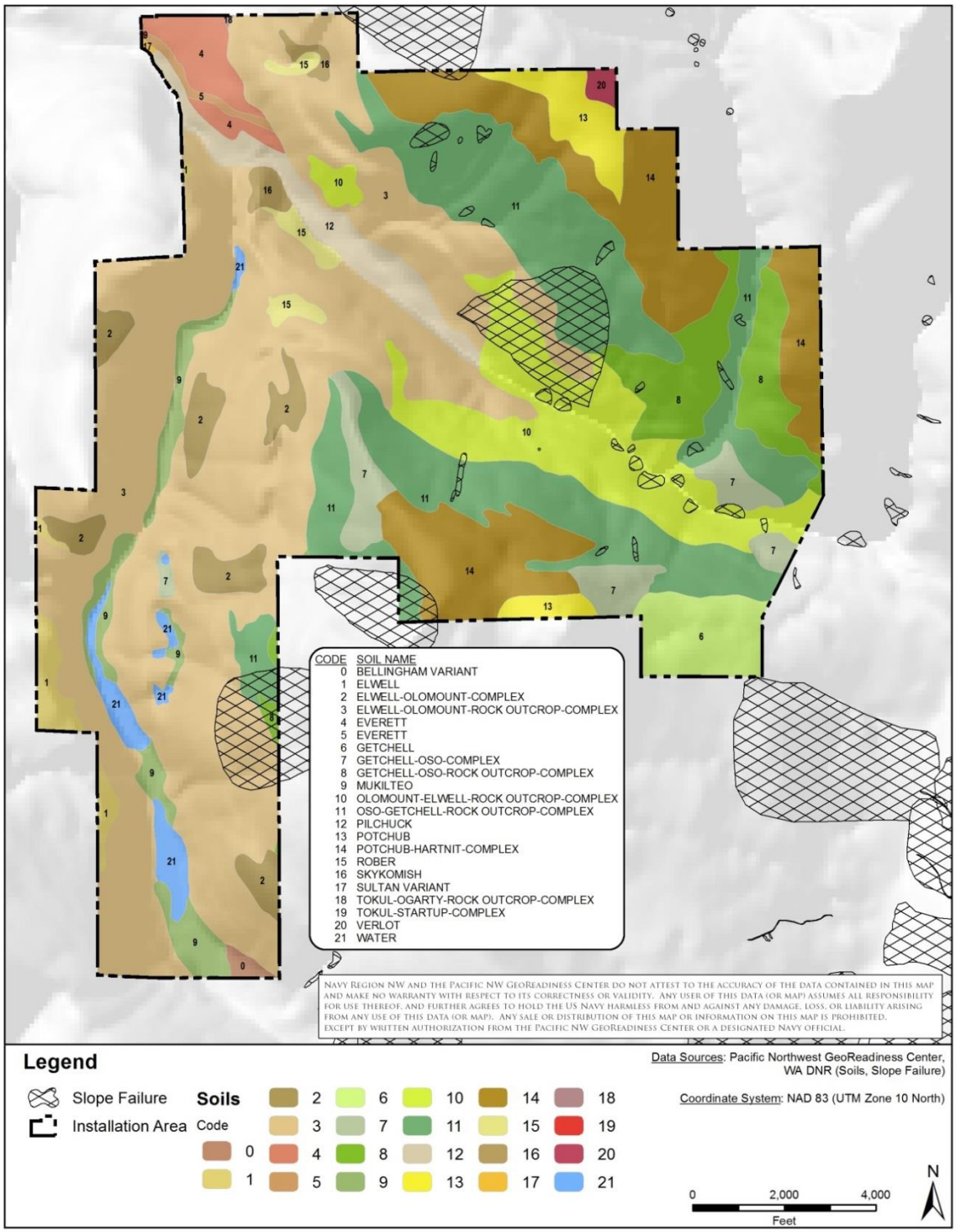

Figure 14. Soils at NRS(T) Jim Creek.

The soils of Jim Creek reflect a geologic history that includes glaciation, volcanic activity and flooding. Consistent with the geological characteristics discussed above, these soils are derived from a wide variety of parent and weathered particles including andesite, argillite, basalt, glacial outwash, glacial till, volcanic ash and decomposed organic matter.

In some places on the installation, the downward movement of water through the soils is restricted to depths ranging from 20 to 40 inches below the surface. Hardpan layers or bedrock exists at these depths under the soils. Alternatively, soils formed from andesite, argillite and basalt extend to depths of up to 25 feet in places where unweathered parent material is encountered. It is common to find perched water tables located immediately above the restrictive drainage layer in these soils and bedrock; particularly through winter and spring.

2.2.7 Hydrology and Surface Waters

Numerous seeps, springs, and unconfined surface flows characterize hydrologic conditions at NRS(T) Jim Creek, primarily on the steep slopes in the operational area. One hydrologic investigation described 10 major hillside springs located between 925 and 1525 feet in elevation, and documented a combined flow of 1,235 gallons of water per minute (gpm) from them. The report estimated flow could reach as much as 4000 gpm under certain circumstances (Rongey and Associates, 1960).

Glacial till deposits are found at higher elevations on both Blue and Wheeler Mountains. Rainwater and snowmelt infiltrates this soil, moving downward and down-slope until it encounters underlying rock deposits that impair infiltration, contributing to the condition where seeps and springs develop on the upper slopes.

The installation contains over 40 miles of unpaved roads. The majority of these are concentrated in and around the 980-acre operational area, resulting in a high road concentration in an area with steep topography, unstable soils, seeps and springs, and land cleared of trees and shrubs over six feet tall (Figure 15). In addition, these roads intercept surface water, requiring establishment of roadside ditches and culverts to direct water away from roads.

The extensive system of roads, particularly in the antenna field, removed underlying slope support in locations where large cuts have been made into the side slopes. Substantial fill sections on these roads have also added additional weight to those portions of the slope upon which they are located. In numerous locations excavated material has been side-cast onto the slopes below the roads and, when paired with steep topography, is more prone to movement when saturated with water.

Hydrologic conditions can influence soil behavior, slope stability, erosion, habitat and water quality. The actions listed below may have accelerated or re-activated landslide movement in some instances. Natural hydrologic conditions and subsequently slope stability have been altered at NRS(T) Jim Creek through:

- Construction activity that removes underlying slope support;
- Interruption of the natural drainage systems by road construction (compacted road prisms) and improper, undersized culvert installations/maintenance;
- Creation of impervious surfaces that displace water into overwhelmed natural drainage channels or onto the remaining absorptive soil areas; and
- Removal and manipulation of vegetation.

High seasonal flows in the tributaries of Cub Creek and Jim Creek periodically damage service roads and culverts, and contribute to landslide or mass wasting events. Otherwise, NRS(T) Jim Creek does not have a significant history of flooding or flood damage to existing facilities.

Figure 15. Wheeler Mountain clearcuts and roads, 1950s

University of Washington Seismograph and Seismic Activity **-** The University of Washington operates a seismograph installed in the Communications Center Link (CCL) Building (B20) on Blue Mountain. This is one of roughly one hundred eighty such instruments maintained by the Pacific Northwest Seismograph Network (PNSN) (Strelow, 2001). The PNSN is responsible for routine seismic monitoring of Cascade Range volcanoes in Oregon and Washington and coordinates very closely with the Cascade Volcano Observatory (CVO) of the U.S. Geological Survey's Volcano Hazards Program. This program monitors many other parameters and has the mandate to study and evaluate all volcanic hazards. There is a weekly update provided by the CVO for Cascade Volcano status.

In the recent past there have been several small-scale earthquakes in the Arlington-Darrington area of Snohomish County with the closest being a magnitude 3.0 quake at a depth of 9.75 miles on 19 August, 2011. PNSN data have documented additional earthquakes within 20 miles of the installation. These quakes are generally short duration, rarely lasting more than 15-20 seconds.

The Washington Interactive Geologic Map, accessed through Washington Department of Natural Resources Geologic Information Portal (http://www.dnr.wa.gov/geologyportal) indicates the majority of the installation has low to very low ground response susceptibility to liquefaction, except in the riparian areas bordering Jim Creek, Cub Creek and the lakes, which have a low to moderate susceptibility.

2.2.8 Water Quality

The Clean Water Act 33 (U.S.C. §1251 *et seq*.) Section 101(a)(2) requires, wherever attainable, that U.S. states restore their waters to be "fishable and swimmable." Section 303(d) of the Clean Water Act establishes a process to identify and clean up polluted waters. In Washington, waterbodies that do not meet the state's surface water quality standards are placed on a list of impaired waterbodies, or 303(d) list maintained by Washington Department of Ecology and found on their website: https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d. These listed waterbodies are ones in which technology-based controls for point sources are insufficient and/or where impairments are nonpoint-source related.

States must establish water quality-based pollution control and Total Maximum Daily Load (TMDL) evaluations for these categories of pollutants per 303(d):

- temperature
- dissolved oxygen
- pH
- nutrients
- total suspended solids and turbidity
- fecal coliform bacteria

The final assessment is submitted by the state to the EPA for approval. The EPA approved Washington State Department of Ecology's September 2015 submittal of the state's Water Quality Assessment 305(b) report and 303(d) list on July 22, 2016.

The water quality assessment divides waterbody impairments into several categories, including:

> Category 2 - Waters of concern: waters where there is some evidence of a water quality problem, but not enough to require production of a water quality improvement (WQI) project (including total maximum daily load [TMDL]) at this time.

Category 4A - Polluted waters that have a TMDL: water bodies that have an approved TMDL in place and are actively being implemented.

Jim Creek on the installation is included on the 303(d) list for dissolved oxygen (Category 4A) and for pH (Category 2). The dissolved oxygen impairment is addressed by the Stillaguamish Multiparameter TMDL/Water Cleanup Plan (WDOE, 2005). The pH impairment does not have a specific TMDL/Water Cleanup Plan.

Upper Twin Lake is included on the 303(d) list for bacteria (Category 4A). This impairment is addressed by the Stillaguamish River Watershed Multiparameter TMDL/Water Cleanup Plan (WDOE, 2005).

2.2.9 Stream Temperatures

Stream temperature data have been collected on the installation by several agencies and by NAVFAC NW for varying purposes (Table 5). Existing data do not represent a comprehensive stream temperature profile (Data on file at PWDE Environmental Division).

TABLE 5. STREAM TEMPERATURE DATA.

Agency	Locations	Data Collection Period
Stillaguamish Tribe	Jim Creek, Cub Creek	1999
NAVFAC	Jim Creek, Cub Creek	1999-2001*
USGS	Jim Creek	1999, 2000, 2008, 2016
NAVFAC	Jim Creek	2011-2012*
Snohomish County Public Works	Jim Creek, Cub Creek	2012*

**continuous monitoring*

In 2001-2002, average temperatures in Jim Creek increased as water moved through the unshaded stream section within the antenna field (Miller, 2003). This section is riprapped and contains little streamside vegetation due to antenna operational requirements. Cub Creek temperatures were also elevated compared to a control site in Jim Creek in an undeveloped area upstream of the ground field. This is likely the result of solar heating within the lake system above Cub Creek.

The United States Geological Survey (USGS) temperature data are collected in conjunction with aerial herbicide treatments as a required component of water quality monitoring. Data were collected on four dates in 2016, from late September to early October. Temperatures in Jim Creek ranged from 50 to 54.5 °F. Temperatures in Rehab Creek ranged from 51 to 56.7 °F.

Baseline temperature data were collected by NAVFAC NW in support of the NPDES permit received in 2015 related to the discharge of the cooling water for Building 1. (Note: this discharge

no longer occurs, eliminating this source of relatively warmer water). The NSE environmental engineer in charge of water quality is responsible for administering and meeting the requirements of the NPDES permit, including collection of temperature data.

2.2.10 Stream Total Suspended Solids and Turbidity

Roads, roadside drainage ditches, and bare, disturbed ground can seasonally be sources of sedimentation to downstream waters, because they move large volumes of water causing erosion and sediment transport. Unarmored ditches, steep areas, and damaged roads worsen this situation. Water-borne fine sediment ultimately can reach streams and rivers where it can degrade the quality of habitat for ESA-listed fish species and other aquatic organisms.

In spite of the presence of roads, drainage ditches and the inherent landslide-prone nature of installation lands, Jim Creek is not a significant source of fine sediments to the South Fork of the Stillaguamish River. Sediment load, measured in Total Suspended Solids (TSS), was evaluated at 13 sites as part of a 2006-2009 project examining fine sediments in gravel reaches suitable for spawning in the South Fork Stillaguamish River. Jim Creek was sampled at the mouth and consistently showed low concentrations of suspended sediment. It was not sampled after the 2006-2007 season (Purser et al. 2009). Within the 13 TSS sample sites, Jim Creek samples indicated very low concentrations of suspended sediment. Further, decreased TSS concentrations in the South Fork Stillaguamish downstream of Jim Creek were attributed to dilution by water from Jim Creek, with its lower TSS (Purser et al., 2009).

2.3 General Biotic Environment

Appendix I contains a list of animals and plants that have been documented on the installation, as well as those that could potentially occur on the installation.

2.3.1 Federally Listed and Special Status Species

The marbled murrelet, listed as threatened by the USFWS, is known to occur at NRS(T) Jim Creek. Bull Trout, also listed as threatened by the USFWS, have been documented on the installation in main stem Jim Creek. Chinook Salmon and steelhead, listed as threatened, inhabit the Stillaguamish watershed and could potentially occur in installation streams because there are no downstream passage barriers. Eleven additional species are Federal candidate species or are Federal or state species of concern, which are either confirmed as present or can potentially be found on the installation (Table 6).

TABLE 6. THREATENED, ENDANGERED, SPECIES OF CONCERN AND CANDIDATE SPECIES.

Common Name (Scientific Name)	*Status/Federal Status/State* [1]	*Critical Habitat*	*Habitat*
THREATENED AND ENDANGERED SPECIES			
Marbled murrelet *(Brachyramphus marmoratus)*	FT/USFWS T/WA	Yes [2] 76 FR 61599	Old growth forest, open marine waters.
Northern spotted owl *(Strix occidentalis caurina)*	FT/USFWS	No; not on installation 77 FR 71875	Old growth forest; mid- and late-seral coniferous forests
Chinook Salmon – Puget Sound ESU *(Oncorhynchus tshawytscha)*	FT/NMFS C/WA	EXEMPT [3] 70 FR 52630	Freshwater streams, estuaries, marine waters
Steelhead – Puget Sound DPS *(Oncorhynchus mykiss)*	FT/NMFS	EXEMPT [3] 81 FR 9251	Freshwater streams, estuaries, marine waters
Bull Trout – Coastal Puget Sound DPS *(Salvelinus confluentus)*	FT/USFWS C/WA	EXEMPT [3] 75 FR 63898	Freshwater streams, estuaries, marine waters
SPECIES OF CONCERN and CANDIDATE SPECIES			
FISH			
Coho Salmon - Puget Sound ESU (*Oncorhynchus kisutch*)	NMFS Species of Concern	NA	Streams, estuaries, marine waters
Salish Sucker *(Catostomus sp)*	State Monitored	NA	Lakes and Streams
BIRDS			
Bald Eagle (*Haliaeetus leucocephalus*)	USFWS Species of Concern	NA	Large trees, usually near marine shorelines, large lakes or rivers

Northern Goshawk *(Accipiter gentilis)*	USFWS Species of Concern/ State Candidate	NA	Mature forest with high canopy, prefer old growth conifer.
Golden Eagle (*Aquila chrysaetos)*	State Candidate	NA	Mountainous, open shrub-steppe communities, lower densities in conifer forest
MAMMALS			
Townsend's Big Eared Bat (*Corynorhinus townsendii)*	State Candidate	NA	100+ year old forests, southern exposures, riparian areas.
American Pika (*Ochotona princeps*)	State Species of Greatest Consvn Need	NA	Usually alpine, subalpine, rocky talus. Also lower elevations.
AMPHIBIANS			
Western Toad *(Bufo boreas)*	USFWS Species of Concern/ State Species of Greatest Consvn Need	NA	Primarily terrestrial, near waterbodies such as wetlands, ponds, lakes, off-channel habitats of rivers.
Coastal Tailed Frog *(Ascaphus truei)*	USFWS Species of Concern/State Monitored	NA	Cold, clear, rocky streams; headwaters.
Cascades Frog *(Rana cascadae)*	USFWS Candidate/State Monitored	NA	wetlands, ponds, lakes, flooded meadows, small alpine ponds
PLANTS			
Yellow Cedar *(Callitropsis nootkatensis)*	USFWS Candidate	NA	Coastal forests but rarely below 1970 feet in elevation

[1] ***FT*** *– Federal Threatened,* ***T/WA****– Threatened Washington,* ***C/WA*** *– Candidate Washington.*
[2] *Critical habitat has been designated on the installation.*
[3] *EXEMPT – INRMP provides adequate protection and conservation benefit.*

Marbled Murrelet - The marbled murrelet (Federal threatened, State threatened) in Washington, Oregon and California was listed as threatened by the USFWS in 1992 (57 FR 45328). Marbled murrelets are found at NRS(T) Jim Creek and they seasonally occupy suitable nesting habitat in the old-growth forest area. Nesting season is generally considered to begin as early as April 1 and extend to September 23 (USFWS, 2012).

Critical habitat was initially designated for the marbled murrelet in 1996 (61 FR 26256) and most recently revised in 2011 (76 FR 61599). The designation includes 1,840 acres of old growth and second growth forest at NRS(T) Jim Creek, including the Twin Lakes area, Cub Creek corridor, and Cub and Coyote campgrounds (Figure 16).

Activities that can potentially affect marbled murrelets or this habitat require consultation with the USFWS consistent with Section 7 of the ESA. No actions should be contemplated within designated critical habitat without first consulting with the NRM to determine if consultation with USFWS under the Endangered Species Act is needed. Additionally, suitable nesting habitat may exist outside the boundary designated by USFWS for this species. For this reason, actions anywhere on the installation involving alterations or removal of trees, or involving elevated sound levels need to first be evaluated in consultation with the NRM.

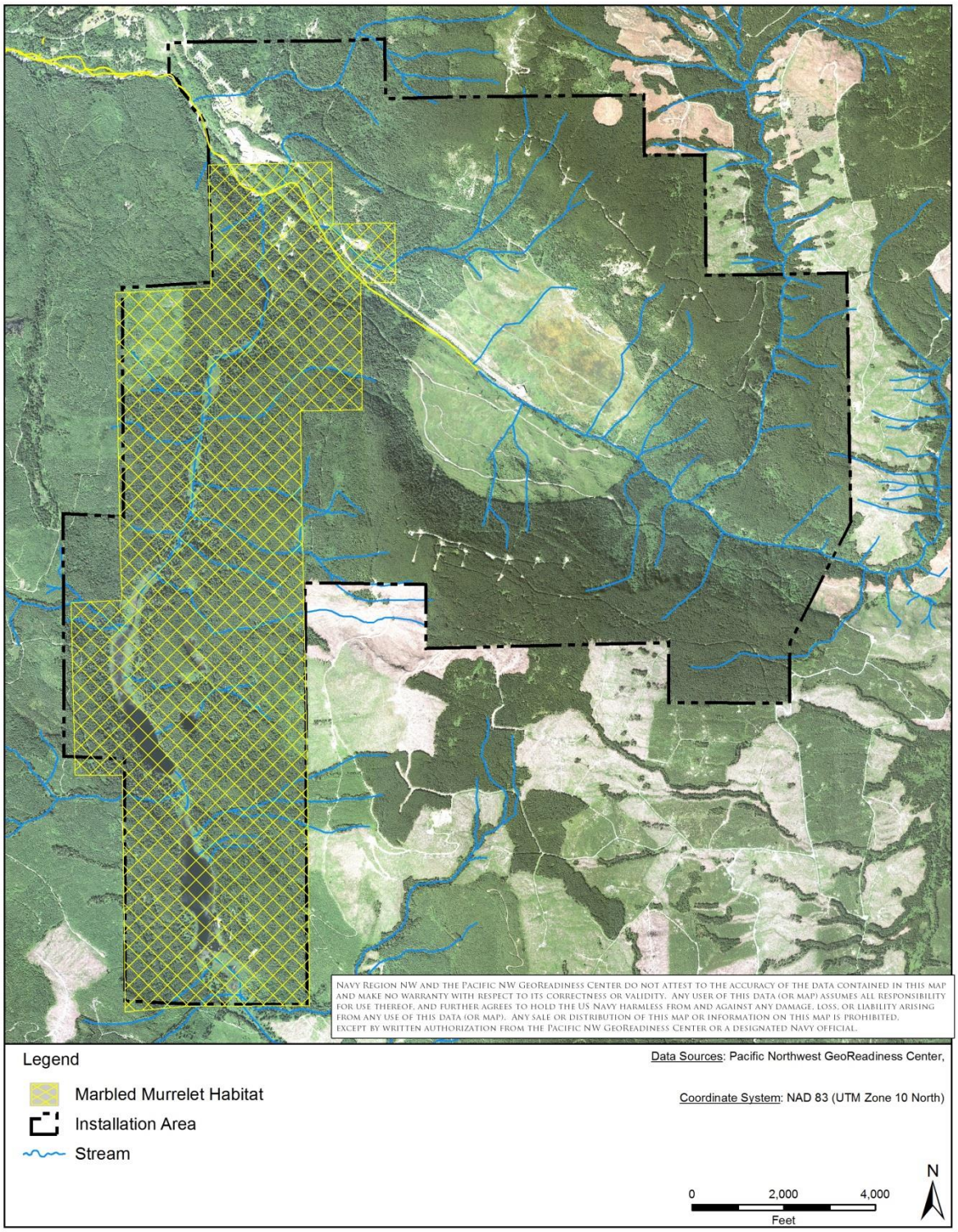

Figure 16. Marbled murrelet designated critical habitat.

USFWS published the Recovery Plan for the Threatened Marbled Murrelet in Washington, Oregon, and California in 1997. The most recent five-year review was completed in 2009 and concluded that the marbled murrelet should remain listed as threatened. Recovery criteria have not been met. The 1997 Recovery Plan indicates a recovery priority of 3 for the species, meaning the USFWS believes the species is under a significant threat, but also has a high recovery potential (USFWS, 1997). The species decline is largely the result of extensive removal of old growth forest which provides nesting habitat (USFWS, 2009). The USFWS initiated another 5-year status review in 2017 (82 FR 18665).

The WDFW includes the marbled murrelet in its State Wildlife Action Plan (SWAP; See Section 3.10.6). The SWAP recognizes the importance of protecting old growth nesting habitat for this species. Conservation threats include conversion of old growth forest nesting habitat to commercial forest and fragmentation of nesting habitat.

The marbled murrelet is a small, robin-sized, diving seabird that feeds primarily on small fish and invertebrates in nearshore marine waters. Marbled murrelets are distributed from the Aleutian Archipelago in Alaska to central California. They spend the majority of their lives on the open ocean but fly inland up to 50 miles to nest in forest stands with old growth forest characteristics. These dense, shady forests are generally characterized by large trees with large branches or deformities that are used by marbled murrelets as nest platforms. Marbled murrelets nest in forest stands varying in size from several acres to thousands of acres. Larger, unfragmented stands of old growth appear to be the highest quality habitat for nesting marbled murrelets. These stands are dominated by Douglas fir in Oregon and Washington and by old-growth redwoods in California (USFWS, 2011a).

Nesting occurs from April to late September with both parents tending a single young. Daily flights between nesting sites and forage grounds occur near dawn and sunset during the nesting period, and the birds tend to follow watercourses while in transit (Stumpf, 2011). Marbled murrelets do not construct a nest from gathered materials; rather they form a nest in moss and duff covering the upper surfaces of broad, sturdy branches.

The primary constituent elements (PCEs[1]) 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

[1] In February 2016, the USFWS and NOAA published a rule removing the terms ‘‘principal biological or physical constituent elements’’ and ‘‘primary constituent elements’’ from the definition of critical habitat and finalized a definition for the term ‘‘physical or biological features’’ (81 FR 7414). This rule applies to rules for which a proposed rule was published after March 14, 2016. In this INRMP the term “PCEs” will continue to be used.

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).

Within the boundaries of designated critical habitat, only those areas that contain one or more primary constituent element are, by definition, critical habitat. Areas without any primary constituent elements are excluded by definition (61 FR 26256).

Recent guidance by USFWS identified the important components of marbled murrelet nest trees specifically in Washington State (USFWS, 2012). Structural components taken into account were platforms, cover, and other tree and forested area characteristics. Potential nest trees are considered to be coniferous trees within 55 miles of marine waters that support at least one four-inch diameter platform located at least thirty-three feet above the ground, with horizontal and vertical cover.

Individual nest trees are often large trees, generally more than 32 inches DBH, with the presence of potential nest platforms or deformities such as large or forked limbs, broken tops, dwarf mistletoe infections, witches' brooms, or other formations providing platforms of sufficient size to support adult marbled murrelets. Because marbled murrelets do not build nests, moss or detritus may be important to cushion or hold the egg. Platforms should have overhead cover for protection from predators and weather, which may be provided by overhanging branches, limbs above the nest area, or branches from neighboring trees.

Nests have been found in Douglas-fir, coastal redwood, western hemlock, western redcedar, and Sitka spruce. On a landscape basis, forests with a canopy height of at least one-half the site-potential tree height in proximity to potential nest trees are likely to contribute to the conservation of the marbled murrelet. Nest trees may be scattered or clumped throughout the area. Potential nesting areas may contain less than one suitable nesting tree per acre.

The marbled murrelets at NRS(T) Jim Creek are part of a distinct population segment (DPS) extending across Washington, Oregon, and northern California (USFWS, 2009). This DPS is a substantially smaller population (approximately 19,700 birds; Falxa and Raphael, 2016), than the population in Canada (approximately 66,000 birds; Burger, 2002). In addition, based on at-sea surveys of juvenile to adult ratios, the productivity of marbled murrelets in Washington, Oregon, and California is considerably lower than in British Columbia (USFWS 2009, citing others).

Population trends were evaluated by Falxa and Raphael (2016) in support of the Northwest Forest Plan using data from 2000 to 2013. No trend in populations was detected for the overall Northwest Forest Plan area (Washington, Oregon, California). Although the trend estimate was negative, the evidence was not conclusive (−1.2 percent per year; 95-percent confidence interval: −2.9 to 0.5) over a 2001 to 2013 period.

At the state scale, which combines conservation zones and portions of conservation zones, Falxa and Raphael (2016) found strong evidence for a declining linear trend in Washington (4.6-percent decline per year; 95-percent confidence interval: −7.5 to −1.5 percent).

The most recent annual population estimate for the entire Northwest Forest Plan area ranged from about 16,600 to 22,800 marbled murrelets during the 14-year period, with a 2013 estimate of 19,700 marbled murrelets (95 percent confidence interval: 15,400 to 23,900) (Falxa and Raphael,2016).

Annual at-sea surveys have been conducted during the breeding season since 2000 using a uniform survey protocol and provide data on population size and status. Results indicate a declining population since 2000 (Huff, 2006; Miller et al., 2006; Raphael et al., 2007). The USFWS concluded in 2009 that the listed population had declined significantly since 2002. Population estimates from the annual at-sea monitoring for 2000-2008 indicated an annual rate of decline in the range of 2.4 to 4.3 percent.

Based on the estimate of about 24,400 birds used in the analysis for the 2004 five-year review (USFWS, 2004a), the 2008 population estimate of about 18,000 birds represents a decline of about 26 percent. Miller et al. (2012) documented a decline of nearly 30% in the marbled murrelet population of Washington, Oregon, and northern California between 2000 and 2010.

More recently, and specifically for Puget Sound and the Strait of Juan de Fuca, the population estimate in 2013 was 4,395 birds (95% confidence interval of 2,275- 6,740 birds). For the 2001-2013 period the annual rate of population decline in this area was 3.88% (Pearson et al., 2014).

Marbled murrelet surveys were conducted at NRS(T) Jim Creek periodically in the 1990s, and again in 2011. The survey locations focused on the Lower Twin Lake, Cub Creek, and Cub Creek reservoir areas where old growth trees provide nesting habitat. Surveys were conducted from May into July. Individual birds were seen and were heard calling in the Lower Twin Lakes vicinity (data on file, PWDE Environmental Division). Surveys focus on detections and occupancy; not on estimating the number of birds. A one-day survey was conducted 19 July 2017 and confirmed the continued presence of marbled murrelets.

In 2000, a study was conducted to evaluate the feasibility of using radar to determine the abundance and movement patterns of marbled murrelets at NRS(T) Jim Creek. The radar detected marbled murrelets (distinguished from other birds by their flight speed and target signature) flying within about one mile of two radar locations; one at Building 84 (a bathroom facility in the developed portion of the installation, near the administration building) and one at a rock quarry upslope of Coyote Campground, near the mouth of Cub Creek (data on file, PWDE Environmental Division).

Northern Spotted Owl **-** The northern spotted owl (Federal threatened, State Endangered) was listed as threatened by the USFWS in 1990 (55 FR 26114). Designated critical habitat was most recently revised in 2012 (77 FR 71875). The nearest designated critical habitat for the owls is about six miles east of Twin Lakes (Figure 17; from www.fws.gov) and the nearest documented historic northern spotted owl site (1994) is located five miles east of the Twin Lakes area (USFWS letter ref# 01EWFW00-2015-I-0411 for Twin Lakes road repair, on file PWDE Environmental Division). This species is included here because there are certain projects or actions that require ESA consultation on this species.

The most recent Recovery Plan for the northern spotted owl was published in 2011 (USFWS, 2011b). It indicates that past and current habitat loss are threats to the spotted owl, even though loss of habitat due to timber harvest has been greatly reduced on Federal lands over the past two decades. The USFWS also recognizes the barred owl constitutes a significantly greater threat to spotted owl recovery than was envisioned when the spotted owl was listed in 1990 (USFWS, 2011b).

Maintaining and restoring sufficient habitat is important to address the threats the spotted owl faces from a loss of habitat due to harvest, loss or alteration of habitat from stand replacing fire, loss of genetic diversity, and barred owls (Forsman et al., 2011).

The WDFW includes the northern spotted owl in its SWAP. The SWAP identifies loss of habitat and competition with barred owls as conservation threats.

The northern spotted owl is relatively long-lived, has a long reproductive life span, invests significantly in parental care, and exhibits high adult survivorship. The majority of pairs do not breed every year. Spotted owls have large home ranges and in those areas prey on a number of small mammal species. Spotted owls are at a competitive disadvantage to the more generalist barred owl which has expanded its range to now include the entire distribution of the northern spotted owl (WDFW, 2015).

The northern spotted owl inhabits mid- and late-seral coniferous forests. Typical habitat characteristics include: generally high canopy closure; complex canopy structure involving trees of multiple age or size classes; large decaying trees and/or snags; and, in most forest areas, a high volume of downed wood.

Formerly a widespread, uncommon resident of coniferous forests in western Washington and the east slope of the Cascade Range, the northern spotted owl is now rare throughout Washington. The population of northern spotted owls in Washington continues to decline (USFWS, 2011b). The most important range-wide threats to the spotted owl are competition with barred owls, ongoing loss of habitat as a result of timber harvest, habitat loss or degradation from stand replacing wildfire and other disturbances, and loss in the amount and distribution of habitat as a result of past activities and disturbances (USFWS, 2011b).

The early nesting season for spotted owls, when young are in the nest, occurs from March to May or June. After they leave the nest in late May or June, juveniles depend on their parents for food until they are able to fly and hunt on their own. Parental care can continue after fledging into September. Spotted owls hunt almost exclusively at night (Forsman et al., 1984).

This species has not been seen on the installation and designated critical habitat does not occur on the installation. Owls were not seen or heard during marbled murrelet surveys conducted in 2011 (T. Cyra WDFW Biologist via email 21 May 2015). Generally, impacts to northern spotted owls are not considered during ESA Section 7 consultations. However, the exception to this is activity in the Twin Lakes vicinity that could disturb owls, should they be present, or that alter or remove suitable habitat. Forested areas in the Cub Creek riparian corridor and the shorelines of the Twin Lakes may provide suitable habitat for the northern spotted owl. Projects in this area need to consider potential effects to ESA-listed species, which would result in consultation with USFWS.

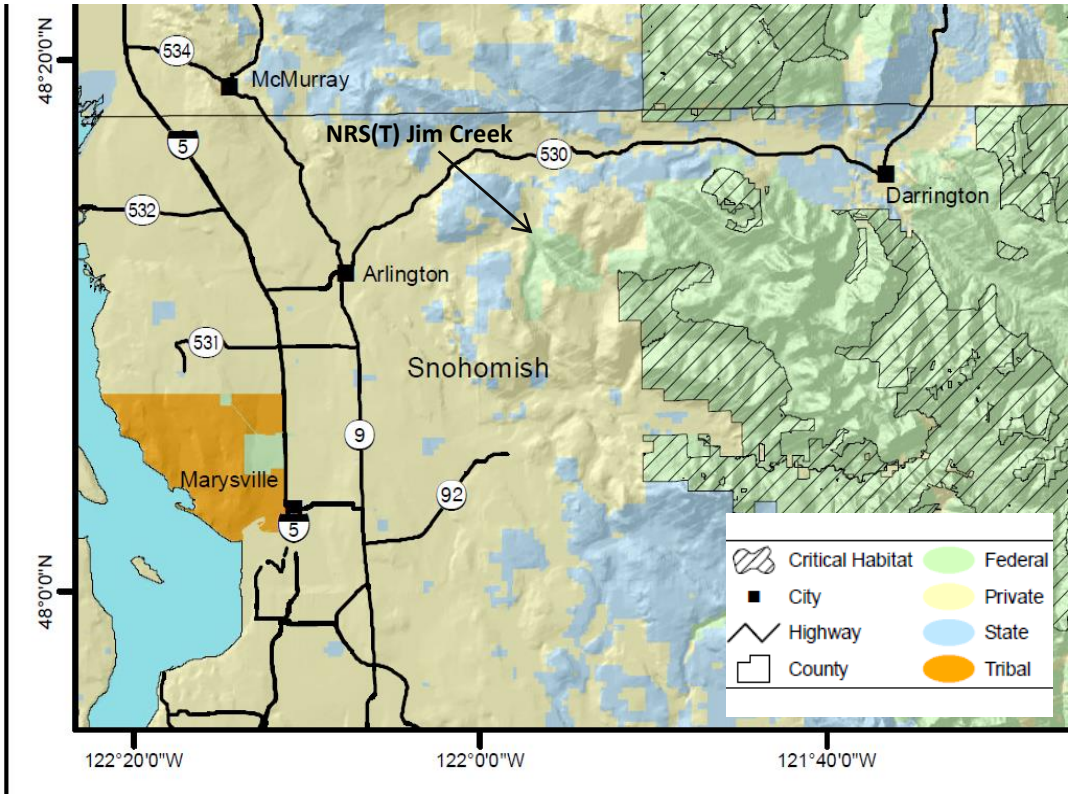

Figure 17. Northern spotted owl designated critical habitat.

Chinook Salmon **-** Chinook Salmon (Federal threatened, State candidate) in the Stillaguamish watershed are part of the Puget Sound Evolutionarily Significant Unit (ESU), which includes all naturally spawned populations of Chinook Salmon from rivers and streams flowing into Puget

Sound. This ESU was listed as threatened in 1999 and the status reaffirmed in 2005 (70 FR 37160). The National Marine Fisheries Service issued a five-year review in 2015, and concluded that this species should remain listed as threatened (NWFSC, 2015).

Critical habitat was designated for the Puget Sound ESU of Chinook Salmon in 2005 (70 FR 52630). The designated waters included the South Fork Stillaguamish River and tributaries, including Jim Creek downstream of the installation. The designation did not include approximately 3.8 miles of main stem Jim Creek on NRS(T) Jim Creek because the installation has an approved INRMP providing adequate protection and conservation benefit (70 FR 52685). There is no designated critical habitat on the installation for this species.

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 (70 FR 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.

Chinook Salmon inhabit the main Stillaguamish River, the North and South Forks, and other large tributaries. Two populations are distinguished by temporal and to a lesser degree spatial differences in spawning: North Fork summer Chinook and South Fork fall Chinook. Fish that would potentially reach Jim Creek are part of the South Fork fall Chinook population (SIRC, 2005).

There are no barriers preventing South Fork fall Chinook Salmon from reaching streams on NRS(T) Jim Creek but the overall numbers in this population are so low it is unlikely. A total of 75 Chinook redds were counted in the South Fork Stillaguamish River system in 2012. All known spawning habitat was surveyed in the main stem Jim Creek, South Fork, Pilchuck Creek, , Siberia Creek and Canyon Creek. Three redds were counted in Jim Creek downstream of the installation (WDFW and Puget Sound Treaty Indian Tribes, 2013).

South Fork fall Chinook Salmon spawn from mid-September to mid-October. Areas providing suitable spawning habitat in Jim Creek are in the lower four miles approximately eight miles downstream from the installation boundary. Chinook Salmon mature and feed in the ocean, then return to their natal streams to spawn. Habitat conditions required during adult upstream migration include adequate water quality, suitable stream flow velocity, cold water temperatures, cover and adequate channel depth for successful passage. Chinook Salmon also require large, deep cold pools for holding prior to spawning.

Substrate composition, in-stream cover, water quality, water quantity, and habitat area are important requirements for salmon during spawning. There is a strong association between pool habitat and spawning location within the Stillaguamish watershed. Areas of the river with usable spawning habitat but no pool habitat see very limited (reduced) spawning. It has been suggested that fry and smolt production could be more dependent upon the amount of suitable spawning areas than on the number of spawners.

Juvenile Chinook Salmon can be found in main stem areas, including side channels and larger tributaries throughout the river system. As the salmon fry migrate downstream, they may inhabit the river's edge, undercut banks, backwater and off-channel habitats, side channels, or banks with cover (SIRC, 2005).

Steelhead - Steelhead (Federal threatened) are an anadromous form of Rainbow Trout (*O. mykiss*). Steelhead in the Stillaguamish watershed are part of the Puget Sound Distinct Population Segment (DPS). The Puget Sound DPS includes all naturally spawned anadromous winter-run and summer-run steelhead populations in streams within the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, including the Stillaguamish River. The Puget Sound DPS was listed as threatened by NMFS in 2007 (72 FR 26722) and the listing reaffirmed after a status review in 2015 (NWFSC, 2015).

Critical habitat was designated for Puget Sound steelhead in 2016 (81 FR 9251). The designated waters include the South Fork Stillaguamish River and tributaries including Jim Creek downstream of the installation. Habitat meeting the statutory definition of critical habitat was identified on the installation, but the designation did not include approximately 3.8 miles of main stem Jim Creek on NRS(T) Jim Creek because the installation has an approved INRMP that addresses Puget Sound steelhead habitat and contains measures that provide benefits to the Puget Sound DPS of steelhead (81 FR 9262). There is no designated critical habitat on the installation for this species.

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.

There are no barriers that prevent migrating steelhead from reaching streams on the installation. Jim Creek, within the installation boundary, may contain limited amounts of habitat for steelhead but this species has not been seen on the installation in recent years. Anecdotal accounts by long-time employees noted the presence of steelhead in Jim Creek on the installation about 25 years ago. A survey conducted April 19, 2018 found no evidence of adult spawning steelhead along two miles of Jim Creek on the installation (pers. comm. Pat DeHaan. USFWS). Electrofishing surveys of installation streams were conducted in August, 2017. Rainbow Trout (the non-migrating, freshwater form of steelhead) were the most abundant species captured so the presence of migratory steelhead cannot be ruled out. The WDFW maintains a steelhead index reach on Jim Creek just downstream of the NRS(T) Jim Creek property. They have documented redds in this reach during annual surveys (data on file, PWDE, Environmental Division).

An analysis by the Northwest Fisheries Science Center (NWFSC) in 2015 found that the biological risks faced by the Puget Sound steelhead DPS have not substantively changed since the listing in 2007, or since the 2011 status review, and that the DPS was at very low viability (NWFSC, 2015).

Stillaguamish River winter steelhead were identified as a separate stock by WDFW based on their distinct spawning distribution (WDFW, 2008). Similarly, the Puget Sound technical recovery team identified one demographically independent population of native, natural run winter steelhead.

Steelhead in Jim Creek would be part of the native winter run stock. There are also two native summer populations; Deer Creek and Canyon Creek, which occur within these two tributaries (NWFSC, 2015).

Steelhead counts in the Stillaguamish River have declined steadily since the 1980s (Ford et al. 2011). Trends in abundance analyzed more recently continue to indicate a declining population. Natural productivity has been well below replacement levels since the mid-1980s for the Stillaguamish steelhead population and other Puget Sound populations (NWFSC, 2015).

This species uses all freshwater habitat types but is commonly found in riffle habitats and generally occupies faster-moving water than other salmonids (WDFW, 2008). Steelhead are found in tributaries of small streams as well as large main channels, and spawn in all sizes of stream channels. Steelhead are capable of surviving in a wide range of temperature conditions. They do best where dissolved oxygen concentration is at least seven parts per million. Deep, low-velocity pools are important wintering habitats. Spawning habitat consists of gravel substrates free of excessive silt.

Steelhead in the Stillaguamish watershed enter fresh water from November through April and spawn from March through June, with peak spawning in May. Spawning areas for this stock include the main stem Stillaguamish, the North and South Forks of the Stillaguamish, Pilchuck Creek, Jim Creek, and Canyon Creek and other tributaries (Hard et al., 2007).

Steelhead eggs incubate for one to four months, depending on water temperature, before alevins emerge, generally between February and June. After emerging from the gravel, fry commonly occupy the margins of streams and side channels, seeking cover (WDFW, 2008). Juveniles generally remain in fresh water for two years before migrating to the ocean (Myers et al., 2015). Smoltification and seaward migration occur principally from April to mid-May (NMFS, 2013). Pools within small quiet streams and beaver ponds are important for rearing fry. As the fish grow they are able to use higher energy stream environments.

Bull Trout **-** Bull Trout (Federal threatened, State candidate) occur throughout the Pacific Northwest in Washington, Oregon and Canada, and east into Idaho, Montana and Nevada. Bull Trout were listed as threatened in the coterminous United States in 1999 (64 FR 58910). One Bull Trout was captured on the installation in main stem Jim Creek during surveys in 2017.

Critical habitat was most recently designated for Bull Trout throughout their range in 2010 (75 FR 63898), including the Stillaguamish River and its tributaries. The USFWS identified about 0.7 miles of Bull Trout stream habitat on the installation, but determined that conservation efforts identified in the NRS(T) Jim Creek INRMP would provide benefits to Bull Trout occurring within or adjacent to the installation and did not designate critical habitat on the installation (75 FR 63945).

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 (75 FR 63897, 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 °C (36 to 59 °F), 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.

Bull Trout in the Stillaguamish watershed are part of the Coastal-Puget Sound population. The Stillaguamish River is one of eight core areas for Bull Trout in Puget Sound (USFWS, 2015a). Bull Trout in the South Fork Stillaguamish River are recognized as a local population within this core area. Two other local populations exist in the Stillaguamish Watershed: Canyon Creek and Upper Deer Creek. However, based on survey efforts conducted in 2002 and 2003 these two local populations may be extirpated (M. Downen, Washington Department of Fish and Wildlife, *in litt.* 2008). The South Fork Stillaguamish local population has a small population size. Consistently low redd counts suggest this population it is highly susceptible to stochastic (random or chance) events (USFWS, 2015a).

Primary habitat threats to Bull Trout in the Stillaguamish watershed include exacerbated landslide activity from legacy forest management, damage from recreational mining, and seasonal high water temperatures due to forest management, residential development and urbanization (USFWS, 2015a).

Overall, spawning habitat in the Stillaguamish watershed is limited. In most cases only the extreme upper reaches of some tributaries appear to provide adequate spawning conditions due to the lack of accessible high elevation stream habitat and instability of soils found in the basin (USFWS, 2004b). Jim Creek contains limited amounts of foraging, migration, and overwintering habitat for Bull Trout. The critical habitat final rule noted that the installation includes approximately 0.7 mile of stream habitat and that the lower reaches of Jim Creek provide foraging habitat for subadult and adult Bull Trout (75 FR 63898).

Bull Trout exhibit resident and migratory life-history strategies. Resident Bull Trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory Bull Trout spawn in tributary streams where juvenile fish rear from one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas, to saltwater (anadromous). The Coastal-Puget Sound Bull Trout population includes an anadromous form. Resident and migratory forms may be found together, and either may produce progeny exhibiting either resident or migratory behavior. Resident Bull Trout are smaller than their migratory counterparts, with an average size of six to twelve inches. Migratory Bull Trout are typically 24 inches or more in length.

This species has the most particular habitat requirements of all the Pacific Northwest salmonids, with a need for cold and clean water, complex habitats, and a connection between rivers, lakes or ocean habitats to headwater streams for migratory activities. As a result, Bull Trout are more sensitive to habitat degradation or destruction, and the health of this species can serve as a good indicator of water quality

Spawning occurs in the late summer and early fall. Bull Trout spawn in low-gradient sections of high-gradient streams in clean, loose gravel when water temperatures are 41- 48 ^{o}F. Bull Trout are repeat spawners; spawning annually or bi-annually and returning to larger rivers, lakes, or estuaries to forage. Requirements for spawning habitat are variable, but generally include streams

with deep pools, riffles, undercut banks and numerous large logs. All life stages of Bull Trout require some type of cover, such as vegetative cover or undercut banks that form ledges (USFWS, 2004).

Fry emerge from the gravel in early April to May, depending on temperature and flow conditions. After one to three years rearing in an upper watershed, migratory Bull Trout travel downstream, usually in the spring months, where they enter a larger body of water. Bull Trout have a high degree of fidelity to their natal streams and straying is rare (USFWS, 2005).

2.3.2 Other Species of Concern and Candidate Species

Coho Salmon **-** Puget Sound Coho Salmon, which includes those in the Stillaguamish watershed, are identified as a species of concern by NMFS. These salmon occur in streams at NRS(T) Jim Creek and spawn in tributaries on the installation. They can be observed in the stream near Coho Campground in the fall from mid-November into January.

There are two distinct Coho Salmon populations in the Stillaguamish watershed: Stillaguamish and Deer Creek populations. The Stillaguamish population is a mix of native and non-native fish due to releases of hatchery Coho Salmon from the early 1950s to 1981. This population is classified as depressed. The Deer Creek population is a native population. Its status is unknown (SIRC, 2005). The Stillaguamish Tribe operates a Coho Salmon broodstock program with fish derived from naturally and hatchery spawned adults.

Adult Coho Salmon return to the Stillaguamish River in September and October, and generally spawn from mid-November through January. They spawn in almost all accessible tributary streams in the Stillaguamish watershed, preferring smaller streams with stable streamflow and gravel-sized substrate. Juvenile Coho rear throughout the watershed, preferring small streams, side channels, wetlands and beaver ponds (SIRC, 2005). Fry emerge in March and April, and spend a full year in natal streams before migrating as smolts to salt water (Miller and Somers 1989).

Habitat conditions required during adult upstream migration include adequate water quality and suitable stream flow velocity, temperature, cover and depth for successful passage. Returning Coho Salmon often gather at the mouths of streams and wait for waters to rise, for example after a rain storm, before moving upstream. The higher flows and deeper water enable the fish to pass obstacles such as log jams and beaver dams that can impair passage at low flows (WDFW, 2011).

Off-channel habitat - A series of off-channel habitat pools were constructed in the early 1990s along Rehab Creek with the intent of providing resting habitat for Coho Salmon. A walk-through evaluation of the area in 2009 found that the stream channel had migrated and water flow had shifted away from the constructed pools. Flows through the area are episodic. A number of the pools were overgrown with vegetation, rendering them unsuitable as habitat. The feasibility of restoring these pools will be undertaken at a later date.

Spawning ground surveys -The WDFW annually conducts Coho spawning ground surveys in a designated index stream section on the installation. The surveys are important in calculating the number of Coho Salmon in the Stillaguamish River and contributing to WDFW's management of these fish. The WDFW has 30 consecutive years of data from NRS(T) Jim Creek. The State relies on the Coho counts performed at NRS(T) Jim Creek to produce annual adult salmon return estimates used in fisheries management.

Fish rearing facility – For six years, from 1994 to 1999, a Coho rearing facility operated at NRS(T) Jim Creek to enhance the Stillaguamish watershed population of this species (Figure 18). Local stock Coho smolts, not hatchery fish, were raised and released to help rebuild depleted naturally spawning Coho Salmon runs in the Jim Creek watershed. The facility had the capacity to rear 10,000 fingerling fish each year, which were released into installation streams. The effort was successful and Coho populations returned to self-sustaining levels. Adult Coho Salmon continue to return annually to Jim Creek and its tributaries to spawn.

The creation, construction, and operation of the rearing facility were cooperative efforts, executed jointly by the Navy, the Stillaguamish Tribe and other entities. Administratively, the facility operated under an MOU signed by Navy representatives, Stillaguamish Tribal members, USFWS, WDFW and others. The fish rearing facility and the remaining equipment (fiberglass tanks, piping) are owned by the Navy; the materials were purchased with DoD Legacy Resource Management Program funds.

The facility has been in "standby mode" since 2000. Interest is periodically expressed by the Stillaguamish Tribe to bring the facility back into use for raising Chinook Salmon, but no specific proposal has been developed.

Figure 18. Coho Salmon rearing facility.

Salish Sucker - The Salish Sucker (State Monitored) is a subspecies of the Longnose Sucker. It is listed as Endangered in Canada. This species occurs in abundance in the Twin Lakes system. A 1987 study identified Salish Sucker in Twin Lakes (Pearson, 1999) and more recently, a survey confirmed the presence of this species (Garrett and Spinelli, 2017).

NRS(T) Jim Creek is home to one of the few known populations of this species in Washington State. The Salish Sucker occurs in western Washington and the lower Frazer Valley in British Columbia. It has been found in six river systems draining to Puget Sound, including the Stillaguamish River. In Washington there are also several lake populations (WDFW, 2015).

Salish Suckers are benthic dwellers mainly found in lowland streams and associated ponds, in off-channel sloughs and marshes of big rivers, as well as in lakes. They inhabit a variety of water velocities over silt and sand substrates, often in areas with instream vegetation and over-hanging riparian vegetation. They have a preference for slow-moving water in streams and most likely seek off-channel habitats during high stream-flows in winter and spring (WDFW, 2015).

At NRS(T) Jim Creek, Salish Suckers occur throughout the entire Twin Lakes system and in main stem Jim Creek. Beaver dam complexes between the lakes are important habitat areas supporting large numbers of fish. Individuals of multiple age classes were captured in surveys in 2016.

Morale, Welfare, and Recreation catch records do not indicate Salish Suckers are being caught in Twin lakes during recreational fisheries (Shaw, 2013).

Bald Eagle - The bald eagle (USFWS Species of Concern) is protected under the Bald and Golden Eagle Protection Act (16 U.S.C. § 668) and the Migratory Bird Treaty Act (16 U.S.C. § 703). Bald eagles are periodically seen on the installation. In the late fall they feed on the carcasses of spawned Coho Salmon in tributary streams. There are no known bald eagle nests on the installation.

A large raptor, the bald eagle has a wingspread of about seven feet. Adults have a dark brown body and wings, white head and tail, and a yellow beak. Juveniles are mostly brown with white mottling on the body, tail, and undersides of wings. Adult plumage usually is obtained by the 6th year. In flight, the bald eagle often soars or glides with the wings held at a right angle to the body.

Bald eagles nest in large trees, usually near marine shorelines, large lakes or rivers. They prey on fish, waterfowl, and small mammals, or scavenge for food. Many birds that nest in Canada and Alaska migrate south to overwinter in Washington, concentrating on rivers with spawned-out salmon, especially Chum Salmon. Bald eagles generally first breed at about five to six years of age, and adults may not lay eggs every year (WDFW, 2015).

Northern Goshawk - The northern goshawk (USFWS Species of Concern, State Candidate) is a large hawk of about 22-24 inches in length; the largest of all the accipiters. Northern goshawks generally prefer mature or old-growth conifer, mixed hardwood-conifer, birch, or aspen forest for

nesting. However, they can also be found in younger forests intermingled with mature trees with high canopies for nesting.

There are no known goshawk nests on the installation, and there have been no confirmed sightings of northern goshawk on the installation, but based on their habitat preferences and their presence in the general area, they may periodically move across installation lands.

Golden Eagle - The golden eagle (State Candidate) is protected under the Bald and Golden Eagle Protection Act (16 U.S.C. § 668) and the Migratory Bird Treaty Act (16 U.S.C. § 703). It is a large, dark-colored raptor with a golden crown and nape, and wingspan of up to seven feet.

Golden eagles have a broad distribution throughout mountainous areas of Washington, especially in eastern Washington. There are over 300 documented breeding territories in Washington, of which over 80 percent are in eastern Washington. Occupancy of these sites is not well understood and information on the number of sites occupied in a given year, as well as an estimate of abundance, are lacking (WDFW, 2015).

The species breeds at higher densities in mountainous, open areas dominated by shrub-steppe communities, but also may nest at lower densities in conifer forest where open space occurs (e.g., burns, clearcuts). Most nests in mountainous areas occur on large cliffs, but tree nests are used in flat terrain at lower elevations in more open and semi-open landscapes and in areas dominated by conifer forest. Golden eagles forage in grasslands and shrublands and prey primarily on mammals such as jackrabbits, cottontails and ground squirrels.

There are no known golden eagle nests on the installation and no sightings have been reported to the NRM, although they may occasionally move across installation lands.

Townsend's Big-eared Bat - Townsend's big-eared bat (WDFW Candidate) occurs across a large range covering western North America, with isolated populations reaching east to the Ozarks and Appalachia. It typically inhabits lowland conifer and deciduous forests, montane conifer forest, ponderosa pine forest, and other areas including open fields (WDFW, 2015). There are scattered populations throughout Washington. This is a medium-sized bat with pale gray or brown fur. Notable are the large ears which can reach a length of 1 ½ inches.

Individuals of this species have been found at NRS(T) Jim Creek within the Jim Creek bridge structure during bat surveys performed as part of the USFW Bat Grid project (Ormsbee and Hohmann, 2010 and data on file, PWDE Environmental Division).

More than 90% of this species diet is usually moths (Hayes and Wiles, 2013 citing others). Foraging activity extends from after sunset to before sunrise. Typical travel distances are likely ½ to 11 miles between day roosts and foraging sites. Townsend's big-eared bats exhibit a slow and highly maneuverable flight and feed mostly on insects caught near foliage. In the west, they forage in closed-canopy forests, canopy gaps, forest edges, riparian corridors and shrub-steppe.

Breeding occurs in late summer to early fall. Females form nursery colonies generally of less than 100 adults and males roost separately during the nursery period. Nearly all adult females breed every year (WDFW, 2015). The length of pregnancy and therefore and timing of births is quite variable within and among colonies and years (Hayes and Wiles, 2013).

Townsend's big-eared bats roost in caves, mines, abandoned buildings and other areas. Specifically in Washington, night roosting and maternity roosting occur in lava tube caves, old buildings, bridges, and concrete bunkers. Large old-growth trees with basal hollows may have formerly been an important roosting habitat in Washington. Fidelity to roosts is high in this species. Individuals often return yearly to the same site, or group of sites (Hayes and Wiles, 2013).

Bats in Washington are considered wildlife and per WAC 220-200-100 are protected and cannot be hunted, except when found in or immediately adjacent to dwellings or other human-occupied buildings.

American Pika **-** The American pika (State Species of Greatest Conservation Need) is a small, tailless member the taxonomic order Lagomorpha (Hall, 1981), a relative of the rabbit. Pikas occur at alpine and subalpine locations in western North America ranging from central and southwestern British Columbia to the southern Rocky Mountains of New Mexico, and the southern Sierra Nevada Mountains of California (Smith 1981, Hall 1981, Smith and Weston, 1990).

The Washington Department of Fish and Wildlife includes the American pika in its SWAP. The SWAP identifies climate change as potentially affecting this specie's distribution and population trends, as well as the threat of general habitat loss and degradation.

The species is generally restricted to high elevation talus habitats however in 2009 a pika was seen at NRS(T) Jim Creek in the rock armoring that borders Jim Creek near the transmitter building, at an elevation of about 738 feet. Subsequent surveys documented additional individuals of this species and WDFW considers there to be population on the installation. Published accounts of pikas in low elevation forested habitats are unusual and were apparently restricted to the Pacific Northwest in the first half of the 20th Century (Howell, 1924; Horsfall, 1925; Roest, 1953; Cowan, 1954). Horsfall (1925) noted pikas living as low as 100 feet in the Columbia River Gorge and extant populations were confirmed there by Simpson (2009). This was the only population in habitat similar to that found at NRS(T) Jim Creek known at the time. Since an initial literature review in 2009 by Milner and Cyra (2016) others in the Pacific Northwest have found pikas in low elevation sites located far from alpine talus (e.g. Manning and Hagar 2011, Henry et al. 2012a, 2012b).

In 2009, the American Pika was considered for listing under the ESA but subsequently was not listed under the Act. Surveys to document the occurrence of American pikas at NRS(T) Jim Creek were conducted from 2013 through 2015 under a cooperative agreement with WDFW. Pika presence was documented at four locations ranging in elevation from 738 to 2756 feet (Milner and

Cyra, 2016). These animals may have adapted behaviors that enable them to survive in low elevation sites, including altering the timing of their above ground activities and their diets. For example, pikas living in alpine habitats store food as large haypiles for consumption in winter when talus fields are under deep snow (Morrison et al., 2009). Winters at NRS(T) Jim Creek are characterized by cool rainy conditions, which may enable pikas to forage year-round and reduce their need for large food caches. Evidence of small food caches were occasionally found at NRS(T) Jim Creek but pikas may also be augmenting their diet by eating moss (Milner and Cyra, 2016). Moss was abundant at three of the four occupied sites.

It is not known whether the pikas at NRS(T) Jim Creek represent a viable population although installation staff reported occasionally seeing them over the last 20 years or more (Hartman, pers. comm.). A sighting of more than one animal at a time during the WDFW surveys at any of the four sites was rare and it could not be determined whether pikas at the installation were reproducing. It is unclear why pikas occur at NRS(T) Jim Creek since they rarely disperse more than about 1.8 miles in alpine talus (Smith, 1978). Dispersal through low elevations forested sites may be further evidence that this species is more adaptable than previously assumed.

Western Toad - The western toad (USFWS Species of Concern, State Candidate and Species of Greatest Conservation Need) occurs across Washington in a variety of terrestrial habitats including prairies, forests, canyon grasslands and ponderosa pine-Oregon Oak habitat (WDFW, 2015). This species has been found at NRS(T) Jim Creek in suitable habitat (NAVFAC, 2007).

The species' range in Washington is large and the species remains locally common in many areas. However, local declines have been documented (WDFW, 2015). Western Toad declines have been documented in the Puget Trough and lower Columbia River. Of 86 historical sites in the Puget Trough Ecoregion, only 21 have been confirmed as present since 1980.

Specific breeding sites have not been identified on the installation. Breeding waters are usually permanent and include wetlands, ponds, lakes, reservoir coves and the still-water off-channel habitats of rivers, as well as river edges. Anecdotal reports indicate that many populations return to the same egg laying location every year. Males gather at breeding sites days to weeks before egg laying commences. Females are uncommon at breeding sites until breeding is about to commence. Most toads at each breeding site lay all eggs within a week.

Eggs are laid in long strings on bare sediments or intertwined in vegetation in shallow water near shore. Toads have been observed to wrap their eggs around vegetation in deeper water (approximately three feet) away from shore, but this is not typical. Tadpoles grow to approximately two inches. The tadpoles form dense aggregations or "schools" composed of thousands of individuals.

Adult toads are primarily terrestrial, but often occur near water bodies, especially in drier climates. Overwintering habitat has not been described for Washington. In Thurston County, individual

toads have been found in mid-February within duff under sword ferns suggesting that some individuals overwinter terrestrially in areas with mild winters, or at least occur terrestrially during the mild portions of winters (WDFW, 2015). Given the weather regime on the installation, Western toads would not be expected to overwinter terrestrially at NRS(T) Jim Creek.

This species is especially vulnerable to road traffic during adult movements to and from breeding sites in the spring, and dispersal of newly metamorphosed toads away from breeding sites in the summer and fall. Because the toads may return to the same egg-laying site annually, alteration of these sites can put populations at risk of declines or extirpation. Breeding sites, especially in western Washington, appear to be vulnerable to successional changes in vegetation, i.e., a tendency for more open wetlands to succeed into shrub-scrub wetlands that provide unsuitable breeding habitat (WNHP et al., 2009).

Coastal Tailed Frog - The tailed frog (USFWS Species of Concern, State monitored) is endemic to the Pacific Northwest and could potentially occur in suitable habitat on the installation.

This species lives year-round in and near streams. It is primarily active at night, but tadpoles and frogs can also be observed during the day. Frogs are most active from April to October, but this can vary by site and habitat conditions. Tailed frogs are primarily found in and near relatively cold, clear, rocky streams in mature forests. All life stages are adapted for life in fast flowing streams.

Tailed frogs mate in the fall. Females are thought to store sperm until eggs are deposited in the summer. The male's "tail" is used for internal fertilization to prevent sperm from being washed away. Eggs are attached to the undersides of rocks to keep them in place in fast-moving water. Eggs hatch in approximately six weeks. The tadpole phase lasts two to five years depending on location and elevation. The tadpoles have a large ventral suction mouth that allows them to feed and move in high-energy streams without losing contact with a substrate and unintentionally drifting. Metamorphosis usually takes place in late summer.

This species is vulnerable to forestry practices and alterations to riparian areas of streams, especially alterations that change the moisture regime, increase stream temperature, increase sediment load, reduce woody debris input and change stream bank integrity. Protection of upper stream reaches of streams is particularly important for this species (Hallock and McAllister, Coastal Tailed Frog 2005)

Cascades Frog - In 2015, the USFWS found that a petition to list the cascades frog as threatened or endangered presented substantial information indicating the petition action *may be* warranted (80 FR 37568). The USFWS is initiating a status review to determine whether the petition action under the Endangered Species Act *is* warranted.

Cascades frogs (USFWS Candidate, State monitored) have been confirmed on the installation (NAVFAC, 2007). This species is found primarily at higher elevations, mostly above 2000 ft. in

Washington, within suitable breeding sites. Most individuals are found in the vicinity of standing or flowing water but it is not unusual to find them away from water. They can be active both day and night. Cascades frogs can be abundant at sites where they occur (Hallock and McAllister, 2009).

Males call during the day and the intensity increases on sunny days. One must be in close vicinity to the breeding site to hear the males. Breeding habitats include a variety of still water bodies that generally persist for at least two months after snow melt. Breeding habitat includes wetlands, ponds, lakes, flooded meadows, small alpine ponds and still water edges of small creeks. Eggs are laid in shallow open areas that receive sun. Tadpoles are bottom feeders that prefer muddy or silty substrate in shallow water.

Results of surveys in Olympic National Park in the late 1990s found Cascades frogs to be among the most commonly encountered pond-breeding species and no evidence of decline was reported. Declines have, however, been reported from Oregon and most severely from California (Hallock and McAllister, 2009). The Washington Herp Atlas indicates the Cascades frog is a common species that remains widespread throughout its historical habitat in Washington (Hallock and McAllister, 2009).

Yellow Cedar - In 2015, the USFWS found that a petition to list yellow cedar as threatened or endangered presented substantial information indicating the petition action *may be* warranted (80 FR 19259). The USFWS is initiating a status review to determine whether the petition action under the Endangered Species Act *is* warranted.

NRS(T) Jim Creek contains habitat suitable for yellow cedar but mature trees of this species are not known to occur. In 2016, at the request of the Stillaguamish Tribe, over 100 individual yellow cedar seedlings were planted within Coyote Campground and in the riparian area adjacent to Jim Creek. Not all the seedlings survived and the success of remaining seedlings is periodically monitored.

Yellow cedar is a member of the cypress family and is native to the Pacific coast in Alaska and British Columbia and the Cascade Range of Oregon and Washington. In Washington, yellow cedar is common on the slopes of the Cascade Mountains and more sporadically distributed within the Olympic Mountains. The species rarely occurs below elevations of 1970 feet (Lesher and Henderson *in* Harrington, 2010; Zobel and Antos, 1986). The highest elevations at NRS(T) Jim Creek; Wheeler mountain at 3,200 feet and Blue mountain at 2,900 feet, are within the elevation range for this species.

Yellow cedar reaches heights of up to 133 feet and trunk diameters up to 3 feet. The yellow cedar tree is covered in shaggy, gray, fibrous bark, with soft green to dark green foliage that lays in flat sprays with long scale-leaves, and cones that have four (occasionally six) scales. Yellow cedar is

one of the longest-lived and slowest growing trees in the western United States and Canada; living over 1,000 years, with limited natural regeneration (Ritland et al., 2001).

Yellow cedar is typically confined to cool, humid areas, and conditions where yellow cedar grows in the Cascade Range of Washington and Oregon are somewhat comparable to those at sea level in coastal Alaska (Harris, 1990). Yellow cedar occupies harsh sites with poorly drained soils, often on the edges of bogs, where nutrient supplies are low. In these very wet, rocky or acidic areas, few other tree species are able to survive, and there is little competition (Harris, 1990; Lesher and Henderson *in* Harrington, 2010).

2.3.3 Critical Habitat

Critical habitat is designated for the survival and recovery of species that are listed as threatened or endangered under the Endangered Species Act (ESA). Critical habitat includes those areas occupied by the species, in which are found physical and biological features that are essential to the conservation of an ESA-listed species and which may require special management considerations or protection. Critical habitat may also include unoccupied habitat if the Interior Secretary determines that the unoccupied habitat is essential for the conservation of the species.

At NRS(T) Jim Creek, designated critical habitat exists for the marbled murrelet (see Marbled Murrelet section above).

2.3.4 Essential Fish Habitat (EFH)

Streams at NRS(T) Jim Creek and downstream waters are within the geographic range and definition of freshwater EFH for Chinook, Pink, and Coho Salmon (PFMC, 2016). This includes main stem Jim Creek, and its tributaries on the installation. In addition to streams, EFH includes lakes, ponds, wetlands and other currently viable water bodies and most of the habitat historically accessible to salmon. Thus EFH assessments are required for proposed actions. An EFH assessment determines whether or not a proposed action may adversely affect designated EFH within a 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 action. Essential fish habitat determinations are generally documented within Biological Assessments for effects to ESA-listed fishes at NRS(T) Jim Creek.

Background and details **-** The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267) requires that regional management councils describe EFH in their fishery management plans, minimize impacts on EFH from fishing activities, and require Federal agencies to consult with NMFS on activities that may adversely affect EFH. An adverse effect to EFH is "any impact that reduces the quality and/or quantity of EFH" (50 CFR 600.910(a)).

The regional management council for this area is the Pacific Fishery Management Council (PFMC). In their Fishery Management Plan, they define EFH for the Pacific Coast salmon fishery as "those waters and substrate necessary for salmon production needed to support a long-term, sustainable salmon fishery and salmon contributions to a healthy ecosystem" (PFMC, 2016).

The geographic extent of freshwater EFH includes all habitats in that are currently occupied by stocks of salmon managed under the Fishery Management Plan (Chinook Salmon, Coho Salmon, and Puget Sound Pink Salmon), as well as most of the habitats that were historically occupied by those same stocks (PFMC, 2016).

Freshwater EFH for all salmon species consists of four major components, (1) spawning and incubation; (2) juvenile rearing; (3) juvenile migration corridors; and (4) adult migration corridors and adult holding habitat. Important features of essential habitat for spawning, rearing, and migration include adequate (1) substrate composition; (2) water quality (e.g., dissolved oxygen, nutrients, temperature, etc.); (3) water quantity, depth, and velocity; (4) channel gradient and stability; (5) prey availability; (6) cover and habitat complexity (e.g., LWD, channel complexity, etc.); (7) space; (8) access and passage; and (9) habitat and flood plain connectivity (PFMC, 2014).

Habitat Areas of Particular Concern - The implementing regulations for EFH provisions of the MSA (50 CFR Part 600) recommend that Fishery Management Plans include identification of Habitat Areas of Particular Concern (HAPCs) (50 CFR 600.815(8)). Such areas include all waters, substrates, and associated biological communities falling within the areas designated as HAPCs.

The PFMC designated five HAPCs in the Pacific Coast Salmon Fishery Management Plan:

1) complex channels and floodplain habitats;

2) thermal refugia;

3) spawning habitat;

4) estuaries; and

5) marine and estuarine submerged aquatic vegetation.

Freshwater HAPCs have not been comprehensively mapped, and some may vary in location and extent over time. The defining criteria of these HAPCs identified by the PFMC (2014) should be applied to determine whether a given area is designated as a HAPC for Pacific Coast salmon.

The definition of EFH also includes areas above artificial barriers, except for certain barriers and dams that fish cannot pass. However, activities that occur above these barriers, and that are likely to affect salmon below the barriers, may be affected by EFH rulings (PFMC, 2016).

2.3.5 Bats

Bats are important components of functioning ecosystems. They are most notable for eating large numbers of night-flying insects such as mosquitoes, termites, flies, and moths. Bats locate flying insects primarily by using a radar system known as echolocation. The bat emits high-pitched sound waves that bounce back to the bat when the sound waves strike a prey object.

Habitat for bats can include old-growth trees with suitable breaks in the canopy to permit entry beneath the overstory, such as that within NRS(T) Jim Creek's protected old-growth forest. Much of this habitat lies within 1968 feet of surface waters within the Cub Creek subbasin, a factor affecting day roost site selection by female long-legged Myotis bats.

Eight bat species have been documented at NRS(T) Jim Creek (Table 7). Focused surveys were conducted in 2008, 2009 and 2010 as part of the Bat Grid Inventory and Monitoring Project (Ormsbee and Hohmann, 2010). The Bat Grid Project was initiated through the U.S. Forest Service in 2002. In 2008, it was expanded to include seven DoD facilities in Washington, one of which was NRS(T) Jim Creek. The expanded surveys continued the implementation of a wall-to-wall sampling grid for inventorying and monitoring bat species across the Pacific Northwest, specifically incorporating lands associated with DoD facilities and neighboring partners (Ormsbee and Hohmann, 2010).

TABLE 7. BAT SPECIES DOCUMENTED AT NRS(T) JIM CREEK 2008, 2009 AND 2010.

Species	Location –Captured	Location - Confirmed with Acoustics/Echolocation
Townsend's big-eared bat	Within Jim Creek bridge structure in 2010	
Long-legged myotis	Within Jim Creek bridge structure in 2010	Upper Twin Lake, near MWR administrative bldg. (B4)
Little brown bat	Upper Twin Lake	Upper Twin Lake, Cub Creek Reservoir
California myotis		Upper Twin Lake
Silver-haired bat		Cub Creek Reservoir, upper Twin Lakes, and antenna ground field
Hoary bat		Cub Creek Reservoir, Upper Twin Lake
Yuma myotis		Cub Creek Reservoir, Upper Twin Lake
Big brown Bat		Cub Creek Reservoir

Surveyors at NRS(T) Jim Creek used mist nets to capture flying bats, echolocation monitoring devices, and exploration of likely roosting habitat. The area near the spillway at the Cub Creek reservoir was noted as containing high quality bat habitat because it is fairly secluded and has high insect populations. The bat species detected at NRS(T) Jim Creek are forest-dwelling and use trees and snags for roosting. Loss of large-diameter trees and snags during timber harvest can negatively affect some bat species (Hayes and Wiles, 2013).

The Townsend's Big-eared Bat is identified by WDFW as a State Candidate species. The California myotis, silver-haired bat and hoary bat are recognized as species of greatest conservation need in WDFW's 2016 State Wildlife Action Plan. All eight bat species are included in WDFW's Bat Conservation Plan (Hayes and Wiles, 2013).

***Jim Creek Bridge (#43)* –** USFS bat surveyors noted the importance of the Jim Creek bridge (# 43) as excellent bat habitat. The underside of this bridge contains cement vaults that are being used by bats for roosting. Surveyors in 2010 speculated that bats found in the bridge were transients; possibly using the bridge as a rest stop during the evening as they traveled between their home roosts and feeding locations. Myotis species and a Townsend's Big-eared bat were found in 2010 within the bridge structure (notes on file at PWDE Environmental Division).

***White Nose Syndrome* -** White nose syndrome (WNS) is a disease caused by a fungus and is found in bats. It is devastating to bat populations but is not known to pose a threat to humans, pets, livestock or other wildlife. The disease is transmitted primarily from bat to bat, although people can carry fungal spores on their clothing, shoes or caving gear.

White Nose Syndrome has spread quickly among bats in eastern North America, killing more than six million beneficial insect-eating bats since it was first documented nearly a decade ago. The disease is named for the fuzzy white fungal growth that is sometimes observed on the muzzles of infected bats. The fungus invades the skin of hibernating bats and causes damage, especially to delicate wing tissue, and physiologic imbalances that can lead to disturbed hibernation, depleted fat reserves, dehydration and death.

White-nose syndrome is starting to appear in Washington State. In March 2016, an infected little brown bat was discovered near North Bend, Washington, in King county about 80 miles south of NRS(T) Jim Creek. This was the first recorded occurrence of this disease in western North America. Subsequently a silver-haired bat, also in King County, tested positive for *Pseudogymnoascus destructans*, the fungus that causes WNS. However, this silver-haired bat did not show signs of having actually contracted WNS. This reinforced the scenario that the sliver-haired bat may be a carrier of the disease to other bat species. In May 2017, a Yuma Myotis also was discovered, again in King county, as testing positive for WNS.
http://wdfw.wa.gov/conservation/health/wns/index.html

The USFWS leads the national WNS response effort, working with state and federal partners to respond to the disease. In Washington, the USFWS will conduct surveillance near where the infected bat was found to determine the extent of WNS in the area. The WDFW is responsible for bat management and conservation in Washington and will coordinate surveillance and response efforts.

WDFW advises against handling bats that appear sick or are found dead. Dead bats, or bats exhibiting unusual behavior such as flying outside during the day or during freezing weather, are to be reported online at http://wdfw.wa.gov/conservation/health/wns or to the WDFW Wildlife Health Hotline at (800) 606-8768.

2.3.6 Migratory Birds

Migratory birds include most native bird species; those naturally occurring in the United States. NRS (T) Jim Creek contains undeveloped forest, riparian areas, wetlands, lake shorelines and other environments providing habitat for many species of migratory birds. Swallows, swifts, finches, hummingbirds and other species occur at the installation. A list of birds observed on the installation, as well as species that might occur is in Appendix I.

Larger birds such as osprey, hawks, eagles, and falcons have also been seen at the installation. Targeted bird surveys have not been conducted, but given the nature of installation lands, it's reasonable to expect a variety of species to be present that are typically found in forested areas of the lower Cascade mountains.

2.3.7 Other wildlife species

Other wildlife species found on the installation are typical of those found in undeveloped, lower elevation forests, rivers, and lakes of the Cascade foothills. Black bear, black-tailed deer, beaver, bobcats, weasels, river otters and other animals have been seen at the installation and occupy suitable habitat or move through the area. Since the installation is not entirely fenced, wildlife can

move on and off installation lands. Mammal species observed on the installation, and those that might occur are listed in Appendix I.

Beavers and beaver dams **-** Several studies demonstrate the importance of beaver dams to salmonid habitat (e.g., Pollock et al., 2004, Bouwes et al., 2016). Periodically beavers construct dams in tributaries of Jim Creek on the installation. Beaver dams should be evaluated concerning the need for removal. Where they are not impacting mission operations and don't pose a safety risk or cause an unacceptable amount of flooding, they should be left in place to enhance salmonid habitat.

2.3.8 Other fish species

Coho, Chum, **and Pink Salmon** spawn in the fall and winter in streams on the installation. The WDFW annually conducts Coho spawning counts in a designated index stream section that is a tributary to Jim Creek. The State relies on these counts in producing annual adult salmon return estimates used in fisheries management for the state of Washington.

Chum Salmon are occasionally documented during the WDFW Coho counts. These fish might be remnants of an introduction program conducted in the 1980's. In 1987 and 1988, the Stillaguamish Tribe imprinted some Chum Salmon in Hatchery Creek; releasing them into this stream. The broodstock were collected from Harvey Creek, a stream within the Stillaguamish watershed but not on NRS(T) Jim Creek.

Pink Salmon return to spawn in alternate years; appearing only in odd-numbered years. When runs of Pink Salmon are exceptionally large, a few of these fish can be seen in the fall at NRS(T) Jim Creek, in the same tributaries used by Coho Salmon.

In 2016, the lake system (Upper and Lower Twin, and Cub Creek Reservoir) was surveyed specifically for fish species composition (Garrett and Spinelli, 2017). **Salish Sucker, Coastal Cutthroat Trout, Rainbow Trout, Redside Shiner and Speckled Dace** were documented during the survey. Cutthroat Trout are occasionally caught in the recreational fishery along with the stocked Rainbow Trout.

Initial stream surveys conducted in 2017 by the USFWS captured eleven species of native and non-native fish in main stem Jim Creek and tributaries on the installation. The most abundant species were **Rainbow Trout, Coho Salmon, Torrent Sculpin** and **Long Nose Dace**.

Other fish species that occur in the Stillaguamish watershed include Sockeye Salmon, Eastern Brook Trout, and Redside Shiner.

2.3.9 Amphibians and Reptiles

Partnership for Amphibian and Reptile Conservation (PARC) scientists visited NRS(T) Jim Creek in 2007, 2010 and 2011. They identified 17 reptile and amphibian species as present or potentially occurring on the installation (Table 8) (Data on file, PWDE Environmental Division).

TABLE 8. AMPHIBIANS AND REPTILES AT NRS(T) JIM CREEK.

Species	Presence	Federal Status	State Status
Western Toad *Bufo boreas*	Confirmed	Species of Concern	Candidate
Cascades Frog *Rana cascadae*	Confirmed	Candidate	State Monitored
Northern Pacific Chorus Frog *Pseudacris regilla*	Confirmed	None	None
Northern Red-legged Frog *Rana aurora*	Confirmed	None	None
Northern Alligator Lizard *Elgaria coerulea*	Confirmed	None	None
Rough-skinned Newt *Taricha granulosa*	Confirmed	None	None
Northwestern Salamander *Ambystoma gracile*	Confirmed	None	None
Coastal Giant Salamander *Dicamptodon tenebrosus*	Confirmed	None	None
Ensatina *Ensatina eschscholtzii*	Confirmed	None	None
Western Redback Salamander *Plethodon vehiculum*	Confirmed	None	None
Northwestern Gartersnake *Thamnophis ordinoides*	Confirmed	None	None
Common Gartersnake *Thamnophis sirtalis*	Confirmed	None	None
Coastal Tailed Frog *Ascaphus truei*	Potential	Species of Concern	State Monitored
American Bullfrog *Lithobates catesbeianus*	Potential	None	None
Long-toed Salamander *Ambystoma macrodactylum*	Potential	None	None
Northern Rubber Boa *Charina bottae*	Potential	None	None
Painted Turtle *Chrysemys picta*	Potential	None	None

Chytridiomycosis at NRS(T) Jim Creek - Chytridiomycosis is a disease found in amphibians that is caused by high levels of the chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*). *Batrachochytrium dendrobatidis* can potentially devastate amphibian populations on a global scale. The distribution of amphibians with *Bd* infections is widespread but the distribution of amphibian population declines caused by lethal outbreaks of *Bd* is restricted to several areas including the western United States.

The DoD conducted surveys in 2009, 2011 and 2013 for *Bd* in amphibians on U.S. military lands to understand the fungus's presence and intensity in relation to temperature, precipitation, spatial and temporal patterns, and other factors. As part of this effort, samples were taken from amphibians at NRS(T) Jim Creek in 2011 and 2013 (Lannoo et al., 2014).

The *Bd* fungus was detected in samples in 2011 and 2013. In 2011, *Bd* was detected in less than 10 percent of the samples (Petersen et al., 2013). In 2013, eight of twelve amphibian samples taken, or over 50 percent, tested positive for *Bd* (Lannoo et al., 2014). Although present, the *Bd* fungus does not appear to be having a negative impact on amphibian species at a population level at NRS(T) Jim Creek. For a *Bd* infection to be considered the disease chytridiomycosis, zoospore levels must be greater than 10,000. The average zoospore equivalent for positive samples in Lanoo's 2013 study, which included NRS(T) Jim Creek, was 11.

2.3.10 Benthic Macroinvertebrates

Benthic macroinvertebrates are bottom dwelling organisms such as aquatic worms, snails, clams and crustaceans. Inventories of benthic invertebrates provide information about trophic interactions in stream environments and the health of the system. In August 2008 a Benthic-Inventory of Biotic Integrity (B-IBI) was conducted in order to quantify the biological health of EFH and associated stream reaches on the installation. This study created an initial, baseline characterization of benthic biological integrity for Jim Creek and its tributaries (Wilkins et al., 2008).

According to the qualitative grading system for B-IBI in Puget Sound Lowlands, sites with a score of 28-34 are considered "impaired", meaning they cannot support self-sustaining salmon populations. Sample locations with a score of 36 to 44 are considered "compromised", meaning there are obvious signs of ecological degradation, including effects on salmon life-stages and biodiversity. Stream reaches with a value from 46 to 50 are considered "healthy" and are able to support the most sensitive life-forms. This is the equivalent to what would be found in a "natural" stream in the area.

Nine sites were selected and sampled at NRS(T) Jim Creek (Figure 19). Six sites had scores indicating they were impaired and the remaining three had scores indicating they were compromised (Table 9).

TABLE 9. B-IBI SCORING FOR NRS(T) JIM CREEK SITES.

Site	B-IBI Score	Grade	Taxa Richness	EPT Richness
1S	30	Impaired	32	15
2R	42	Compromised	38	20
3S	28	Impaired	34	17
4S	36	Compromised	31	21
5S	28	Impaired	34	20
6S	34	Impaired	30	17
7R	32	Impaired	35	18
8R	36	Compromised	37	22
9S	28	Impaired	28	12

With several caveats, the 2008 study concluded that, compared to the reference sites, the main stem of Jim Creek study sites 4S and 6S were in good biological order. Study sites in Rehab Creek (1S, 3S, 9S and main stem Jim Creek site 5S) fell significantly under their respective reference sites and should be closely monitored in subsequent years.

Periodic B-IBI studies at regular intervals will be valuable over the long term in characterizing normal conditions for installation streams, rather than continued evaluation using the Puget Sound Lowland grading system, which may be inappropriate for NRS(T) Jim Creek's ecological setting (Wilkins et al., 2008).

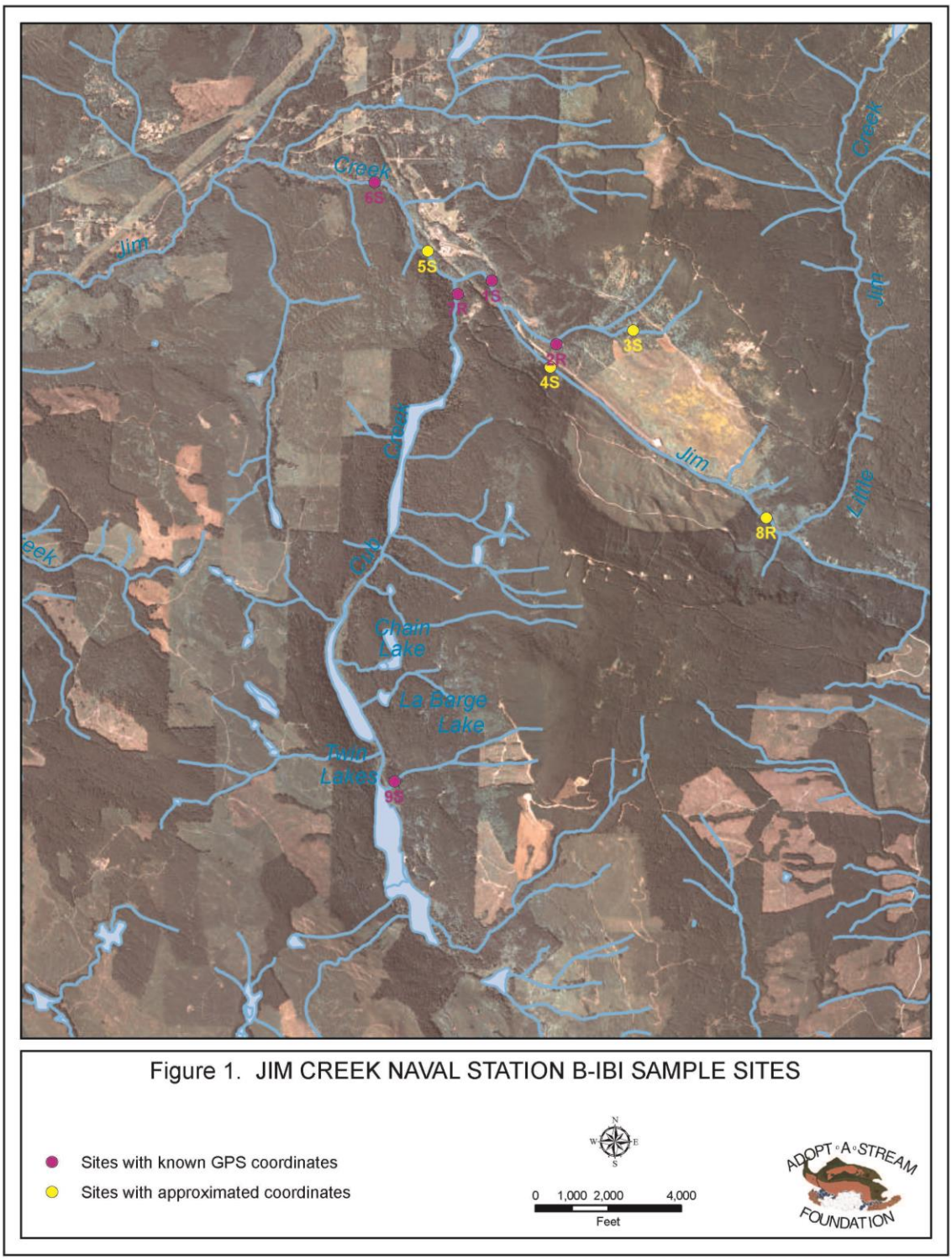

Figure 19. Benthic index of biotic integrity sample sites.

2.3.11 Vegetation

Plant Species of Concern and Endangered Species **-** According to the Natural Heritage Program and USFWS, there are no records of threatened, endangered, or sensitive plant species at NRS(T) Jim Creek. However, formal botanical surveys have not been conducted. The likelihood of such species occurring specifically within the antenna ground field is very low because the vegetation in this area has been intensively managed for decades and continues to be treated.

Noxious and Invasive Plants **-** In accordance with the Plant Protection Act of 2000 (7 U.S.C. 7701 *et seq*.), the U.S. government has designated certain plants as noxious weeds. The term "noxious weed" means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. More information on federal and state noxious weeds, an invasive plant list, and an introduced plant list, can be found at http://plants.usda.gov/java/noxiousDriver#federal.

With respect to a particular ecosystem, an invasive species is any species, including its seeds, eggs, spores, or other biological material, whose introduction or presence may cause environmental or economic harm, or harm to human health.

In Washington State the laws and regulations regarding noxious weeds are found in the Revised Code of Washington (RCW) Chapter 17.10 and in the Washington Administrative Code (WAC) Chapter 16-750.

The list of noxious weeds can be found at: https://snohomishcountywa.gov/750/Noxious-Weeds-List. It is updated each spring and is not included here since it can change annually.

Noxious weeds are divided into three categories:

Class A noxious weeds are those not native to the state that are of limited distribution or are unrecorded in the state and that pose a serious threat to the state. These weeds are a threat to all counties of the state. Eradication is required.

Class B noxious weeds are those not native to the state that are of limited distribution or are unrecorded in a region of the state and that pose a serious threat to that region. In Snohomish County control is required for certain Class B noxious weeds.

Class B designated weeds are common in the county and are not designated by the State Weed Board to be controlled in that county, however the County has chosen to control these weeds and have included them on the County Weed List. Control in Snohomish County is required for these Class B designated weeds:

Common Name	Scientific Name
Knotweed, bohemian	*Polygonum x bohemicum*
Knotweed, giant	*Polygonum sachalinense*
Knotweed, Japanese	*Polygonum cuspidatum*
Loosestrife, purple	*Lythrum salicaria*
Ragwort, tansy	*Senecio jacobaea*
Watermilfoil, Eurasian	*Myriophyllum spicatum*

Class C noxious weeds are designated by the State Weed Board as noxious so that any county may control these weeds within the county if they desire. Control is optional.

In Snohomish County, control of English hawthorn (*Crataegus monogyma*) is required.

The most pervasive noxious weed at NRS(T) Jim Creek is **Scotch Broom (*Cytisus scoparius*);** a **Class B weed**. This plant has been observed within the antenna ground field, where it is aggressively treated under the Antenna Ground Field Vegetation Management Plan because it can interfere with transmitter efficiency. It also exists in other areas of the installation.

Tansy ragwort, a **Class B designated weed** grows on the installation. Control is required by Snohomish County. **Himalayan blackberry (*Rubus armeniacus or Rubus discolor*), a Class C weed**, also grows on the installation.

Aquatic Invasive Species **-** Eurasian water milfoil is one aquatic non-native weed that is a particular problem statewide. It reproduces by fragmentation and proliferates to form dense mats of vegetation in the littoral zone of lakes and reservoirs, where it crowds out native aquatic vegetation, reduces dissolved oxygen (DO) and can severely degrade the ecological integrity of a water body in just a few growing seasons.

Infestations of non-native, invasive aquatic plants have not been documented in NRS(T) Jim Creek lakes or streams however focused surveys have not been conducted. There has been a long-standing ban on the use of personal recreational boats at Twin Lakes. This has prevented the introduction of Eurasian water milfoil and other undesirable plants from outside sources.

Native plants **-** For erosion control and establishing vegetation on disturbed ground, the Antenna Ground Field Vegetation Management Plan (NAVFAC 2008a) recommends a mix of these species:

Sheep fescue (*Fescuta ovina L.*)

Blue Wildrye (*Elymus glaucus*)

Mountain Brome (*Bromus marginatus*)

Tufted Hair Grass (*Deschampsia cespitosa*)

Blue flax (*Linum perenne L., Linum lewisi*)

Wallflower (*Erysimum L.*);

Western Yarrow (*Achillea millefolium L. var. occidentalis*)

Black-eyed Susan (*Rudbeckia hirta L.*)

Lupine *(Lupinus*)

Other native plants found in the undeveloped areas of the installation are those typical of the forests of the Cascade Mountains of western Washington. These include a wide range of trees, shrubs, understory plants and groundcovers. Native blackberry, salmonberry, vine maple, huckleberry varieties, salal, Western trillium, red flowering currant, fringe cup and bunchberry are just a few of the many species.

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3 Environmental Management Strategy and Mission Sustainability

3.1 Cooperative Management

The Navy, USFWS, NMFS and the WDFW each have mutual agreement signature authority for this INRMP. At the installation level, cooperative management occurs through the annual INRMP review process, through the incorporation of shared technical information, and through integration of applicable management objectives from resource management and recovery plans developed by the cooperating agencies. At the field level, cooperative management is facilitated through consultation on a project-by-project basis and through mitigation and monitoring agreements. Also, wildlife, fish, and habitat surveys are conducted through formal cooperative agreements with USFWS and WDFW.

3.2 Adaptive Management

OPNAV M-5090.1, Section 12-5.1 defines adaptive management as: "the process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans and use the resulting information to improve policy and management decisions."

Adaptive management is a structured, iterative process of management decision-making when there is uncertainty. It follows a process of planning (setting management goals and objectives), implementing, monitoring, evaluating and then adjusting management based on new information gained. Uncertainty is reduced over time by repeating this cycle and adjusting management based on results. Information is continually gained and used to improve future management and outcomes.

Adaptive management is a useful process for natural resource management at NRS(T) Jim Creek because natural resources and natural systems are not static; seasonal patterns and random events such as floods, landslides, disease outbreaks in vegetation or animals, establishment of invasive species, discovery of a new species, etc. create situations requiring adjustments in management. The overall natural resource management program, as reflected in this INRMP follows an adaptive management protocol.

3.3 Ecosystem Management

Ecosystem management considers the environment as a complex system functioning as a whole; not as a collection of parts, and recognizes that people and their social and economic needs are a part of the system. An ecosystem management approach has the overarching goal of protecting the properties and functions of natural ecosystems. Over the long term, this approach should 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.

The Navy's INRMP Guidance for Navy Installations (2006) requires the incorporation of ecosystem management as the basis for planning and management of Navy installations. This approach will take a long-term view of human activities, including military uses, and biological resources as part of the same environment. The goal is to preserve and enhance the integrity of natural ecosystems, and to sustain both biological diversity and continued availability of those resources for military readiness and other human uses.

Ecosystem-based management includes:

• A shift from single species to multiple species conservation.

• Formation of partnerships necessary to consider and manage ecosystems that cross boundaries.

• Use of the best available scientific information, and use of adaptive management techniques.

At NRS(T) Jim Creek, installation lands are part of larger ecosystems, such as forests and watersheds. To the extent possible, natural resource management at NRS (T) Jim Creek will contribute positively to these larger ecosystems of which installation lands are a part (See Section 1.11 Management Strategy).

3.4 Ecosystem Services

Inherent to ecosystems are the services they provide, from a human perspective. These can be tangible goods that provide a direct benefit to humans (potable water, wood products, food) and also less tangible services, such as flood control, good water quality, recreation opportunities, and a connection to spiritual values. Consideration of ecosystem services includes recognizing those that provide current benefits and those that will benefit future generations.

Some of the ecosystem services generated by installation lands include the following:

- The forested lands of NRS(T) Jim Creek provide unfragmented habitat for various bird species, bobcats, bats, and other wildlife within a larger area that has been harvested, resulting in altered or destroyed habitat.
- Old growth trees provide a guarantee of nesting habitat for the threatened marbled murrelets that travel to the installation to nest and raise their young; contributing to the future survival of this species.
- The semi-secluded nature of the installation and its un-impacted lands provide a natural, wilderness-type setting for recreationists that value the outdoors.

- Jim Creek contributes unpolluted flows to the watershed downstream. It contains less sediment than other streams into the watershed and helps to alleviate the effects from sediment inputs from other tributaries.
- The streams on the installation provide spawning habitat for Coho Salmon that are part of a larger watershed population. Beyond contributing to overall population numbers, these fish are counted annually and the data used in the overall fishery management of the larger Stillaguamish watershed.
- The Twin Lakes system contains a unique assemblage of fish due to the presence of the Salish Sucker in a nearly pristine environment. This provides opportunities for study in the future and contributes to overall knowledge about this species and its habitat requirements.
- The installation contains fish, bats, amphibians and the American pika which have been counted, surveyed, studied, and monitored; contributing to knowledge about the numbers of animals, habitats, diseases, and distribution of these animals at a larger scale.

3.5 Supporting Sustainability of the Mission and the Natural Environment

3.5.1 Achieving No Net Loss to the Military Mission.

No net loss to the military mission at NRS(T) Jim Creek, or to the capability of lands to support the mission is anticipated through implementation of this INRMP. Mission-related activities and operations are not presently constrained by natural resource conditions or concerns. The NRM will stay cognizant of mission activities and environmental conditions at the installation in order to identify potential constraints on the military mission related to natural resources. Section 2.1.8 identifies restrictive measures protective of natural resources.

Supporting the management elements identified in this INRMP requires not only that the INRMP be implemented, but that future development be conducted in a manner consistent with this INRMP and with cooperation between environmental, engineering, operational, and planning personnel.

3.6 Natural Resources Consultation Requirements

3.6.1 ESA Section 7 Consultations for Federally Threatened and Endangered Species

Section 7(a)(1) of the ESA states that Federal agencies shall, "in consultation with and with the assistance of the Secretary [of the Interior], utilize their authorities in furtherance of the purposes [of the ESA] by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 [of the ESA]."

The implementation of this INRMP and specifically of the Management Plans described in Chapter 4 provide for conservation of ESA-listed species. Although the intent of the INRMP is to meet

the Sikes Act requirements for more general natural resources conservation, it's programs also lend protections for ESA-listed species and their habitats.

Section 7(a)(2) of the ESA requires federal agencies to consult with the USFWS or NMFS whenever proposed actions "may effect" threatened and endangered species. Each Federal agency, in consultation with and with the assistance of the Secretary, is required to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. Federal agencies are to use the best scientific and commercial data available in meeting these requirements.

At NRS(T) Jim Creek, proposed projects, operations, and other actions are scrutinized for potential impacts to ESA-listed species through a formal internal review process. ESA Section 7 consultations for federally threatened and endangered species will be initiated in accordance with ESA Section 7 regulations at 50 CFR 402, if warranted, otherwise, written documentation that there are no effects to such species will be generated by the NRM and kept with the project files.

To facilitate compliance with the above requirements, the NRM initiates ESA consultation with USFWS or NMFS by conducting a biological assessment, consistent with Section 7 (c) of the ESA when projects are likely to affect a threatened or endangered species. Federal agencies are required by the ESA to manage federally-listed threatened and endangered species and their habitat in a manner promoting conservation, consistent with the recovery plans for the species.

The NRM will use this INRMP as one 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. Alternatively, through the ESA Section 7 consultation process, USFWS or NMFS may require avoidance or mitigation measures that could result in project delays and additional costs. For this reason, it is imperative that the Command initiate early environmental review of proposed actions in order to assess environmental impacts, develop alternatives, and correctly identify mitigation costs, both in terms of time and funds.

3.6.2 Essential Fish Habitat (EFH) Consultation

EFH consultations are typically done concurrent with the ESA Section 7 consultations for ESA-listed fishes under the jurisdiction of NMFS. Most installation streams are considered EFH for Pacific Coast salmon.

The NRM will review proposed projects and operations for possible impacts to EFH. If impacts are identified that may adversely affect EFH, the NRM will consult with the NMFS and provide recommendations to the project managers to avoid or minimize impacts, or to allow for considering mitigation early in the planning process. When it is determined there will be no adverse impacts

to EFH, the determination will be documented in the project files, or within the Biological Assessment developed for ESA consultation.

3.6.3 Migratory Bird Treaty Act (MBTA)

The ESA; (MBTA); and Bald and Golden Eagle Protection Act have similar regulatory requirements, but differing purposes, differing "take" definitions, and other notable differences (Appendix J).

Migratory birds are protected under the MBTA. A migratory bird, for the purposes of protection under the MBTA, is a bird of a species that belongs to a family or group of species present in the United States as well as Canada, Japan, Mexico, or Russia. Most native bird species (birds naturally occurring in the United States) belong to a protected family and are therefore protected by the Migratory Bird Treaty Act. The USFWS maintains a list of protected migratory bird species (50 CFR 10.13).

At NRS(T) Jim Creek, the house sparrow (aka English sparrow) and the European starling are two species that are NOT protected under the MBTA.

The 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. The MBTA prohibits the taking of most birds, nests, and eggs, except as permitted by the USFWS. Specifically, the MBTA provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not.

In 2003, the National Defense Authorization Act (NDAA) exempted DoD from the MBTA for the incidental take of migratory birds that results from authorized military readiness activities. With the passage of the NDAA, Congress signaled that DoD would give appropriate consideration to migratory bird protection when planning and executing readiness activities. Consequently, as directed by language in the NDAA, USFWS, in cooperation with DoD, developed the Military Readiness Rule to carry out congressional intentions.

Military Readiness Rule: Under this 2007 rule (72 FR 8931), the USFWS authorizes take of migratory birds resulting from military readiness activities. This rule was developed in cooperation and coordination with the Department of Defense and has received concurrence from the Secretary of Defense. Military readiness activities include all training and operations of the Armed Forces that relate to combat, and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use (72 FR 8931, 8937). Military readiness does not include the routine operation of installation operating support functions, such as: administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; morale, welfare, and

recreation activities; shops; and mess halls, the operation of industrial activities, or the construction or demolition of facilities listed above (72 FR 8931, 8933). The Military Readiness Rule directs DoD to assess the adverse effects of military readiness activities on migratory birds, in accordance with, and through the National Environmental Policy Act (NEPA) process. The Military Readiness Rule requires DoD to develop and implement appropriate conservation measures for proposed actions that may have a significant adverse effect on a migratory bird population. The Rule is not a blanket exemption, nor does it automatically exempt military readiness activities from Incidental Take.

Under the Rule, the Armed Forces have agreed to consult with the USFWS to identify measures to minimize and mitigate adverse impacts to migratory birds from authorized military readiness activities and to identify techniques and protocols to monitor impacts. Monitoring is an important part of cooperation under the Rule, to determine the level of take from military activities and determine the effectiveness of conservation measures.

Also, an MOU between the USFWS and DoD signed in 2014 identifies specific activities where cooperation between the two agencies will contribute to the conservation of migratory birds and their habitats. The MOU describes actions that should be taken by DoD to advance migratory bird conservation, avoid or minimize the take of migratory birds, and ensure DoD activities other than military readiness activities are consistent with the MBTA.

The operation of the VLF radio communications system at NRS(T) Jim Creek could fall within the definition of military readiness activities under the Military Readiness Rule. The communications activities at NRS(T) Jim Creek are not known to result in take of migratory birds. No adverse impacts have been identified requiring mitigation, minimization measures, or monitoring of migratory birds. Presently there are no specific measures in place related to migratory bird impacts at NRS(T) Jim Creek.

3.6.4 Birds of Conservation Concern

The USFWS identifies migratory and non-migratory birds that are of conservation concern to stimulate coordinated and proactive conservation actions among Federal, State, Tribal, and private partners. These birds are identified in the 2008 Birds of Conservation Concern list (latest update) (USFWS, 2008). The list identifies 32 species in the Northern Pacific Forest Region, which includes NRS(T) Jim Creek. Some species on the list may use suitable habitat at NRS(T) Jim Creek. The Birds of Conservation Concern list includes some non-MBTA-protected species because their conservation status and efforts are of concern to the USFWS.

The DoD PIF program publishes a consolidated Species of Concern list based on eight different priority lists, including the Birds of Conservation Concern list. The list follows the USFWS Bird Conservation Regions.

Additional information is at http://www.dodpif.org/resources/bcrmap.php.

3.6.5 Bald and Golden Eagle Protection Act

Bald and golden eagles are migratory birds that are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. § 668). Bald eagles have been observed, but active nests are not known to occur on the installation.

The Bald and Golden Eagle Protection Act states that no one may "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or any golden eagle, alive or dead, or any part, nest, or egg thereof of the foregoing eagles…"

3.7 Planning for National Environmental Policy Act (NEPA) Compliance

The National Environmental Policy Act (42 USC § 4321 *et seq*.) requires that federal agencies 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 and the Secretary of the Navy Instruction (SECNAVINST) 5090.6A, Environmental Planning for Department of the Navy Actions (26 April, 2004), each support NEPA and emphasize that environmental planning is necessary and most effective at the earliest stages of project development. 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 project planning at the earliest possible time. This ensures that planning and decision-making reflect environmental values, avoid unnecessary impacts, avoid delays, and avoid potential conflicts.

3.7.1 NEPA Compliance on the INRMP

Implementation of this INRMP is considered a major Federal action and as such, is subject to NEPA. An analysis under NEPA was performed in 1999 and was based on an INRMP dated 1997. Due to changes in the status of some species since the 1999 Environmental Assessment (EA), (e.g., bald eagles are no longer listed under the ESA, steelhead are listed under the ESA, critical habitat was designated for steelhead) and other changed environmental conditions, there was a need for a new NEPA analysis. An Environmental Assessment (EA) was conducted to evaluate the potential environmental effects associated with adopting this INRMP (Appendix B).

It is reasonably foreseeable that future actions proposed by the Navy under this INRMP may be minor in nature and would be adequately addressed under the EA. An updated INRMP may not necessarily require a new EA and may rely on the determinations of the previous EA, if the updated INRMP is within the scope of that analysis.

Vegetation Management Environmental Assessment. In 1997 the Navy completed an EA for vegetation management activities conducted under a Vegetation Management Plan for maintaining the cleared groundfield critical to the installation mission (U.S. Navy, 1997). The proposed action in the EA covers manual cutting, ground application of herbicide, and aerial application of herbicide as part of the vegetation management program. It identifies avoidance and minimization measures to reduce environmental impacts; especially those related to water quality. These include monitoring surface waters before, during and after spraying; establishing no-treatment buffers for manual and aerial treatment on all major streams; and following manufacturer's label instructions for aerial application. Although the environmental conditions of the operational area and the scope of the vegetation treatment activities have not changed, the Vegetation Management Plan and associated EA should be reviewed to determine if they are still valid or require updating.

115 kV Powerline Environmental Assessment. In 2012 the Navy completed an EA for maintaining a dedicated power transmission system and corridor extending from Arlington WA to the installation (U.S. Navy, 2012). Approximately 1.2 miles of the cleared powerline corridor are on the installation. The EA identifies avoidance and minimization measures to reduce environmental impacts. These include establishing streamside buffers where the extent of ground disturbance would be limited, vegetation treatment would be selective, and only specific herbicides would be used (Garlon 3A®) in order to limit alterations to functioning riparian areas. Other measures include those to prevent gasoline and oil spills and discharges of these products to water, and to prevent erosion of steep slopes.

These projects were considered in the EA for this INRMP as contributing to cumulative effects. Also, the INRMP EA considered water resources and biological resources, similar to environmental components addressed in the Vegetation Management and 115 kV Powerline EAs. The avoidance and minimization measures in these EAs address resources important to the INRMP EA.

3.7.2 Coordination and Planning for Construction and Facility Maintenance

Maintenance and Minor Construction, excluding military construction (MILCON) - Early project planning and review for maintenance, minor construction, and other projects is achieved through an environmental review process which requires all new projects, programs, and operations, or changes to existing projects, programs, and operations, to be reviewed by the NRM for potential impacts to natural resources. The NRM reviews the actions, identifies the risks to natural resources, and provides comments and/or alternatives to the action proponents that will minimize or eliminate the risks, if possible.

The process allows the NRM to identify the environmental laws and regulations that apply to a project so that compliance mechanisms and adequate protection of natural resources can be included in the project design. For example, the NRM identifies whether ESA consultations are

needed or if the work requires permitting from the USACE (e.g., in-water work). Changing the aspect or placement of a new building to protect trees, or identifying wetlands that must be protected are other examples of requirements to avoid impacts and protect natural resources that would be communicated to the project proponent.

To do this, an established procedure is in place within PWDE Environmental Division which requires project proponents to complete and submit an "Environmental Checklist" and provide adequate detail about a project to discern potential impacts. This process extends to MWR, Security, and any other entity proposing an action at NRS(T) Jim Creek. Depending on the scope of the project, more information may be collected from the project proponent beyond that initially provided on the Checklist.

This early review process also allows for identifying the appropriate level of NEPA analysis, so the time and cost requirements of a Categorical Exclusion, Environmental Assessment or Environmental Impact Statement can be factored into the overall project schedule at an early stage. In most cases, projects can be categorically excluded in accordance with 32 CFR § 775.6(f). Examples of categorically excluded projects include:

- Demolition of excess, antiquated buildings and houses.
- Construction of an ADA-compliant parking and walkway area.
- Maintenance and repair of the communication antenna towers, cabling, and hardware.
- Roof repairs and other structural repairs to buildings.
- Hazard tree removal.

Major Construction, including MILCON **-** Coordinating MILCON funding cycles with NEPA requirements is an area of persistent challenge. An essential benefit of the NEPA process is planning proposed projects and identifying alternatives in order to identify environmental issues at an early stage that may affect the scope, schedule and budget of a project before it is fully designed. Initial project design is the proper stage to incorporate avoidance or minimization measures to address potential environmental effects. Early coordination with the NRM and other environmental staff is especially important when the project is unique or highly constrained, has unknown potential impacts, or when sites characteristics may include unanticipated or unique species, resources or attributes. A lack of full coordination with environmental staff can put the project at risk. In all cases it is best if the NEPA Development of Preferred Action Alternatives (DOPAA) process is completed early in project development, prior to refinement of the project during the scoping phase.

The NEPA analysis cannot be funded with MILCON funds. Given that MILCON funds expire typically after five years, and project construction may not begin prior to a signed NEPA decision, early communication between project proponents and NEPA/NR staff will enable installation

planners to secure funding for the required NEPA as soon as possible and a thorough and meaningful analysis can be conducted to ensure project success.

3.8 Public Access, Outdoor Recreation and Outreach

Access to NRS(T) Jim Creek is limited to active duty, reservists, retired military, and DoD civilian employees. The general public can access the installation only as sponsored guests. The general public is prohibited from entering NRS(T) Jim Creek unless a sponsor from the above-authorized users is present.

Public outreach efforts have included day trips for Scout troops, site visits for Stillaguamish tribal members and the USFS, tours of the old growth forest with local dignitaries, and periodic news releases about the marbled murrelet and unique old growth forest.

3.9 Encroachment Management

The lands surrounding NRS(T) Jim Creek are largely undeveloped and forested, with scattered rural single family residences and accessory uses primarily along the Jim Creek corridor. Zoning ordinances as of 2017 require relatively large minimum lot sizes in this part of Snohomish County and the general development continues to be of a residential nature so there is little risk of public or commercial developmental interests encroaching on the installation. No imminent encroachment situations are known.

The exception to this is timber harvest, primarily clearcut logging, which has occurred up to the installation boundary (Figures 1, 4). This does not impact mission operations, but does create a risk to functioning, non-fragmented forest habitat important to wildlife and to properly functioning watershed hydrology.

Presently there are no anticipated changes to the mission at the installation, or expansion of operations, so there are no encroachments by the Navy that would affect adjacent lands or require partnerships with surrounding landowners.

The Encroachment Action Plan (NAVFAC, 2008b) identified two relatively minor concerns, as discussed in Section 1.12.2; continued use of USFS lands under a special use permit and trespassing by individuals at multiple access points.

3.10 Beneficial Partnerships and Collaborative Resource Planning

There have been a number of collaborative efforts which have contributed to improved natural resources management on and off the installation, including the following:

3.10.1 U.S. Forest Service Bat Surveys

Through Legacy Program funding, USFS scientists conducted bat surveys on the installation in 2008, 2009, and 2010 (Ormsbee and Hohmann, 2010). Their data and continued involvement in bat research will provide information important to bat management. The NRM will maintain contact with the USFS scientists and the bat survey project in order to remain aware of future opportunities for collaborative research on the installation.

3.10.2 Stillaguamish Tribe of Indians

There is on-going communication and consultation with the Stillaguamish Tribe on cultural resource issues. In the past, there was the cooperative operation of the fish rearing facility. The installation has hosted visits to certain areas of the installation for cultural and Tribal coordination purposes. The NRM will coordinate with the installation's CRM in order to maintain contact with the Stillaguamish Tribe and their staff. The NRM and CRM will maintain this relationship of cooperation regarding cultural and natural resources issues important to the Stillaguamish Tribe.

3.10.3 Snohomish County Public Work, Surface Water Division

Snohomish County periodically conducts stream temperature and flow monitoring in Jim Creek and Cub Creek, gathering data in the interest of developing accurate watershed monitoring, modeling and management within Snohomish County and the Stillaguamish Watershed.

3.10.4 Washington Department of Fish and Wildlife Coho spawning counts

This agency has conducted Coho Salmon spawning counts for over 30 years in a designated index stream section on the installation. Surveys begin each year in mid to late October and generally continue on a weekly basis through the first half of January. It is important to continue providing access to the Coho index stream for this ongoing monitoring effort. The State relies on the Coho counts at NRS(T) Jim Creek to produce annual adult salmon return estimates used in fisheries management by the State of Washington.

3.10.5 University of Washington Seismic Monitoring

The University of Washington operates a seismograph installed in the Communications Center Link (CCL) Building (B20) on Blue Mountain. This is one of roughly one hundred eighty such instruments maintained by the Pacific Northwest Seismograph Network (PNSN) (Strelow, 2001). The PNSN is responsible for routine seismic monitoring of Cascade Range volcanoes in Oregon and Washington and coordinates very closely with the Cascade Volcano Observatory (CVO) of the U.S. Geological Survey's Volcano Hazards Program. This program monitors many other

parameters and has the mandate to study and evaluate all volcanic hazards. Continued access to B20 is critical to this effort.

3.10.6 State Wildlife Action Plan

The WDFW manages wildlife and habitat under its SWAP; a comprehensive plan for conserving Washington's fish and wildlife and the natural habitats on which they depend (http://wdfw.wa.gov/conservation/cwcs/). One guiding principle of the SWAP planning process is to identify actions needed to conserve wildlife and their habitats before species become too rare and restoration efforts too costly.

The NRM will coordinate with WDFW to ensure natural resource management at NRS(T) Jim Creek meets the intent of the SWAP in conserving, protecting, and managing fish and wildlife resources and habitats. Actions on the installation should take into account and support the conservation and management goals and strategies of the State Wildlife Action Plan (WDFW, 2015).

3.11 Training of Natural Resource Personnel

Navy environmental training is centralized through the Naval Civil Engineer Corps Officers School (CECOS) and the Naval Safety and Environmental Training Center (NAVSAFENVTRACEN). Training through these venues is free of charge, requiring only travel and per-diem funding.

The Sikes Act requires that, to the extent practicable, military departments ensure professionally trained natural resources management personnel are available and assigned responsibility to implement the Sikes Act, including the preparation and implementation of INRMPs.

DoDI 4715.03, Natural Resources Conservation Program requires that sufficient numbers of professionally trained natural resources management personnel are available and assigned responsibility to manage their installations' natural resources. It recognizes the need to provide supplemental training to ensure the proper and efficient management of those resources in a timely manner (e.g., Naval CECOS Natural Resources Compliance Course, DoD Sikes Act Training Course).

Training for the NRM position responsible for implementing Sikes Act and DoD natural resources requirements are in Chapters 3 and 12 of OPNAV M-5090.1

Additional training opportunities exist at a local level, and across western Washington including:

The Adopt A Stream Foundation has training sessions on a variety of topics. **www.streamkeeper.org**.

The Padilla Bay National Estuarine Research Reserve in Bayview, WA hosts several training sessions annually in coordination with the Washington State Department of Ecology. **http://www.coastaltraining-wa.org**

Washington State University's extension office offers classes on a variety of forestry, wildlife, and natural resource topics in the north Puget Sound region. **http://extension.wsu.edu/**

The Wetland Training Institute, Inc. (WTI) provides training in wetland delineation, soils and hydrology, wetland construction and restoration, and other topics. The WTI periodically offers classes in Arlington, WA. **https://www.wetlandtraining.com/**

King County offers classes and workshops concerning noxious weeds. **http://www.kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/classes.aspx**

The USFWS, through the National Conservation Training Center, offers courses on many environmental topics. **https://training.fws.gov/**

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4 Management Program Elements

4.1 Implementing the Natural Resources Management Program

Per DoD Manual 4715.03 (*Integrated Natural Resources Management Plan (INRMP) Implementation Manual, Nov. 25, 2013*), INRMPs are implemented by:

- Actively requesting and using funds for natural resources management projects, activities and other requirements in support of goals, and objectives identified in the INRMP.
- Ensuring that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP.
- Inviting annual feedback from the appropriate USFWS and State fish and wildlife agency offices on the effectiveness of the INRMP.
- Documenting specific INRMP action accomplishments undertaken each year.
- Evaluating the effectiveness of past and current management activities and adapting those activities as needed to implement future actions.

Guidance on INRMP implementation is also found in OPNAVM-5090.1 which recognizes that projects identified in the INRMP must be entered into the Environmental Readiness Program Requirements Web (EPRWeb) for review and approval by the Budget Submitting Officer and OPNAV (N45).

OPNAV M-5090.1 further recognizes that Sikes Act cooperative agreements (developed with federal and state agencies, universities, non-governmental organizations, and individuals) typically provide a suitable vehicle to accomplish work identified in the INRMP. Other options to implement INRMPs include, but are not limited to, interagency agreements, Economy Act orders (usually executed by issuance of Financial Management Service (FMS) Form 7600A/B, Interagency Agreement (IAA)), cooperative ecosystem study unit agreements, contracts, and in-house and self-help processes, and voluntary services.

Chapter 5 contains additional details on INRMP implementation.

4.2 Threatened and Endangered Species, Critical Habitat, Species of Concern

The ESA Section (7)(a)(1) directs federal agencies to carry out programs for the conservation of threatened and endangered species. Section 7(a)(2) of the ESA requires Federal agencies to consult with the USFWS and NMFS whenever actions are proposed that may affect ESA-listed species, or species proposed for listing.

Specifically, pursuant to Section 7 of ESA, the DoD consults with the USFWS, and NMFS when threatened or endangered species or designated critical habitats may be affected, to ensure no DoD action will likely jeopardize the continued existence of listed species, or destroy or adversely

modify designated critical habitats. An Incidental Take Statement acquired in accordance with Section 7(b)(4) of the ESA is necessary for DoD action proponents to be exempt from the take prohibitions described in Section 9 of the ESA (DoD Manual 4715.03).

Presently there are no projects at NRS(T) Jim Creek that have resulted in the issuance of a Biological Opinion and Incidental Take Statement by either regulatory agency.

This INRMP is meant to aid in identifying potential impacts of planned and ongoing Navy actions on threatened and endangered species at an early stage, and to provide guidance in avoiding and minimizing impacts.

The ESA-listed species for which consultation with NMFS and/or USFWS may be required are:

- Marbled murrelet (and designated critical habitat)
- Chinook Salmon
- Steelhead
- Bull Trout
- Northern spotted owl; for certain projects in the Twin Lakes area.

Consultation on EFH is also required for projects that may adversely affect streams and salmon habitat.

4.2.1 Critical Habitat Designation Restrictions

Navy management and protection plans for threatened and endangered species must demonstrate compliance with strict criteria, intended to insure the adequacy of management for the benefit the species.

Pursuant to Section 4(a)(3)(B)(i) of the ESA, the Secretary of the Interior or the Secretary of Commerce will not designate as critical habitat any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an integrated natural resources management plan prepared under Section 101of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. The simple existence of an INRMP does not prohibit the designation of critical habitat; the plan must provide a benefit to the species.

USFWS Special Management Criteria **-** The USFWS uses three criteria to determine if an INRMP provides adequate special management or protection to obviate the need for critical habitat designation. Per USFWS (2015b), the Service will do the following:

(1) Assess an INRMP's potential contribution to species conservation, giving due regard to those habitat protection, maintenance, or improvement projects and other related activities specified in

the plan that address the particular conservation and protection needs of the species for which critical habitat would otherwise be proposed. Although evaluation will be easier if the species is specifically addressed in the INRMP, that is not a requirement; the requirement is that the species receives a benefit from the INRMP.

Examples of a benefit include: reducing fragmentation of habitat; maintaining or increasing populations; planning for catastrophic events; protecting, enhancing, or restoring habitats; buffering protected areas; and testing and implementing new conservation strategies.

(2) Presume that the species-related measures outlined in the INRMP will be funded and implemented unless the USFWS has specific reasons to believe there may be a problem. In such a case, consult with the USFWS on what types of assurances may be needed from the military installation to address these specific problems.

(3) Consider whether the INRMP provides assurances that the conservation measures in the plan will be effective. When determining the effectiveness of a conservation effort, the USFWS considers whether the plan includes:

(a) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals);

(b) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured;

(c) provisions for monitoring and, where appropriate, for adaptive management;

(d) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness of the conservation effort (based on evaluation of quantifiable parameters); and

(e) a description of a temporal duration sufficient to implement the INRMP and achieve the benefits of the goals and objectives of the plan.

4.2.2 Management Plan for the Marbled Murrelet

Thomas Hamer photo.

Presence on the installation**:** Confirmed. This species has been documented in the old growth forest near Twin Lakes during nesting season. Designated critical habitat occurs on the installation (Figure 16). PCEs are identified in Chapter 2.

The old growth forest at NRS(T) Jim Creek and the larger area of designated critical habitat are essential to the conservation of marbled murrelets and require protection. Ongoing, routine mission operations do not occur near the area occupied by marbled murrelets.

Criteria 1: Species Conservation and Habitat Protection **-** The Navy will contribute to conservation of the marbled murrelet by protecting NRS(T) Jim Creek's old growth forest, and other suitable nesting habitat on the installation, and by avoiding disturbance of birds during nesting time when they are on installation lands.

Environmental checklists will be required for new projects so adequate protection can be identified.

The Navy will avoid conducting projects and activities during the 1 April to 23 September time period in areas where nesting birds could be disturbed.

The Navy will ensure that proposed actions that could potentially affect marbled murrelets, designated critical habitat, PCEs, or suitable nesting habitat outside the critical habitat boundary comply with Section 7 of the Endangered Species Act through consultation with USFWS. Proposed tree alteration or removal (e.g., hazard tree removal) will be evaluated to ensure trees do

not contain potential nesting habitat regardless of the tree's location, within or outside of the designated critical habitat boundary.

The NRM will identify mission operations and infrastructure that could affect marbled murrelets or designated critical habitat and coordinate with installation personnel and the USFWS to avoid impacts.

The NRM will periodically meet with the NSE installation Commanding Officer, NCTAMS OIC, and other NSE operational departments to maintain awareness of proposed new missions, or changes to existing missions at NRS(T) Jim Creek to ensure adequate protection of marbled murrelets and nesting habitat.

Criteria 2: Implementation of the Plan **-** NSE maintains a NRM position with oversight of natural resources management at NRS(T) Jim Creek. This position is responsible for implementing this INRMP, reviewing projects in light of marbled murrelet conservation needs, and monitoring activities at NRS(T) Jim Creek to protect marbled murrelets and their habitat. The NRM is also able to request natural resources expertise from NAVFAC NW located at NBK - Bangor, staffed with environmental planners and specialists, to assist the NRM in conservation and environmental compliance requirements.

The NRM has the authority to implement conservation and protection plans and obtain all necessary authorizations or approvals for proposed management actions. The NRM annually develops projects and requests funding for natural resources management, including habitat enhancement projects and special projects to assist in the recovery of T&E species as needed.

Criteria 3: Effectiveness of Conservation Measures **–** Assurances that the conservation measures in this INRMP will be effective are provided through the following:

Goals and Objectives: This INRMP establishes a goal in Chapter 1 of ensuring the sustainability of the ecosystems that encompass the installation.

Objectives in Chapter 1 applicable to the marbled murrelet are:

- Protecting threatened and endangered species, sensitive species, and critical habitats regulated under the Endangered Species Act and
- Specifically protecting the old growth forest at Twin Lakes.

Parameters: The parameters for measuring management effectiveness are the documented presence of marbled murrelets on the installation and no loss of suitable nesting habitat across all installation lands.

Monitoring: Periodically, about every five to seven years, surveys will be conducted to verify marbled murrelets are continuing to nest at NRS(T) Jim Creek. The most current survey protocols will be used, and surveys will be conducted by individuals certified to conduct the surveys (EPR # 68742CN001; 1 CR NW Marbled Murrelet Density and Occupancy Surveys).

This INRMP includes provisions for annual review, analysis, and adaptation in coordination with USFWS and WDFW. However, out-of-cycle adaptive management is not prohibited. While subject to required consultation and approval, the plan is adaptable.

Reporting: During the annual review of the INRMP, progress on marbled murrelet conservation will be shared with USFWS and WDFW. Changes to the plan, protection measures, monitoring and other actions that would benefit the species will be discussed and incorporated into the INRMP as needed. Proposed installation projects that involve cutting trees (e.g., hazard tree removal, road maintenance, timber harvest) and projects in the Twin Lakes vicinity will be discussed at the annual meetings. The NRM coordinates and schedules the annual meetings, as documented in the Natural Resource Conservation/INRMP Metrics reporting within the Navy's internal Conservation Website.

Duration: This INRMP is intended to provide continual management guidance with no specified endpoint. Annual reviews and a review for operation and effect at least every five years provide suitable mechanisms and sufficient flexibility to achieve plan objectives and enable plan effectiveness.

4.2.3 Management Plan for Northern Spotted Owl

Presence on the installation: It is unlikely this species inhabits installation lands based on the distance to designated critical habitat (6 miles) and analyses of the species range, but suitable habitat exists in the Twin Lakes area, overlapping that of the marbled murrelet so the presence of northern spotted owls cannot be completely discounted.

The old growth forest at NRS(T) Jim Creek, the larger area of designated critical habitat, and other forested areas on the installation provide habitat suitable for the northern spotted owl and require protection.

Criteria 1: Species Conservation and Habitat Protection - The Navy will contribute to conservation of the northern spotted owl by protecting NRS(T) Jim Creek's old growth forest, and other suitable habitat on the installation, and by avoiding disturbance of birds during nesting times (March – June).

Environmental checklists will be required for new projects so adequate protection can be identified.

The PWDE Environmental Division will ensure that proposed actions that could potentially affect northern spotted owls or habitat comply with Section 7 of the ESA through consultation with USFWS. Proposed tree alteration or removal (e.g., hazard tree removal) will be evaluated for impacts to habitat. Large disturbance projects involving tree removal and elevated sound levels will consider potential effects to northern spotted owls and suitable habitat. Appropriate ESA consultations will be conducted with USFWS if a project may affect this species or suitable habitat. If no effect would occur, written documentation and rationale will be maintained in the project file.

The NRM will identify mission operations and infrastructure that could affect northern spotted owls and coordinate with installation personnel and the USFWS to avoid impacts. Ongoing, routine mission operations do not occur in forested areas of the installation where this species could potentially occur.

The NRM will periodically meet with NSE, the NCTAMS OIC, and other operational departments to maintain awareness of proposed new missions, or changes to existing missions at NRS(T) Jim Creek to ensure adequate protection of northern spotted owls and their habitat.

The NRM and Region Forester will work with USFWS to evaluate the need for considering implementation of forest restoration activities as described in the Recovery Plan for northern spotted owl (USFWS, 2011b) on installation lands.

Criteria 2: Implementation of the Plan - NSE maintains a NRM position with oversight of natural resources management at NRS(T) Jim Creek. This position is responsible for implementing this INRMP, reviewing projects in light of northern spotted owl conservation needs, and monitoring activities at NRS(T) Jim Creek to protect the owls and their habitat. The NRM is also able to request natural resources expertise from the NAVFAC NW at NBK - Bangor, staffed with environmental planners and specialists, to assist the NRM in conservation and environmental compliance requirements.

The NRM has the authority to implement conservation and protection plans and obtain all necessary authorizations or approvals for proposed management actions. The NRM annually develops projects and requests funding for natural resources management, including habitat enhancement projects and special projects to assist in the recovery of T&E species as needed.

Criteria 3: Effectiveness of Conservation Measures – Assurances that the conservation measures in this INRMP will be effective are provided through the following:

Goals and Objectives: This INRMP establishes a goal in Chapter 1 of ensuring the sustainability of the ecosystems that encompass the installation.

Objectives in Chapter 1 applicable to the northern spotted owl are:

- Protecting threatened and endangered species, sensitive species, and critical habitats regulated under the Endangered Species Act and
- Specifically protecting the old growth forest at Twin Lakes.

Parameters: The parameter for measuring management effectiveness is the prevention of habitat loss across all installation lands.

Monitoring: Site-specific surveys for northern spotted owl have not been conducted by regulating agencies for more than 20 years because there is a range-wide demographic study that has been underway since 1994. This study is being conducted as a commitment under the Northwest Forest Plan (USDA and USDI 1994a and b), which covers the range of the northern spotted owl and is used to assess the status of this species in the Pacific Northwest. Regular surveys are conducted in three geographic areas in Washington, as well as in Oregon and California. Monitoring spotted owl populations throughout the species' range in Washington, Oregon, and California is an extensive effort conducted by several agencies and partners. This effort is not designed to count the number of individual spotted owls but rather to gather sampling data from which population trends are derived. More specific spotted owl surveys also are conducted in areas where forest management activities may affect spotted owl nesting, roosting, or foraging habitat so that potential adverse effects can be avoided or minimized.

http://www.fws.gov/oregonfwo/Species/Data/NorthernSpottedOwl/main.asp.

Northern spotted owl surveys may be appropriate at NRS(T) Jim Creek, should there be large disturbance or timber harvest activities planned in forested areas on the installation.

This INRMP includes provisions for annual review, analysis, and adaptation in coordination with USFWS and WDFW. However, out-of-cycle adaptive management is not prohibited. While subject to required consultation and approval, the plan is adaptable.

Reporting: During the annual review of the INRMP, progress on northern spotted owl conservation will be shared with USFWS and WDFW. Changes to the plan, protection measures, monitoring and other actions that would benefit the species will be discussed and incorporated into the INRMP as needed. Proposed installation projects that involve cutting trees (e.g., hazard tree removal, road maintenance, timber harvest) and projects in the Twin Lakes vicinity will be discussed at the annual meetings. The NRM coordinates

and schedules the annual meetings, as documented in the Natural Resource Conservation/INRMP Metrics reporting within the Navy's internal Conservation Website.

Duration: This INRMP is intended to provide continual management guidance with no specified endpoint. Annual reviews and a review for operation and effect at least every five years provide suitable mechanisms and sufficient flexibility to achieve plan objectives and enable plan effectiveness.

4.2.4 Management Plan for Chinook Salmon

Presence on the Installation: There are no barriers preventing South Fork fall Chinook Salmon from accessing streams at NRS(T) Jim Creek but the overall numbers of fish in this population are so low it is unlikely that individual fish would move upstream into Jim Creek. Further, the section of Jim Creek on the installation is not recognized as containing suitable spawning habitat.

Criteria 1: Species Conservation and Habitat Protection **-** The Navy will contribute to conservation of South Fork fall Chinook Salmon by maintaining or improving stream and riparian habitat quality; contributing to local and downstream habitat conditions.

Environmental checklists will be required for new projects so that adequate protection measures can be identified.

The PWDE Environmental Division will require that proposed projects taking place in Jim Creek or its tributaries be conducted within the approved in-water work window for Jim Creek (1 July – 15 August), or during periods of very little or no streamflow.

The PWDE Environmental Division will ensure that proposed actions that could potentially affect Chinook Salmon and PCEs of their habitat comply with Section 7 of the Endangered Species Act through consultation with the NMFS. Such actions could include in-water work, herbicide applications, and emergency road and culvert repairs.

The NRM will identify mission operations and infrastructure that could affect water quality (e.g., storm drain discharge; herbicide application near streams; road maintenance) and coordinate with project proponents, NSE's water resources manager, and NMFS to minimize or eliminate potential impacts.

Individual projects will be reviewed by the NRM and the NSE water resources manager, and project-specific environmental protection plans will be required when petroleum products or other materials will be used that could inadvertently be released to the environment.

NSEt will continue to maintain an Oil Spill Prevention, Control, and Countermeasure Plan (SPCC) for NRS(T) Jim Creek. This plan is required by the EPA for oil pollution prevention due to the amount of oil stored at NRS(T) Jim Creek. It is reviewed and updated at least every five years. It describes operating procedures to prevent the discharges of oil into waters of the U.S. and applies to oil storage and management.

The NRM will periodically meet with NSE, the NCTAMS OIC, and other operational departments to maintain awareness of proposed new missions or changes to existing missions at NRS(T) Jim Creek to ensure adequate protection of Chinook Salmon and installation stream habitat.

Stream buffers have been established and will be managed for the protection of ecological function of riparian areas and to contribute to PCEs for Chinook Salmon (See Section 4.13.1 Fish Habitat below).

Criteria 2: Implementation of the Plan **-** NSE maintains a NRM position with oversight of natural resources management at NRS(T) Jim Creek. This position is responsible for implementing this INRMP, reviewing projects in light of Chinook Salmon conservation needs, and monitoring activities at NRS(T) Jim Creek to protect Chinook Salmon habitat. The NRM is also able to request natural resources expertise from the NAVFAC NW at NBK - Bangor, staffed with environmental planners and specialists, to assist the NRM in conservation and environmental compliance requirements.

The NRM has the authority to implement conservation and protection plans and obtain all necessary authorizations or approvals for proposed management actions. The NRM annually develops projects and requests funding for natural resources management, including habitat enhancement projects and special projects to assist in the recovery of T&E species as needed.

Criteria 3: Management Effectiveness - Assurances that the conservation measures in this INRMP will be effective are provided through the following:

> **Goals and Objectives:** This INRMP establishes a goal in Chapter 1 of ensuring sustainability of the ecosystems that encompass the installation.

Objectives stated in Chapter 1 applicable to Chinook Salmon are:

- Protecting, conserving, and managing watersheds, wetlands, natural landscapes, soils, forests, fish and wildlife, and other natural resources on the installation thereby ensuring continued function of the ecosystem services they provide.
- Protecting threatened and endangered species, sensitive species, and critical habitats regulated under the ESA.
- Ensuring installation land-use planning is synchronized with ecosystem and species management plans. Accommodating findings of on-going surveys and assessments, and institutionalizing these through development of installation land-use/activity siting criteria.
- Implementing projects that promote the maintenance and restoration of natural conditions and maintain ecosystem services.

Parameters: The parameters for measuring management effectiveness are the maintenance or improvement of habitat quality as measured by periodic evaluation of in-stream and riparian conditions of installation streams.

Monitoring: Streams on the installation will be periodically evaluated for fish presence and habitat quality using water temperature data, B-IBI evaluations, habitat complexity studies and other methods.

A project to evaluate installation streams for potential use by Chinook Salmon and to evaluate in-stream habitat conditions was initiated in 2016 (EPR# 6113512002; 1 S NW Jim Creek Fish Species Presence and Distribution). The results of this effort, expected to take two years, and future surveys conducted under this project will be used to adjust management on the installation as needed.

Reporting: During the annual review of the INRMP, progress on Chinook Salmon conservation will be shared with NMFS and WDFW. Changes to the plan, protection measures, monitoring and other actions that would benefit the species will be discussed and incorporated into the INRMP as needed. Proposed installation projects that involve work in or near streams, or that could otherwise affect stream quality or riparian areas will be discussed at the annual meetings. The NRM coordinates and schedules the annual meetings, as documented in the Natural Resource Conservation/INRMP Metrics reporting within the Navy's internal Conservation Website.

Duration: This INRMP is intended to provide continual management guidance with no specified endpoint. Annual reviews and a review for operation and effect at least every five

years provide suitable mechanisms and sufficient flexibility to achieve plan objectives and enable plan effectiveness.

4.2.5 Management Plan for Steelhead

Presence on the Installation: Potential. There are no barriers preventing steelhead from reaching installation streams but migrating adult steelhead have not been seen on the installation in recent years. However, stream surveys in 2017 documented Rainbow Trout so the presence of steelhead cannot be ruled out. The State's Statewide Steelhead Management Plan indicates spawning takes place in Jim Creek (WDFW, 2008).

Criteria 1: Species Conservation and Habitat Protection **-** The Navy will contribute to conservation of steelhead by maintaining or improving stream and riparian habitat quality; contributing to local and downstream habitat conditions.

Environmental checklists will be required for new projects so that adequate protection measures can be identified.

The PWDE Environmental Division will require that proposed projects taking place in Jim Creek or its tributaries be conducted within the approved in-water work window for Jim Creek (1 July – 15 August), or during periods of very little or no streamflow.

The PWDE Environmental Division will ensure that proposed actions that could potentially affect steelhead and PCEs of their habitat comply with Section 7 of the Endangered Species Act through consultation with the NMFS. Such actions could include in-water work, herbicide applications, and emergency road and culvert repairs.

The NRM will identify mission operations and infrastructure that could affect water quality (e.g., storm drain discharge; herbicide application near streams; road maintenance) and coordinate with project proponents, NSE's water resources manager, and NMFS to minimize or eliminate potential impacts.

Individual projects will be reviewed by the NRM and the NSE water resources manager, and project-specific environmental protection plans will be required when petroleum products or other materials will be used that could inadvertently be released to the environment.

NSE will continue to maintain an Oil Spill Prevention, Control, and Countermeasure Plan (SPCC) for NRS(T) Jim Creek. This plan is required by the EPA for oil pollution prevention due to the amount of oil stored at NRS(T) Jim Creek. It is reviewed and updated at least every five years. It describes operating procedures to prevent the discharges of oil into waters of the U.S. and applies to oil storage and management.

The NRM will periodically meet with the NSE, the NCTAMS OIC, and other operational departments to maintain awareness of proposed new missions or changes to existing missions at NRS(T) Jim Creek to ensure adequate protection of steelhead and installation stream habitat.

Stream buffers have been established and will be managed for the protection of ecological function of riparian areas and to contribute to PCEs for steelhead (See Section 4.13.1 Fish Habitat below).

Criteria 2: Implementation of the Plan - NSE maintains a NRM position with oversight of natural resources management at NRS(T) Jim Creek. This position is responsible for implementing this INRMP, reviewing projects in light of steelhead conservation needs, and monitoring activities at NRS(T) Jim Creek to protect steelhead habitat. The NRM is also able to request natural resources expertise from NAVFAC NW located at NBK – Bangor, staffed with environmental planners and specialists, to assist the NRM in conservation and environmental compliance requirements.

The NRM has the authority to implement conservation and protection plans and obtain all necessary authorizations or approvals for proposed management actions. The NRM annually develops projects and requests funding for natural resources management, including habitat enhancement projects and special projects to assist in the recovery of T&E species as needed.

Criteria 3: Management Effectiveness – Assurances that the conservation measures in this INRMP will be effective are provided through the following:

> **Goals and Objectives:** This INRMP establishes a goal in Chapter 1 of ensuring sustainability of the ecosystems that encompass the installation.
>
> Objectives stated in Chapter 1 applicable to steelhead are:
>
> - Protecting, conserving, and managing watersheds, wetlands, natural landscapes, soils, forests, fish and wildlife, and other natural resources on the installation thereby ensuring continued function of the ecosystem services they provide.
> - Protecting threatened and endangered species, sensitive species, and critical habitats regulated under the ESA.

- Ensuring installation land-use planning is synchronized with ecosystem and species management plans. Accommodating findings of on-going surveys and assessments, and institutionalizing these through development of installation land-use/activity siting criteria.
- Implementing projects that promote the maintenance and restoration of natural conditions and maintain ecosystem services.

Parameters: The parameters for measuring management effectiveness are the maintenance or improvement of habitat quality as measured by periodic evaluation of in-stream and riparian conditions of installation streams.

Monitoring: Stream conditions will be periodically evaluated for fish presence and habitat quality using water temperature data, B-IBI evaluations, habitat complexity studies and other methods.

A project to evaluate installation streams for potential use by steelhead and to evaluate in-stream habitat conditions was initiated in 2016 (EPR# 6113512002; 1 S NW Jim Creek Fish Species Presence and Distribution). The results of this effort, expected to take two years, and future surveys conducted under this project, will be used to adjust management on the installation as needed.

Reporting: During the annual review of the INRMP, progress on steelhead conservation will be shared with NMFS and WDFW. Changes to the plan, protection measures, monitoring and other actions that would benefit the species will be discussed and incorporated into the INRMP as needed. Proposed installation projects that involve work in or near streams, or that could otherwise affect stream quality or riparian areas will be discussed at the annual meetings. The NRM coordinates and schedules the annual meetings, as documented in the Natural Resource Conservation/INRMP Metrics reporting within the Navy's internal Conservation Website.

Duration: This INRMP is intended to provide continual management guidance with no specified endpoint. Annual reviews and a review for operation and effect at least every five years provide suitable mechanisms and sufficient flexibility to achieve plan objectives and enable plan effectiveness.

4.2.6 Management Plan for Bull Trout

Presence on the Installation: Confirmed. One Bull Trout was captured on the installation in main stem Jim Creek during surveys in 2017. Small populations may reside in other parts of the Stillaguamish watershed.

Criteria 1: Species Conservation and Habitat Protection **-** The Navy will contribute to conservation of Bull Trout by maintaining or improving stream and riparian habitat quality; contributing to local and downstream habitat conditions.

Environmental checklists will be required for new projects so that adequate protection measures can be identified.

The PWDE Environmental Division will require that proposed projects taking place in Jim Creek or its tributaries be conducted within the approved in-water work window for Jim Creek (1 July – 15 August), or during periods of very little or no streamflow.

The PWDE Environmental Division will ensure that proposed actions that could potentially affect Bull Trout and PCEs of their habitat comply with Section 7 of the Endangered Species Act through consultation with the USFWS. Such actions could include in-water work, herbicide applications, and emergency road and culvert repairs.

The NRM will identify mission operations and infrastructure that could affect water quality (e.g., storm drain discharge; herbicide application near streams; road maintenance) and coordinate with project proponents, NSE's water resources manager, and NMFS to minimize or eliminate potential impacts.

Individual projects will be reviewed by the NRM and the NSE water resources manager, and project-specific environmental protection plans will be required when petroleum products or other materials will be used that could inadvertently be released to the environment.

NSE will continue to maintain an Oil Spill Prevention, Control, and Countermeasure Plan (SPCC) for NRS(T) Jim Creek. This plan is required by the EPA for oil pollution prevention due to the amount of oil stored at NRS(T) Jim Creek. It is reviewed and updated at least every five years. It

describes operating procedures to prevent the discharges of oil into waters of the U.S. and applies to oil storage and management.

The NRM will periodically meet with the NSE command, the NCTAMS OIC, and other operational departments to maintain awareness of proposed new missions or changes to existing missions at NRS(T) Jim Creek to ensure adequate protection of Bull Trout and installation stream habitat.

Stream buffers have been established and will be managed for the protection of ecological function of riparian areas and to contribute to primary constituent elements (PCEs) for Bull Trout (See Section 4.13.1 Fish Habitat below).

Criteria 2: Implementation of the Plan **-** NSE maintains a NRM position with oversight of natural resources management at NRS(T) Jim Creek. This position is responsible for implementing this INRMP, reviewing projects in light of Bull Trout conservation needs, and monitoring activities at NRS(T) Jim Creek to protect Bull Trout habitat. The NRM is also able to request natural resources expertise from the Naval Facilities Engineering Command Northwest at Bangor, staffed with environmental planners and specialists, to assist the NRM in conservation and environmental compliance requirements.

The NRM has the authority to implement conservation and protection plans and obtain all necessary authorizations or approvals for proposed management actions. The NRM annually develops projects and requests funding for natural resources management, including habitat enhancement projects and special projects to assist in the recovery of T&E species as needed.

Criteria 3: Management Effectiveness - Assurances that the conservation measures in this INRMP will be effective are provided through the following:

Goals and Objectives: This INRMP establishes a goal in Chapter 1 of ensuring sustainability of the ecosystems that encompass the installation.

Objectives stated in Chapter 1 applicable to Bull Trout are:

- Protecting, conserving, and managing watersheds, wetlands, natural landscapes, soils, forests, fish and wildlife, and other natural resources on the installation thereby ensuring continued function of the ecosystem services they provide.
- Protecting threatened and endangered species, sensitive species, and critical habitats regulated under the ESA.
- Ensuring installation land-use planning is synchronized with ecosystem and species management plans. Accommodating findings of on-going surveys and assessments,

and institutionalizing these through development of installation land-use/activity siting criteria.

- Implementing projects that promote the maintenance and restoration of natural conditions and maintain ecosystem services.

Parameters: The parameters for measuring management effectiveness are the maintenance or improvement of habitat quality as measured by periodic evaluation of in-stream and riparian conditions of installation streams.

Monitoring: Stream conditions will be periodically evaluated for fish presence and habitat quality using water temperature data, B-IBI evaluations, habitat complexity studies and other methods.

A project to evaluate installation streams for potential use by Bull Trout and to evaluate in-stream habitat conditions was initiated in 2016 (EPR# 6113512002; 1 S NW Jim Creek Fish Species Presence and Distribution). The results of this effort, expected to take two years, and future surveys conducted under this project will be used to adjust management on the installation as needed.

Reporting: During the annual review of the INRMP, progress on Bull Trout conservation will be shared with USFWS and WDFW. Changes to the plan, protection measures, monitoring and other actions that would benefit the species will be discussed and incorporated into the INRMP as needed. Proposed installation projects that involve work in or near streams, or that could otherwise affect stream quality or riparian areas will be discussed at the annual meetings. The NRM coordinates and schedules the annual meetings, as documented in the Natural Resource Conservation/INRMP Metrics reporting within the Navy's internal Conservation Website.

Duration: This INRMP is intended to provide continual management guidance with no specified endpoint. Annual reviews and a review for operation and effect at least every five years provide suitable mechanisms and sufficient flexibility to achieve plan objectives and enable plan effectiveness.

4.2.7 Management Plan for Candidate Species and Other Species of Concern

Federal Candidate Species - The USFWS annually releases a list of plants and animals that are candidates for ESA protection. The complete notice and list appears in the *Federal Register*. Candidate species are those for which the USFWS has sufficient information on their biological vulnerability 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 (81 FR 87246). The NMFS also maintains a list of species of concern for which more information is needed before the species can be proposed for listing. Candidate species receive no statutory protection under the ESA, however the USFWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the ESA.

One candidate species, the **Cascades frog** is confirmed as present at NRS(T) Jim Creek. Management for it is addressed below in the Reptile and Amphibians section.

Forest habitat suitable for another candidate species, **yellow cedar**, occurs at NRS(T) Jim Creek. Forest communities exist on the installation that could support this species, but its presence has not been confirmed. The NRM will coordinate with the Region Forester and USFWS to determine the presence of yellow cedar at NRS(T) Jim Creek and identify any needed protective or conservation measures for the species.

New candidate species will be identified at the annual Natural Resource Conservation/INRMP Metrics meetings, and the NRM, in cooperation with USFWS, WDFW and NMFS, will determine if specific management for the species is needed at the installation.

4.2.8 Coho Salmon

Coho Salmon spawn annually in tributary streams on the installation (and in other parts of the Stillaguamish watershed). Juveniles rear for up to two years in installation streams before migrating to the ocean.

Habitat for Coho Salmon overlaps with that of other salmonids in the Stillaguamish watershed. Coho use smaller, shallower streams with slightly smaller substrate than those used by Chinook Salmon.

Habitat management for Chinook Salmon, steelhead and Bull Trout such as establishing buffers, protecting riparian areas and protecting water quality will benefit Coho Salmon as well.

Management for this species will consist of:

- Implementing Chinook, steelhead, and Bull Trout habitat management actions and projects as described above.
- Ensuring continued installation access for WDFW in support of the Coho index stream counts.
- Managing other installation operations and projects so that juvenile Coho Salmon inhabiting installation streams are not impacted.

4.2.9 Salish Sucker

A robust, healthy population of this species occurs in the Twin Lakes system (Pearson, 1999, Garret and Spinelli, 2017).

Management for this species will consist of:

- Periodic surveying to monitor the population level and health of the species (EPR# 61135NR010; SIKES NW Jim Creek Lakes and Salish Sucker Surveys).
- More focused surveying on spatial and temporal habitat selection, as well as spawning timing to contribute to the knowledge base for this species in the Pacific Northwest (EPR # 61135NR010; SIKES NW Jim Creek Lakes and Salish Sucker Surveys).
- Maintaining the habitat features in the lake system that are important to this species, specifically beaver ponds that create deep pools with instream vegetation and low flows.
- Avoiding activities that would alter habitat or directly impact this species or its habitat.

4.2.10 Townsends Big-Eared Bat and other Bat Species

Long-Legged Bat

Eight bat species, including Townsend's Big-eared Bat (State candidate species), have been documented at NRS(T) Jim Creek in the Twin Lakes/Cub Creek area, in the antenna field, around the MWR administrative building (B4) and within the Jim Creek bridge structure. Since bats are free-flying animals they could occur anywhere across the installation in suitable habitat. Hibernacula or maternity colonies are not known to exist on the installation.

Bats in Washington are considered wildlife and per WAC 220-200-100 cannot be hunted except when found in or immediately adjacent to dwellings or other human-occupied buildings.

Management of bats and bat habitat will consist of:

- Continuing cooperation and coordination on bat surveys conducted by other agencies.

  This could include research on migration patterns, habitat requirements and population status; and surveys to determine the likelihood of bat colonies or bat colony habitat on the installation.

- Maintaining large diameter trees and snags, and creation of snags in proposed harvest prescriptions.

  The NRM will coordinate with the Region Forester in protecting bat habitat during harvest projects.

- Properly removing pest bats.

Where removal of bats from buildings is necessary, the NRM will coordinate with WDFW and follow the recommended timing, techniques, and other guidance at http://wdfw.wa.gov/living/bats.html.

- Mitigating to compensate for the loss of bat roosting habitat, if the Jim Creek Bridge (#43) is reconstructed or replaced. In addition, bridge designs that create roosting habitat in the new bridge will be proposed.
- Evaluating proposed construction and repair projects that could impact habitat or displace individual roosting bats so that appropriate avoidance, minimization or mitigation can be identified.
- Surveying installation lands in response to the discovery of WNS in Washington state. This would be conducted under a larger, Region-wide bat survey project (EPR# 68742BAT01; 3 SAR NE Bat Surveys and Monitoring).

4.2.11 American Pika

This species is present in rocky habitats on both Wheeler and Blue mountains. Pika have been detected at four sites on the installation and the presence of more than one animal confirmed.

Management for this species will consist of:

- Periodic monitoring (every five to seven years), specifically at the four active sites (EPR# 6113512001; SIKES NW American Pika Species Survey).
- Avoiding actions that break or compact rocky habitat.
- Avoiding vegetation treatment (brush cutting, mowing, herbicide application) at the four occupied sites, within the requirement of the treatment needed for ground field maintenance.
- Working with WDFW to better understand the pika's distribution at the occupied sites and monitoring to assess impacts of a warming environment.

- Working with WDFW and other partners to better understand the distribution of occupied sites and evaluate recreation intensity and access.

4.3 Wetlands

Over 160 acres of lacustrine and palustrine wetlands occur the installation. Additional surveys could result in more wetland areas being discovered.

Executive Order 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 USACE. OPNAV M-5090.1 refers to 33 CFR 320-330; the Clean Water Act Section 404, and requires that the Navy comply with the national goal of no net loss of wetlands, and to avoid degradation or loss of size, function and value of wetlands.

Wetland management will consist of:

- Protecting wetlands consistent with the above requirements.
- Identifying possible encroachment and impacts to wetlands from proposed projects through the project review process, and ensuring that program/project managers are aware of the laws and regulations concerning the protection of wetlands.

- Applying the following general management guidelines:

    a) The Navy will plan all construction and operational actions to avoid adverse impacts to or destruction of wetlands. Any construction requirement that cannot be sited to avoid wetlands shall be designed to minimize wetlands degradation and shall include compensatory mitigation as required by wetlands regulatory agencies in all phases of the project's planning, programming and budgeting process. All such projects need to be approved by the chain of command;
    b) Any action significantly affecting wetlands is addressed during the environmental review and public notification process under NEPA;
    c) Boundaries of legally defined wetlands on all Navy lands are identified and mapped with sufficient accuracy to protect them from potential unplanned impacts. Wetland maps will be distributed to all potential users, including facilities planners, operational units and tenant commands. Jurisdictional maps may be required prior to actual construction if there is any potential of wetlands present in the vicinity of the project. Field verification and jurisdictional determinations will be required for all projects;
    d) Adequate expertise is available to installation commanding officers for the protection, management, identification and mapping of wetlands;

e) Implementation of wetlands creation or enhancement projects and wetlands banking, where compatible with the installation mission, is encouraged. Natural resources managers should identify potential wetland mitigation sites.

- Maintaining the Spill Prevention, Control, and Countermeasures Plan for Jim Creek to prevent accidental contaminant releases to wetlands.
- Managing and/or eliminating invasive plants within wetland buffer areas (EPR# 61135NR014; CHS NW Jim Creek Invasive Species Control).

4.4 Forests

Since the Navy initially acquired the installation property in the 1950's, there has been little active forest management, due to the combination of young, second growth forest and the protected old growth forest. Recent forest management activities have concentrated on GIS inventory and mapping of the old growth and adjacent second growth stands. Forested lands are generally not managed for commercial timber harvest.

Forestry resources are managed through a separate Jim Creek Forest Management Plan (Appendix K) and through the Regional Forest Products Sales and Permit Program (COMNAVREG NW INST 11015.1). In accordance with DoD and DON requirements, the Navy Forest Management Program is centrally funded and executed through the NAVFAC NW. The Region Forester provides professional forestry services to manage and develop the forest resources of the installation. Existing forest inventory data is in need of updating, and the existing Jim Creek Forest Management Plan is in need of revision.

Forest management objectives within the Forest Management Plan include:

1. Continued maintenance of timber stands in a healthy, productive condition.
2. Support of the military mission through maintenance of land availability and use options.
3. Preservation of the old growth stands in the Twin Lakes/Cub Creek corridor.
4. Protection of water quality in the Jim Creek, Little Jim Creek, and Cub Creek drainages.
5. Generation of forest products and income through timber sales contracts.
6. Integration of forest management with other natural resources disciplines and programs.
7. Support of natural resources aspects of outdoor recreation.

These objectives support, and are consistent with those of this INRMP however a new, updated Forest Plan will emphasize the importance of forested habitats to fish and wildlife, vs. commercial harvest.

In the existing Forest Plan, management prescriptions include various actions to restore, enhance, conserve and protect the forest productivity and resources (Appendix K). Thinning prescriptions are identified for roughly half the stands and little or no active management on the remainder. This is interspersed with selective planting and selective removal of danger trees.

Additional management related to forests and forestry will consist of:

- Coordinating proposed forest management actions on lands controlled by the USFS or WDNR with these agencies prior to implementation.
- Continuing protection of the forested areas within the Cub Creek watershed, the overlapping Walter Briggs Old Growth Forest Area, designated Marbled Murrelet critical habitat, and areas classified as Sitka spruce/swordfern forest by the Washington Heritage Program.
    - In this area, recreational uses and developments will be limited to the existing features.
    - No new trails, docks or landing development will be allowed on the west side of the lakes or Cub Creek.
- Updating the forest inventory and the Jim Creek Forest Management Plan (Appendix K).
- As needed, taking advantage of services offered annually by the Wenatchee Forest Insect and Disease Service Center (Appendix L).

4.5 Vegetation

4.5.1 Ground field vegetation

To support mission operations, vegetation in the ground field will continue to be treated according to the most recent Antenna Ground Field Vegetation Management Plan. Vegetation management in this area will be conducted consistent with the Antenna Ground Field Vegetation Management Plan and the associated Environmental Assessment and ESA consultations.

Aerial herbicide spraying is considered a discharge of pesticides to waters of the United States. A notice of intent (NOI) is required to be submitted to the EPA for each aerial treatment event. The PWDE Environmental Division, with assistance from NAVFAC NW located at NBK - Bangor will submit these notices in compliance with the provisions in the National Pollutant Discharge Elimination System (NPDES) Pesticides General Permit (PGP).

At the annual Natural Resource Conservation/INRMP Metrics meeting, the cooperating agencies will be informed of upcoming aerial spraying.

4.5.2 Landscaping

A relatively small amount of the installation's total acreage is landscaped with ornamental lawn, shrubs, and trees, primarily around the administrative buildings and MWR buildings and cabins. Consistent with DoD policy, native plants and grasses will be used to the maximum extent feasible when planting opportunities arise in order to reduce maintenance requirements, water consumption, and insect and plant disease problems.

4.5.3 Invasive Species

Tansy Ragwort

Scotch Broom

Scotch broom, tansy ragwort, and Himalayan blackberry occur on installation lands. Other species of noxious weeds are likely present as well in small numbers, but have not yet been inventoried. No invasive animal species have been discovered on the installation.

Scotch broom will continue to be treated within the antenna ground field, consistent with the most recent Antenna Ground Field Vegetation Management Plan. Most of the invasive species management effort has been focused on this species because it interferes with transmitter efficiency.

Invasive species management will also occur through implementation of the IPMP. Plan preparation, periodic review and update as well as prescriptions for known and documented infestations and issues are included in the IPMP.

Additional invasive species management will consist of:

- Identifying and removing Scotch broom in areas outside the antenna field.

- Conducting surveys of installation lands for the presence of Class A noxious weeds and other invasive plants to determine the presence, location and extent of any noxious and invasive plants.

- Eradicating Class A noxious weeds and other plants whose control is required by Snohomish County, and other invasive plants discovered during surveys.

- Surveying wetlands and associated buffers for the following species according to the Washington State Department of Agriculture's revised Integrated Pest Management Plan for Freshwater Emergent Noxious and Quarantine Listed Weeds (WSDA, 2013).

    - Common reed, Phragmites (*Phragmites australis*)
    - Flowering rush (*Butomus umbellatus*)
    - Garden loosestrife (*Lysimachia vularis*)
    - Hairy willow-herb (*Epilobium hirsutum*)
    - Knotweed (*Polygonum spp*)
    - Purple loosestrife (*Lythrum salicaria*)
    - Wand loosestrife (*L. virgatum*)
    - Reed canarygrass (*Phalaris arundinacea*)
    - Saltcedar (*Tamarix ramosissima)*
    - Yellow flag iris (*Iris pseudocorus*)

- Monitoring installation lands for new infestations of invasive species, including plants and animals.

Implementation of these efforts are supported by EPR # 61135NR014; CHS NW Jim Creek Invasive Species Control.

4.6 Wildland Fire

NRS(T) Jim Creek does not have a dedicated, on-site fire department. Fire-fighting capability is limited to a few hoses and water supply lines near the buildings, and fire extinguishers within each building.

Commander, Navy Region Northwest has a cooperative agreement with the USFS for mutual aid in the instance of wildland fire and a mutual aid agreement with the cities of Everett, Marysville, and Snohomish County Fire Protection District #21 for fire response (Appendices N and O).

Human activity and lightning strikes are the main sources of wildfire. During dry periods in summer and early fall, there is a moderate to high risk of wildfire at NRS(T) Jim Creek. The large number of summer recreationists increases the risk of an accidental fire. Fire-works are not

permitted on the installation. The Region Forester generally monitors the level of fire risk and in coordination with the NRM provides recommendations to the NSE Commanding Officer concerning fire danger levels. Burn bans are sometimes put in place, following Federal and Snohomish county restrictions.

4.7 Outdoor Recreation

MWR operates a robust outdoor recreation program at NRS(T) Jim Creek. Recreation activities on the installation must comply with the management plans and requirements of this INRMP.

Fishing at Twin Lakes – The routine stocking of the lake with catchable-sized trout is not interfering with the lakes' natural fish community, as indicated by the 2016 lake survey (Garrett and Spinelli 2017).

Existing restrictions such as prohibiting snowmobiles and recreational ORVs protect natural resources.

Outdoor recreation management on the part of the NRM will consist of:

- Coordinating with MWR on their activities and providing recommendations to avoid impacts to natural resources when needed.
- Coordinating with MWR in creating environmental education materials (posters, brochures, bird lists, etc.) (EPR# 61135NR011; CHE NW NRS(T) Jim Creek Environmental Education.).

4.8 Agricultural Outleasing

There is no agricultural outlease program at NRS(T) Jim Creek. Installation lands are not suitable for agricultural uses.

4.9 Other Leases

The Navy has issued a lease to the U.S. Geological Survey for the placement and maintenance of a seismograph in the Communications Center Link (B20) on Blue Mountain. The seismograph is monitored by the University of Washington as part of the Pacific Northwest Seismograph Network (PNSN). This lease will likely be renewed and maintained as long as the PNSN has need for the seismograph. There are no natural resource concerns with the continued seismic monitoring. Researchers periodically go to the site to maintain the equipment.

4.10 GIS Management, Data Integration, Access, and Reporting

NAVFAC NW manages the local GeoReadiness Center (GRC), which is responsible to CNIC for managing all Geographic Information Systems (GIS) data for installations within the Navy Region

Northwest (NRNW) AOR. In addition to the NAVFAC NW Environmental group, other user groups include facilities, utilities, public works, public safety, and others.

The NAVFAC NW GRC supports the development of natural resources data reflecting the land and sea habitats of rare and endangered species, migratory birds and marine mammals. These data are critical for the maintenance and management of the environmental business line infrastructure, help with the installations' efforts to comply with environmental laws, and ensure the protection of sensitive resources while supporting military operations. GIS provides the framework for the acquisition, analysis, synthesis, and application of inventory and monitoring data for the NAVFAC NW Environmental Business Line.

The NAVFAC NW Natural Resources Branch is responsible for preserving biodiversity and ensuring the integrity of natural ecosystems over time while meeting the needs of the military mission and complying with applicable regulations. This requires identifying, analyzing and mapping existing and historic conditions, and species presence and distribution (EPR# 61135NR015; CHE NW NRS(T) Jim Creek INRMP Conservation Mapping). This information is vital in establishing a foundation for the preparation of INRMPs.

Data coverage of Natural Resource media in general is limited, and it is necessary to gather datasets and coverage from public sources in order to improve the utility of GIS as a natural resource management tool for informed decision making. Data development, mining and integration are on-going efforts. However, the NAVFAC NW Natural Resources Branch has developed a Scope of Work to obtain GIS data development services from the NAVFAC NW GRC. The intent is to develop ESRI features, geodatabases and maps that support NAVFAC NW Natural Resource Business Line. This geospatial information will conform to Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE, version 3.x) and final deliverables are to be stored and accessible in the GeoReadiness Explorer (GRX), which is the primary web-based viewing tool that provides views of geospatial map data at Navy Installations. Data collected to meet this intent can include field surveys, extraction from reports/imagery, or extraction from existing geospatial data.

As this INRMP is reviewed and improved to accommodate new information and objectives, data requirements and surveys will be identified. Planning level surveys proposed under this INRMP will be scoped to require the submittal of data in an appropriate format and sufficient standard to enable spatial inquiries and use of the data within a greater GIS suite as developed by the GRC. The GRC will be consulted when developing survey scopes to ensure sufficient data fidelity for integration into GRX. Updates to this INRMP will include data and visual representations of data that have been compiled and stored by the GRC.

Survey results, reports, and other non-GIS documents and products originating at, and compiled by NSE that support this INRMP are maintained at NSE, within the PWDE Environmental Division. Electronic documents are within the shared folder system:

W:\Region_Env\Everett\Natural Resources and the NRM manages these documents. Where such items are part of a larger, Regional effort, documents are maintained by the NAVFAC NW Senior Natural Resource Specialist located at NBK - Bangor.

4.11 Bird/Animal Aircraft Strike Hazard (BASH)

There is one helicopter landing area at NRS(T) Jim Creek, located in the open field area immediately north of Building 2, within the cantonment area of the installation. It is not used on a regular basis but has been used periodically for training. A BASH program does not exist and is not warranted at NRS(T) Jim Creek.

4.12 Law Enforcement

N/A; no law enforcement presence is needed on the installation specific to wildlife management.

4.13 Fish and Wildlife

Because the installation is not fenced, wildlife such as deer, coyotes, bobcats, etc. move freely across installation lands, occupy suitable habitat, and are part of larger populations which are managed by WDFW. No installation-specific wildlife management is warranted. Wildlife generally do not pose a risk to mission-related operations.

4.13.1 Fish habitat

Installation streams will be protected through the management described above for Chinook Salmon, steelhead and Bull Trout. Periodic surveys of fish habitat; and species presence and distribution are supported by EPR # 6113512002; 1 S NW Jim Creek Fish Species Presence and Distribution.

Twin Lakes, which provides habitat for several native fish species will continue to be protected by its location within the old growth forest and within the designated critical habitat for marbled murrelet.

Management of lake habitat for the Salish Sucker will benefit other native fish species (i.e., maintaining beaver ponds that create deep pools with instream vegetation and low flows), avoiding activities that would alter habitat. Periodic surveys of the lake system are supported by EPR# 61135NR010; SIKES NW Jim Creek Lakes and Salish Sucker Surveys.

Buffers **-** NRS(T) Jim Creek is within a watershed that includes other Federal lands (the Mount Baker-Snoqualmie National Forest) managed under the Northwest Forest Plan (NWFP) (USDA and USDI 1994a and b). The NWFP is a series of federal policies and guidelines governing land use on federal lands in the Pacific Northwest region. One strategy within the NWFP is the Aquatic Conservation Strategy. The Aquatic Conservation Strategy was designed to restore and maintain

ecological processes for aquatic and riparian area conservation on federal lands in the western portion of the Pacific Northwest. This strategy includes, among other conservation measures, establishment of riparian reserve buffers on streams and other waterbodies.

To be consistent with adjoining federal land management and in order to contribute to overall ecosystem function, riparian reserves, or stream buffers, have been adopted at NRS(T) Jim Creek that are consistent with those in the Aquatic Conservation Strategy of the NWFP:

Fish-bearing streams: 300 feet each side.

Permanent, nonfish-bearing streams: 150 feet each side.

Wetlands greater than 1 acre: 150 feet.

Lakes and natural ponds (Twin Lakes): 300 feet slope distance.

Seasonally flowing or intermittent streams, wetlands, and unstable and potentially unstable areas: Minimum of 100 feet slope distance.

Full definitions are in Appendix M.

Establishing these buffers does not totally preclude activity or projects within them, but the management intent within these areas is to prohibit and regulate activities that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Standards and guidelines for riparian reserves as described in the Aquatic Conservation Strategy will be consulted when activities are proposed within these buffers.

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. The PCEs for Chinook Salmon, steelhead, and Bull Trout were identified in Chapter 2.

Critical habitat is not designated on the installation for ESA-listed fishes, but implementation of this INRMP including establishing stream buffers, protecting wetlands, reviewing projects to identify and minimize impacts, maintaining a SPCC Plan, and other management actions will contribute to meeting PCEs. Mission-related operations do not occur in or near streams.

Fording Jim Creek with heavy equipment - Proposed fording specifically related to antenna system and tower maintenance will be coordinated with the NRM and is limited to one crossing; over and back. Fording can only occur between 1 July and 15 August, the in-water work window established by the USACE for the South Fork Stillaguamish River and tributaries.

No other fording of Jim Creek or tributary streams by vehicles is otherwise permitted.

Herbicide treatment buffers – Buffers have been established in the Antenna Ground Field Vegetation Management Plan and associated EA and ESA consultations specific to herbicide treatment conducted in support of the installation mission. These will be followed during herbicide treatment performed for vegetation control.

In-stream alterations **-** During the summer of 2001, a hand-constructed dam in Jim Creek was discovered just downstream of the Navy property line. The purpose of the dam was probably to create a pool for swimming and wading. High winter flows and movement of in-stream substrate in later years removed the dam. Adding structures to streams or altering the flow of streams without proper environmental review and permits is illegal and may impact fish and other aquatic organisms. Frequent checks of Jim Creek will be made during the warmer months to ensure that similar structures are not built on Navy property.

4.13.2 Beavers and Beaver Dams

Situations involving beaver activity will be evaluated and discussed with NCTAMS and MWR staff as they arise and are brought to the attention of the NRM. When there are no risks to mission operations, and no safety or flooding concerns, the first option considered will be to not interfere with the beavers.

Where unacceptable risk is identified the dams can be altered to lower impounded water levels, and/or the animal removed in coordination with WDFW.

4.13.3 Amphibians and Reptiles

Cascades Frog

Western Toad

Ensatina

The **western toad** (USFWS Species of Concern, State Species of Greatest Conservation Need) and the **Cascades frog** (USFWS Candidate, State Monitored) are confirmed on the installation. Suitable habitat exists for the **coastal tailed frog** (USFWS Species of Concern, State Monitored). Numerous other amphibians and reptiles have been observed on the installation (Table 8).

Amphibians occupy a variety of aquatic habitats found on the installation including cold, clear headwater streams; still water bodies associated with ponds, lakes, and wetlands; edges of rivers and streams and riparian areas; and river off-channel habitat. They can be found at low elevations and also high elevations (e.g., the Cascades frog primarily occurs at about 2000 feet in Washington). Forested environments away from water bodies also provide amphibian and reptile habitat.

No breeding sites, where large numbers of some amphibian species congregate, have been discovered on the installation.

Management of amphibians and reptiles will consist of:

- Protecting wetlands as described above.
- Establishing buffers on surface waters and wetlands as described above.
- Protecting other occupied habitats where they are found.
- Identifying existing operations and infrastructure at NRS(T) Jim Creek that could affect amphibian and reptile habitat and coordination with the NSE and NCTAMS to minimize impacts.
- Continuing cooperation and coordination on amphibian and reptile surveys and activities conducted by other agencies and the Partnership for Amphibian and Reptile Conservation (PARC).
- Coordinating with the Region Forester on proposed forestry management actions in order to insure forest practices are conducted in a manner which does not negatively impact amphibian habitat. In particular avoiding practices that could result in excessive stream temperatures and siltation.

Chytridiomycosis at NRS(T) Jim Creek **-**The chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*) was found in sampled amphibian specimens at NRS(T) Jim Creek but not at high levels. Lannoo et al. (2014) recommended the following steps to prevent the spread of the chytridiomycosis disease caused by high levels of Bd. These recommendations are incorporated here as part of amphibian management at NRS(T) Jim Creek:

- 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.

4.13.4 Wildlife Habitat

In addition to the management described above for specific fish and wildlife species, EPR # 68742NWTJ1; SIKES NRNW Establishing, Sustaining and Improving Vegetated Habitats. supports establishing, sustaining and improving vegetated habitats for various species and can be used as specific needs are identified that fit within the scope of this project.

4.14 Migratory Birds

The undeveloped character and natural, forested environment of installation lands provides habitat for many species of migratory birds.

Executive Order 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*; 66 FR 3853) was issued in 2001 to better fulfill the Federal Government's role as a leader in migratory bird and habitat conservation, and to incorporate bird conservation more fully into agency programs. It directs Federal agencies taking actions that have, or are likely to have, a measureable negative effect on migratory bird populations to develop and implement MOUs with the USFWS that promote the conservation of migratory bird populations.

A MOU developed pursuant to EO 13186 between USFWS and DoD (2014) identifies specific activities where cooperation between the two agencies will contribute to the conservation of migratory birds and their habitats. The MOU describes actions that should be taken by DoD to advance migratory bird conservation, avoid or minimize the take of migratory birds, and ensure DoD activities (other than military readiness activities) are consistent with the MBTA. The MOU describes how DoD and USFWS will work together cooperatively to achieve conservation of migratory birds.

At NRS(T) Jim Creek, routine mission-related actions and recreation activities are not known to expose migratory birds to stressors, to the extent that impacts to individual birds or to bird populations occur.

Migratory Bird Management will consist of:

- Periodic monitoring (roughly every five years) of the marbled murrelets in the old growth forest (EPR # 68742CN001; 1 CR NW Marbled Murrelet Density and Occupancy Surveys).
- Treating vegetation in the antenna field consistent with the Antenna Ground Field Vegetation Management Plan and the Integrated Pest Management Plan to minimize exposure of birds to herbicides.
- Evaluating proposed actions at NRS(T) Jim Creek in light of the MBTA, Executive Order 13186, and the 2014 MOU to ensure that actions integrate bird conservation principles and avoid or minimize exposure to stressors that could result in take.
- In cooperation with USFWS and WDFW, identifying and implementing other protection, habitat restoration and habitat enhancement opportunities beneficial to migratory birds.
- For the bald eagle, golden eagle, northern goshawk and other raptors, monitoring for the establishment of nests on the installation and providing protection, should these species establish nests.

4.15 Pest Management

Pest management is coordinated through the NSE Integrated Pest Management (IPM) Coordinator consistent with the Integrated Pest Management Plan (NAVFAC 2014). The overall pest management strategy, pest control methods, pesticides permitted for use, pesticide safety and pest

survey techniques are identified in the Naval Station Everett IPMP (which includes NRS(T) Jim Creek).

The IPM program is to be implemented to prevent adverse environmental impacts, and integrated pest management requires a preventative strategy. As stated in the IPMP, one objective of an integrated pest management program is the reduction of the use and dependence on pesticides.

Consistent with OPNAVINST 6250.4C, pest management must use targeted, sustainable methods including habitat modification, biological, genetic, cultural, mechanical, physical and regulatory controls and, when necessary, the judicious use of least hazardous pesticides. Methods must be those least hazardous to non-target organism and the general environment. The IPMP recognizes that the first criterion in selecting a pesticide is determining the need for a pesticide v. use of a different control method.

Generally, herbicides are not used by MWR staff or grounds keeping staff at NRS(T) Jim Creek. The Navy requires State-certified applicators for applying these products. No chronic pest problems are known but periodically pests such as rats, mice and insects occur and are referred to the NSE Integrated Pest Management (IPM) Coordinator for resolution. The Base Operating Support Contract must follow the Integrated Pest Management Plan.

The IPMP is reviewed annually and updated as needed. It is reviewed and signed by the Installation Environmental Program Director, providing a mechanism for maintaining awareness of the program and for providing updates to address environmental concerns. During annual reviews of the IPMP, the IEPD and NRM will verify the IPMP includes consideration of migratory bird impacts related to pesticide use.

4.16 Land Management

Various aspects of land management are found in the installation's Antenna Ground Field Vegetation Management Plan, Forestry Plan, Integrated Pest Management Plan, and program elements in this section, such as wetlands, invasive species, and fish and wildlife habitat.

Road management and reduction: - Most native surface and gravel roads on the installation were built when the land was initially logged or when the installation was first established in the early 1950's. Some of these roads may no longer be needed, and it would be beneficial to evaluate them and consider permanently closing them; in some cases removing the culverts and obliterating the roadbeds. This would improve hydraulic and landscape conditions, result in fewer areas susceptible to landslides and slope failures, and reduce erosion and sediment sources.

This effort would require an inventory of all installation roads and an assessment of the level of service and need for continued maintenance for each road. This effort would require close coordination with NCTAMS, Security, and MWR.

4.17 Coastal/Marine Management

Not applicable

4.18 Floodplains Management

Not applicable

4.19 Climate Change

Timeframes of less than 25 years to 100 years and more are used to characterize predicted effects from climate change. For example, an average annual temperature increase of 3.2°F by the 2040s and a 37-44% decline in spring snowpack by the 2040s are predicted in Littell et al. (2009, citing others). It can be expected that climate change effects to the physical environment at NRS(T) Jim Creek will occur incrementally over similar timeframes.

During annual review of this INRMP with USFWS, NMFS and WDFW, consideration of local environmental changes attributable to climate change will be made so that natural resources management can be adjusted as appropriate. The recommended management actions in this INRMP are based on current and near-term foreseeable conditions. Adaptive management of natural resources at NRS(T) Jim Creek will occur as climate change-related issues develop.

A vulnerability assessment is expected to be initiated at a regional level through Landscape Conservation Cooperatives and other partnerships at the landscape level. This would be used to lay the foundation for an adaptation strategy on Navy properties. Such an assessment would help focus attention on the areas and resources most at risk, as well as the phenomena and associated impacts that could cause the greatest losses.

The phenomena expected to be of greatest importance and applicability at NRS(T) Jim Creek are:

- Sediment Dynamics and Wetland Migration
- Increasing Storm Intensity/Frequency
- Increased Air Temperatures
- Increased Water Temperatures

At a broader scale, the Federal government is implementing climate change management strategies through a number of policies. To implement its climate policy, the Federal government is using voluntary and incentive-based programs to reduce emissions and has also established programs to promote climate technology and science, including:

Executive Order 13693: Planning for Federal Sustainability in the Next Decade (March 19, 2015). This EO revokes EOs 13423 and 13514 and was enacted to maintain Federal leadership in sustainability and greenhouse gas emission reductions. It outlines forward-looking goals for federal agencies in the areas of energy, climate change, water use, vehicle fleets, construction, and acquisition.

Department of Defense Strategic Sustainability Performance Plans: Updated annually. The objective of the annual Strategic Sustainability Performance Plans is for sustainability to become thoroughly integrated with the everyday actions of the DoD mission. It recognizes the importance of resiliency in the face of climate change.

Department of Defense Instruction 4715.03 (March 2011): Requires integration of climate change impact assessment and adaptation planning in INRMPs. Instructs DoD components to utilize existing tools and the best science available to assess the potential impacts of climate change to natural resources on DoD installations in a regionally consistent manner and to the extent practicable.

OPNAV M-5090.1 (January 2014): Recognizes that a landscape approach to assessing the impacts of climate change is appropriate and that Navy properties may be too small in scale to address comprehensive climate change vulnerabilities. The manual suggests regional partnerships as a suitable means to participate in landscape-scale climate change assessments.

To the extent they apply at NRS(T) Jim Creek, these and other Federal and DON initiatives will be incorporated into management at the installation. The NRM will monitor, coordinate with, and integrate actions and recommendations from appropriate Federal and Department of Defense guidance as they pertain to natural resource management at NRS(T) Jim Creek.

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5 Implementation

Projects and actions to implement this INRMP are in Appendix A. Projects can be added, modified, or removed in coordination with the regulatory partners to maintain a viable, effective natural resources program.

This INRMP reflects a strategy that addresses legal, regulatory, DoD, DON, and CNO directives and policy requirements regarding funding and manpower. "Implementation" anticipates the execution of all Environmental Readiness Level (ERL) 4 projects and activities within the timeframes identified in the INRMP. However, all projects and 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 U.S.C. § 1341 *et seq*.)

5.1 Summary of Process

The process to implement this INRMP consists of funding and executing specific projects and conducting work with in-house staff, which also requires specific funding. Implementation further includes NRM input to military and MWR activities and proposed projects in order to ensure they are consistent with natural resource requirements and with this INRMP.

Per DoD Manual 4715.03 (*Integrated Natural Resources Management Plan (INRMP) Implementation Manual, Nov. 25, 2013*) INRMPs are implemented by:

- Actively requesting and using funds for natural resources management projects, activities and other requirements in support of goals, and objectives identified in the INRMP.
- Ensuring that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP.
- Inviting annual feedback from the appropriate USFWS and State fish and wildlife agency offices on the effectiveness of the INRMP.
- Documenting specific INRMP action accomplishments undertaken each year.
- Evaluating the effectiveness of past and current management activities and adapting those activities as needed to implement future actions.

5.2 Use of Cooperative Agreements

The Navy can enter into cooperative agreements with States, local governments, nongovernmental organizations, and individuals to implement this INRMP through the execution of specific

projects. The Navy can also establish interagency agreements with other Federal agencies to do this. Per the Sikes Act, in implementing this INRMP, priority shall be given to Federal and State agencies responsible for the conservation or management of fish and wildlife. Further, the current policy memo from DoD to the Assistant Secretary of the Navy (Energy, Installations and Environment) clarifying of the role of USFWS and state agencies in implementing INRMP objectives will be followed when entering into cooperative agreements, intragency support agreements, or contracts to conduct projects in support of this INRMP.

Cooperative agreements have been used successfully at NRS(T) Jim Creek to conduct marbled murrelet, American pika, and lake surveys. Cooperative agreements and intragency support agreements will be considered as mechanisms to conduct future surveys and natural resource projects.

5.3 Other Agreements

On a larger scale, DoD has entered into partnerships and collaborative agreements to assist with natural resources management and NRS(T) Jim Creek, as part of DoD, benefits from these agreements:

- January 2006 MOU between DoD, USFWS and the International Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resources Management Program on Military Installations.
- July 2014 MOU between the USFWS and DoD to Promote the Conservation of Migratory Birds. This MOU promotes the conservation of migratory bird populations while sustaining the use of military lands and airspace for testing, training, and operations.
- November 2006 MOU between DoD and U.S. Department of Agriculture Natural Resources Conservation Service. Both agencies signed an MOU agreeing to coordinate activities to preserve land and improve water quality on lands surrounding government-owned military bases.
- 1996 MOU between the U.S. Environmental Protection Agency and DoD for coordinating of Integrated Pest Management activities.
- 1996 cooperative agreement between DoD and The Nature Conservancy for conducting natural resources inventories at installations.

5.4 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* (DoD 2011). This instruction identifies recurring and non-recurring requirements:

Recurring Requirements:

- Administrative, personnel, and other costs associated with managing the DoD Natural Resources Conservation Program that are necessary to meet applicable compliance requirements in Federal and state laws, regulations, Executive Orders (EO), and DoD policies, or in direct support of the military mission.
- DoD components shall give priority 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.

Non-Recurring Requirements:

Current Compliance - Includes installation projects and activities to support:

a. Installations currently out of compliance (e.g., received an enforcement action from an authorized Federal or state agency or local authority).

b. Signed compliance agreement or consent order.

c. Meeting requirements with applicable Federal or state laws, regulations, standards, EOs, or DoD policies.

d. Immediate and essential maintenance of operational integrity or military mission sustainment.

e. Projects or activities that will be out of compliance if not implemented in the current program year. Those activities include:

i. 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.

ii. Planning documentation, master plans, compatible development planning, and INRMPs.

iii. Natural resources planning-level surveys.

iv. 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 or continuing actions can be modified in consultation with the USFWS or NMFS.

v. Mitigation to meet existing regulatory permit conditions or written agreements.

vi. 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.

vii. Wetlands delineation critical for the prevention of adverse impacts to wetlands, so that continuing actions can be modified to ensure mission continuity.

viii. Compliance with missed deadlines established in DoD-executed agreements.

Maintenance Requirements - Includes those projects and activities needed to meet an established deadline beyond the current program year and maintain compliance. Examples include:

a. Compliance with future deadlines.

b. Conservation, GIS mapping, and data management to comply with Federal, state, and local regulations, EOs, and DoD policy.

c. Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives.

d. Wetlands enhancement to minimize wetlands loss and enhance existing degraded wetlands.

e. Conservation recommendations in biological opinions issued pursuant to the ESA.

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 EO, and are not of an immediate nature. Examples include:

a. Community outreach activities, such as International Migratory Bird Day, Earth Day, National Public Lands Day, Pollinator Week, and Arbor Day activities.

b. Educational and public awareness projects, such as interpretive displays, oral histories, Watchable Wildlife areas, nature trails, wildlife checklists, and conservation teaching materials.

c. Restoration or enhancement of natural resources when no specific compliance requirement dictates a course or timing of action.

d. Management and execution of volunteer and partnership programs.

Environmental Readiness Levels (ERL):

To further facilitate project funding, the Navy has developed four Environmental Readiness Levels:

ERL 4 - Legal requirements derived from existing laws and Executive Orders (EO) and Final Governing Standards or Overseas Environmental Baseline Guidance Document (OEBGD), as applicable, which apply to Navy activities, platforms and operations. These OMB/EPR Class 0, 1

and 2 EPRs/ongoing efforts include responding to applicable Federal, state and local requirements (e.g., ESA; MMPA; RCRA; CWE; CAA; SDWA; NEPA; TSCA; OPA, APS and Executive orders such as 12088 (Federal Agency Compliance), 12843 (ODS Conversion/replacement), and 13423 (PW, Recycling, ODS, Energy Conservation).

ERL 3 - Requirements derived from DoD policy, Navy Policy, or proactive initiatives that could result in obvious returns on investments and support critical readiness activities by decreasing encumbrances of statutory compliance (e.g. polychlorinated biphenyl [PCB] elimination, regional environmental coordination, candidate conservation agreements, etc.). These project/proposed efforts are not mandated by law or other Federal, state, or local regulations/orders but would minimize current or future impacts (including costs) to the Navy mission.

ERL 2 - Requirements derived from DoD policy, Navy policy, or proactive initiatives that result in speculative returns on investments and uncertain benefits to the Navy mission. These projects/proposed efforts are not mandated by law or other Federal, state, or local regulations/orders and should be based on best available scientific or commercial data; or pending Federal, state, or local regulations under development (where publication is scheduled) using, if available, model state regulations or permit standards.

ERL 1 - Investments in environmental leadership and general proactive environmental stewardship, and provides manpower and recurring cost to support these functions.

5.4.1 Description of Funding Process

Once validated, INRMP projects are entered into EPR-web; the Navy's Environmental Program Requirements website and the correct ERL assigned to each project. Typically, funding for all ERL Level 3 and 4 projects will be programmed in this manner. Projects that are ERL 1 and 2 should seek alternate funding sources (listed below). There are restrictions on how different Navy funding sources for natural resources management can be used. It is important, therefore, that appropriate funding sources are used and that EPR entries clearly justify funding requests so that: (1) natural resource funds are distributed wisely and (2) funding levels are not threatened by the use of funds in ways that are inconsistent with funding program rules. The following are primary funding sources for Navy natural resources programs:

(1) *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:

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 (RPM) 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 RPM funds.

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.

(2) *The Legacy Resource Management Program (Legacy Program):* is a special, congressionally-mandated initiative to fund military conservation projects. The program assists DoD in protecting and enhancing resources while supporting military readiness. A Legacy project may involve regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, Native American consultations, and/or monitoring and predicting migratory patterns of birds and animals. Three principles guide the Legacy program: stewardship, leadership, and partnership. *Stewardship* initiatives assist DoD in safeguarding its irreplaceable resources for future generations. By embracing a *leadership* role as part of the program, the Department serves as a model for respectful use of natural and cultural resources. Through *partnerships*, the program strives to access the knowledge and talents of individuals outside of DoD.

If the installation intends to request Legacy Program funds, the following should be noted:

- The availability of Legacy funds is generally uncertain early in the year.
- Pre-proposals for Legacy projects are due in March and submitted using the Legacy Tracker Website: https://www.dodlegacy.org .
- Project proposals are reviewed by the Navy chain of command before being submitted to the DoD Legacy Resources Management Office for final project selection.
- The Legacy Website provides further guidance on the proposal process and types of projects requested.

(3) *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:

a. Annual Navy Forestry Funds. These funds support commercial forestry operations at installations. Borrowed from NAVFACENGCOM 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.

b. 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 percent 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:
    a) Improvement of forest lands;
    b) 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);
    c) 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;
    d) 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 other references for more information on

funding availability and timelines. It is important to note that these funds may not be used for "must fund" projects.

(4) *Agricultural Outleasing.* There are no agricultural outleases at NRS(T) Jim Creek, so this is not a potential revenue source.

(5) *Fish and Wildlife Fees.* User fees collected for the privilege of hunting or fishing are 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 and fishing 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.

Presently such fees are collected for fishing at Twin Lakes within the NRS(T) Jim Creek installation.

(6) *Recycling Funds.* Naval Radio Station (T) Jim Creek operates under Naval Station Everett's Qualified Recycling Program (QRP) so funds from the QRP may be a potential revenue source. An installation with a QRP may use proceeds for some types of natural resource projects. Proceeds must first be used to cover QRP costs. Up to 50 percent 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).

(7) *Strategic Environmental Research and Development Program (SERDP) Funds*.
SERDP is DoD's corporate environmental research and development (R&D) program, planned and executed in full partnership with the Department of Energy (DOE) and Environmental Protection Agency (EPA), with participation of numerous other Federal and

non-Federal organizations. SERDP funds for environmental and conservation efforts are allocated through a competitive process. Within its broad areas of interest, the SERDP focuses on Cleanup, Compliance, Conservation, and Pollution Prevention 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. The program solicits 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.

(8) *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.

INRMPs should include valid ERL 1 and 2 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 out-leasing, forestry, hunting and fishing fees), and appropriated reimbursable funds (e.g., DoD Legacy Program, U.S. Department of Agriculture (USDA) Pest Management Program). These accounts are sources of funds for ERL 3 projects. Installations, however, should not depend on reimbursable programs to fund their natural resources management programs.

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References

Alt, D., and Hyndman, D. (1984). Roadside geology of Washington. Missoula, MT: Mountain Press.

Baenen, J.A. (1981). Stillaguamish, Snohomish, Snoqualmie and Duwamish. In Inventory of Native American Religious Use, Practices, Localities and Resources: Study Area on the Mt. Baker – Snoqualmie National Forest Washington State, edited by Blukis Onat, A.R., and Hollenbeck, J. L. 396-471. Institute of Cooperative Research, Seattle.

Bailey, R. G. (1995). Descriptions of the Ecoregions of the United States. Second Edition. Pub. No. 1391 (rev.). Washington, D.C. USDA Forest Service.

Bouwes, N., Weber, N., Jordan, C., Saunders, W., Tattam, I., Volk, C., Wheaton, J., and Pollock, M. (2016). Ecosystem experiment reveals benefits of natural and simulated beaver dams to a threatened population of steelhead (*Oncorhynchus mykiss*). Scientific Reports 6, Article # 28581.

Burger, A. E. (2002). Conservation assessment of Marbled Murrelets in British Columbia: a review of the biology, populations, habitat associations, and conservation Technical Report Series No. 387. Canadian Wildlife Service, Pacific and Yukon Region, British Columbia. Issued under the Authority of the Minister of Environment Canadian Wildlife Service. 168 p.

Cowan, I. M. (1954). The distribution of pikas (*Ochotona*) in British Columbia and Alberta. The Murrelet 35(2), 20-24.

Cowardin, L., Carter, V., Golet, F., and LaRoe, E. (1979). Classification of wetlands and deepwater habitats of the United States (FWS/OBS-79-31). First Edition. Washington, D.C.: U.S. Fish and Wildlife Service, Office of Biological Services.

Falxa, G.A., Baldwin, F., Lynch, D., Nelson, S.K., Miller, S.L., Pearson, S.F., Raphael, M.G., Strong, C., Bloxton, T., Galleher, B., Hogoboom, B., Lance, M., and Young, R. (2009). Marbled murrelet effectiveness monitoring, Northwest Forest Plan: 2008 summary report. 18 p.

Falxa, G. A., Raphael, M. G., tech. coords. (2016). Northwest Forest Plan—the first 20 years (1994–2013): status and trend of marbled murrelet populations and nesting habitat. Gen. Tech. Rep. PNW-GTR-933. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 132 p.

Federal Geographic Data Committee. (2013). Classification of wetlands and deepwater habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, DC.

Ford, M. (ed.), Cooney, T., McElhany P., et al. (2011). Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Northwest. NOAA Technical Memorandum NWFSC 113, 1-281.

Forsman, E.D., Meslow, E.C., and Wight, H.M. (1984). Distribution and Biology of the Spotted Owl in Oregon. Wildlife Monographs, 87, 3-64.

Forsman, E.D., R.G. Anthony, K.M. Dugger, E.M. Glenn, A.B. Franklin, G.C. White, C.J. Schwarz, K.P. Burnham, D.R. Anderson, J.D. Nichols, J.E. Hines, J.B. Lint, R.J. Davis, S.H. Ackers, L.S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, S.A. Gremel, D.R. Herter, J.M. Higley, R.B. Horn, J.A. Reid, J. Rockweit, J. Schaberl, T.J. Snetsinger and S.G. Sovern. 2011. Population demography of northern spotted owls: 1985–2008. Studies in Avian Biology. Cooper Ornithological Society.

Garrett, D. and Spinnelli, J. (2017). The Presence of Salish Sucker and the Native Fish Fauna at Naval Radio Station Jim Creek, Washington. WDFW. Mill Creek office. 16 p.

Hall, E.R. (1981). The Mammals of North America, (2nd ed.). John Wiley and Sons, New York, USA.

Hallock, L., and McAllister, K. (2005). Coastal Tailed Frog. Retrieved May 21, 2013, from Washington Herp Atlas: http://wdfw.wa.gov/conservation/herp_atlas/speciesmain.html

Hallock, L., and McAllister, K. (2009). Cascades Frog. Retrieved May 22, 2013, from Washington Herp Atlas: http://wdfw.wa.gov/conservation/herp_atlas/speciesmain.html

Hard, J.J., Myers, J.M., Ford, M.J., Cope, R.G., Pess, G.R., Waples, R.S., Winans, G.A., Berejikian, B.A., Waknitz, F.W., Adams, P.B., Bisson, P.A., Campton, D.E., and Reisenbichler, R.R. (2007). Status review of Puget Sound steelhead (*Oncorhynchus mykiss*). U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-81, 117 p.

Harrington, C. (2010). A Tale of Two Cedars: International Symposium on Western Redcedar and Yellow-Cedar. Gen.Tech. Rep. PNW-GTR-828. Pacific Northwest Research Station, Portland, OR. 177 p.

Harris, A. S. (1990). *Chamaecyparis nootkatensis* (D. Don) Spach: Alaska-cedar. Burns, R. and Hakata, B., editors. Silvics of North America Volume 1: conifers. Agricultural Handbook 654. USDA Forest Service. 97–102.

Hayes, G., and Wiles, G. J. (2013). Washington Bat Conservation Plan. Washington Department of Fish and Wildlife. Olympia, Washington.

Henry, P., Sim, Z., and Russello, M.A. (2012a). Genetic evidence for restricted dispersal along continuous altitudinal gradients in a climate change-sensitive mammal: the American pika. PloS ONE 7(6): e39077. https://doi.org/10.1371/journal.pone.0039077.

Henry. P., Henry, A., and Russello, M.A. (2012b). Variation in habitat characteristics of American pikas along an elevational gradient in their northern range margin. Northwest Scientific Association 86(4), 346-350.

Horsfall, R.B. (1925). The pika at sea level. Journal of Mammalogy 6, 201.

Howell, A.H. (1924). Revision of the American pikas. North American Fauna 471, 1-57.

Huff, M. H. (2006). Introduction to effectiveness monitoring of the Northwest Forest Plan for marbled murrelets. *In*: Huff, M., Raphael, M.G., Miller, S.L., Nelson, S.K., Baldwin, J., tech. coords. Northwest Forest Plan—the first 10 years (1994-2003): status and trends of populations and nesting habitat for the marbled murrelet. Gen. Tech. Rep. PNW-GTR-650. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR. 1-8.

Iverson, D.R, Forsman. L.A., Lewarch, D.E., and Larson. L.L. (2001). Naval Radio Station Jim Creek archaeological resources and traditional cultural places assessment. Snohomish County, Washington. 39 p.

Lannoo, M.J., Petersen, C., Lovich, R.E., and Phillips, C. (2014). Department of Defense amphibian disease survey; Natural Resource Manager training and data collection. DoD Legacy Program 12-426. 29 p.

Littell, J., Elsner, M.M., Binder, S.W., and Snover, A. (2009). The Washington climate change impacts assessment: Evaluating Washington's future in a changing climate. Seattle, WA. University of Washington.

Manning, T. and Hagar, J.C. (2011). Use of nonalpine anthropogenic habitats by American pikas (*Ochotona princeps*) in western Oregon. Western North American Naturalist 7(1), 106-112.

Mauger, G.S., Casola, J.H., Morgan, H.A., Strauch, R.L., Jones, B., Curry, B., Busch Isaksen, T.M., Whitely Binder, L., Krosby, M.B., and Snover, A.K. (2015). State of Knowledge: Climate Change in Puget Sound. Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93777D.

Miller, J. (2003). 2001-2002 stream temperature measurements. Naval Radio Station (T) Jim Creek. PWDE Environmental Division, Naval Station Everett. 9 p.

Miller, C. and Somers, D. (1989). Timber, Fish, and Wildlife program, Stillaguamish river early action project. Tulalip Tribes Natural Resources Department, Marysville, WA.

Miller, S.L., Ralph, C.J., Raphael, M.G., Strong, G., Thompson, C., Baldwin, J., Huff, M.H. (2006). At-sea monitoring of marbled murrelet population status and trend in the Northwest Plan area. Huff, M., Raphael, M.G., Miller, S.L., Nelson, S.K., Baldwin, J.; tech. coords. Northwest Forest Plan—the first 10 years (1994-2003): status and trends of populations and nesting habitat for the marbled murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 31-60.

Miller, S.L., Raphael, M.G., Falxa. G.A., Strong, C., Baldwin, J., Bloxton, T., Gallagher, B.M., Lance, M., Lynch, D., Pearson, S.F., Ralph, C.J., and Young, R.D. (2012). Recent population decline of the Marbled Murrelet in the Pacific Northwest. Condor 114, 771-781.

Milner, R.L. and Cyra, T.A. (2016). American Pika (*Ochotona princeps*) Habitat and Occupancy Surveys at the Naval Radio Station (Transmitting) Jim Creek, Snohomish County, Washington. Final Report to Naval Station Everett. Washington Department of Fish and Wildlife, Wildlife Program, Olympia, Washington. 34 p.

Morrison, S.F., Pelchat, G., Donahue, A., and Hik, D. S. (2009). Influence of food hoarding behavior on the over-winter survival of pikas in strongly seasonal environments. Oecologia 159, 107-116.

Myers, J.M., Hard, J.J., Connor E.J., Hayman, R.A., Kope, R.G., Lucchetti, G., Marshall, A.R., Pess, G.R., and Thompson, B.E. (2015). Identifying historical populations of steelhead within the Puget Sound distinct population segment. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-128.

Naval Facilities Engineering Command (NAVFAC) (2007). Naval Radio Station (T) Jim Creek, Amphibian and Reptile Survey Final Report. Prepared by NAVFAC Atlantic. 32 p.

Naval Facilities Engineering Command (NAVFAC) (2008a). Antenna Ground Field Vegetation Management Plan, NRS(T) Jim Creek. Prepared by NAVFAC SW. San Diego, CA. 17 p.

Naval Facilities Engineering Command (NAVFAC) (2008b). Naval Station Everett Encroachment Action Plan. Prepared by MAKERS architecture and urban design. 104 p.

Naval Facilities Engineering Command (NAVFAC) (2014). Integrated Pest Management Plan. Naval Station Everett, Washington. Prepared by Naval Facilities Engineering Command Atlantic. Norfolk, VA.

National Marine Fisheries Service (NMFS). (2011). 5-Year Review: Summary and Evaluation of Puget Sound Chinook, Hood Canal Summer Chum, Puget Sound Steelhead. National Marine Fisheries Service Northwest Region. Portland OR. 43 p.

National Marine Fisheries Service (NMFS). (2013). Steelhead Trout (*Oncorhynchus mykiss*). Retrieved June 3, 2013, from NOAA Fisheries, Office of Protected Resources: http://www.nmfs.noaa.gov/pr/species/fish/steelheadtrout.htm

Northwest Fisheries Science Center (NWFSC). (2015). Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. December 21, 2015. 356 pp.

Northwest Indian Fisheries Commission (NWIFC). (2016). State of our watersheds report. Stillaguamish watershed. 16 p.

Ormsbee, P. and Hohman, M. (2010). The Bat Grid Inventory and Monitoring Project: A Regional Approach to Inventorying and Monitoring Bat Populations. 2008 Inventory Report.

Pacific Fishery Management Council (PFMC). (2014). Appendix A to the Pacific Coast Salmon Fishery Management Plan As Modified by Amendment 18 to the Pacific Coast Salmon Plan. Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council Portland, OR. 227 p.

Pacific Fishery Management Council (PFMC). (2016). Pacific Coast Salmon Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California as Amended through Amendment 19. PFMC, Portland, OR. 91 p.

Pearson, M. (1999). The Biology and Management of the Salish Sucker and Nooksack Dace. Vancouver, BC, Canada: Westwater Research Centre, Institute for Resources and Environment.

Pearson, S.F., Lance. M.M., and Raphael, M.G. (2014). Washington 2013 at-sea marbled murrelet population monitoring: Research Progress Report. Washington Department of Fish and Wildlife, Wildlife Science Division and USDA Forest Service Pacific Northwest Research Station, Olympia, WA.

Petersen, C., Lovich, R.E., Phillips, C., Dreslik, M., Nanjappa, P., Lannoo, M.J. (2013). From the mountains to the prairies – seasonal Bd responses differ by latitude and longitude at a continental scale. DoD Legacy Program 10-426. 32 p.

Pollock, M., Pess, G.R., and Beechie, T.J. (2004). The importance of beaver ponds to Coho salmon production in the Stillaguamish River Basin, Washington, USA. North American Journal of Fisheries Management 24, 749-760.

Purser, M., Gaddis, B., and Rhodes, J. (2009). Primary Sources of Fine Sediment in the South Fork Stillaguamish River: Project completion report for Washington State Salmon Recovery Funding Board, Olympia, WA. Everett, WA: Snohomish County Public Works Surface Water Management.

Raphael, M.G., Baldwin, J., Falxa, G.A., Huff, M.H., Miller, S.L., Pearson, S.F., Ralph, C.J., Strong, C., Thompson, C. (2007). Regional population monitoring of the marbled murrelet: field and analytical methods. Gen. Tech. Rep. PNW-GTR-716. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific NW Research Station. 70 p.

Ritland, C., Pape, T., and Ritland, K. (2001). Genetic structure of yellow cedar (*Chamaecyparis nootkatensis*) Can. J. Bot. 79, 822–828.

Roest, A.I. (1953). Notes on pikas from the Oregon cascades. Journal of Mammalogy 34, 132-133.

Rongey and Associates. (1960). Report to District Public Works Office, Thirteenth Naval District on Hydrologic Investigations, U.S. Naval Radio Station, Jim Creek. Richard J. Rongey and Associates, Engineering Geologists.

Schaaf, D.V., Wilhere, G., Ferdaña, Z., Popper, K., Schindel, M., Skidmore, P., Rolph, D., Iachetti, P., Kittel, G., Crawford, R. Pickering, D., and Christy, J. (2006). Pacific Northwest Coast Ecoregion Assessment. Prepared by The Nature Conservancy, the Nature Conservancy of Canada, and the Washington Department of Fish and Wildlife. The Nature Conservancy, Portland, Oregon.

Shaw, J. (2013, May 15). MWR Manager, NRS(T) Jim Creek. Discussion regarding Twin Lakes fishery (J. Thompson, Interviewer).

Simpson, W.G. (2009). American pikas inhabit low-elevation sites outside the species' previously described bioclimatic envelope. Western North American Naturalist 69, 243-250.

Smith, A.T. (1978). Comparative demography of pikas (*Ochotona* spp): effect of spatial and temporal age-specific mortality. Ecology 59, 133-139.

Smith, A.T. (1981). Territoriality and social behavior of *Ochotona princeps*. Proceedings of the world lagomorph conference. (Myers, K. and MacInnes, C.D., eds.) Guelph Univ. Press, Guelph. 310-323.

Smith, A.T. and Weston, M.L. (1990). *Ochotona princeps*. Mammalian Species 352, 1-8.

Stell Environmental Enterprises, Inc. (2013) Archaeological Survey at Naval Radio Station Jim Creek, Snohomish County, Washington Final Report. Prepared for United States Naval Facilities Engineering Command, Northwest, Silverdale, Washington 98135-1101. Contract No. N62470-12-D-7002 Task Order JP06.

Stillaguamish Implementation Review Committee (SIRC). (2005). Stillaguamish Watershed Chinook Salmon Recovery Plan. Everett, WA.: Snohomish County Department of Public Works, Surface Water Management Division.

Strelow, A. (2001). Electronics Technician, UW Geophysics Program, Seattle WA. (J. Miller, Interviewer).

Stumpf, J., Denis, N., Hamer, T., Johnson, G., Verschuyl, J. (2011). Flight Height Distribution and Collision Risk of the Marbled Murrelet (*Brachyramphus marmoratus)*: Methodology and Preliminary Results. Marine Ornithology, 39, 123-128.

Tweddell, C. E. (1974). A Historical and Ethnological Study of the Snohomish Indian People. American Indian Ethnohistory: Indians of the Northwest, edited by Horr, D.A., Garland Publishing, Inc., New York. 475-694.

U.S. Army Corps of Engineers (USACE). (1987). Wetlands Delineation Manual. Technical Report Y-87-1. 143 p.

U.S. Department of Agriculture (USDA) Forest Service and U.S. Department of the Interior (USDI) Bureau of Land Management. 1994a. Final Supplemental Environmental Impact Statement On Management Of Habitat For Late-Successional And Old-Growth Forest Related Species Within The Range Of The Northern Spotted Owl (Northwest Forest Plan). Portland, Oregon.

U.S. Department of Agriculture (USDA) Forest Service and U.S. Department of the Interior (USDI) Bureau of Land Management. 1994b. Record Of Decision On Management Of Habitat For Late-Successional And Old-Growth Forest Related Species Within The Range Of The Northern Spotted Owl (Northwest Forest Plan). Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). (1997). Recovery Plan for the Threatened Marbled Murrelet in Washington, Oregon, and California. Portland, OR.

U.S. Fish and Wildlife Service. (2004a). Marbled murrelet 5-year review. USFWS, Region 1. Portland, OR. 28 p.

U.S. Fish and Wildlife Service (USFWS). (2004b). Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull Trout (*Salvelinus confluentus*). Volume I. Seattle, WA: USFWS, Puget Sound Management Unit.

U.S. Fish and Wildlife Service (USFWS). (2008). Birds of Conservation Concern 2008. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 p. https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

U.S. Fish and Wildlife Service (USFWS) (2009). Marbled Murrelet (*Brachyramphus marmoratus*) 5-Year Review. Washington Fish and Wildlife Office. Lacey, WA June 12, 2009.

U.S. Fish and Wildlife Service (USFWS). (2011a). Species Fact Sheet Marbled murrelet (*Brachyramphus marmoratus*). Retrieved March 27, 2013, from USFWS, Oregon Fish and Wildlife Office: http://www.fws.gov/oregonfwo/Species/Data/MarbledMurrelet/default.asp

U.S. Fish and Wildlife Service (USFWS). 2011b. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). U.S. Fish and Wildlife Service, Portland, Oregon. xvi + 258 pp.

U.S. Fish and Wildlife Service (USFWS). (2012). Marbled Murrelet Nesting Season and Analytical Framework for Section 7 Consultation in Washington. June 20, 2012. Washington Fish and Wildlife Office, Lacey, WA.

U.S. Fish and Wildlife Service (USFWS). (2015a). Recovery plan for the coterminous United States population of bull trout (*Salvelinus confluentus*). Portland, Oregon xii + 179 p.

U. S. Fish and Wildlife Service (USFWS) (2015b). U.S. Fish and Wildlife Service Guidelines for Coordination on Integrated Natural Resource Management Plans. June 20, 2015. 50 p.

U. S. National Vegetation Classification (USNVC). (2016). United States National Vegetation Classification Database, V2.0. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. Retrieved June 26, 2017 from http://usnvc.org

U.S. Navy (1997). Antenna Field Vegetation Management Environmental Assessment. Naval Radio Station (T) Jim Creek, Arlington, WA. August 1997.

U.S. Navy (2006). Integrated Natural Resources Management Plan Guidance for Navy Installations. April 2006. 117 p.

U.S. Navy (2012). Final Environmental Assessment for NRS(T) Jim Creek 115-kV Power Transmission System Maintenance Program. October 2012.

U.S. Navy (2014). Integrated Cultural Resources Management Plan. Naval Station Everett and Special Areas. United States Navy. 258 p.

Washington Department of Ecology (WDOE). (2005). Stillaguamish River Watershed Fecal Coliform, Dissolved Oxygen, pH, Arsenic, and Mercury Total Maximum Daily Load (Water Cleanup Plan). WDOE Water Quality Program, Northwest Regional Office, Bellevue, and Environmental Assessment Program, Olympia, WA. April 2005 Publication Number: 05-10-044.

Washington Department of Ecology (WDOE). (2012). Preparing for a changing climate. Washington State's Integrated Climate Response Strategy. April 2012.

Washington Department of Fish and Wildlife (WDFW). (2008). Statewide Steelhead Management Plan: Statewide Policies, Strategies, and Actions. Olympia, WA.

Washington Department of Fish and Wildlife (WDFW). (2011). Coho (Silver) Salmon. Retrieved June 4, 2013, from Washington Department of Fish and Wildlife Conservation: https://fortress.wa.gov/dfw/score/score/species/coho.jsp?species=Coho

Washington Department of Fish and Wildlife (WDFW). (2015). Washington's State Wildlife Action Plan: 2015 Update. Olympia, WA.

Washington Department of Fish and Wildlife (WDFW) and Puget Sound Treaty Indian Tribes. (2013). Puget Sound Chinook Comprehensive Harvest Management Plan. Annual Report covering the 2012-2013 fishing season. 114 p.

Washington Department of Natural Resources (WDNR). (2013a). Washington Interactive Geologic Map. Retrieved February 1, 2013, from Washington Geological Survey: https://fortress.wa.gov/dnr/geology/

Washington Department of Natural Resources (WDNR). (2013b). Natural Hazards. Retrieved October 9, 2013, from Washington's Geological Survey, Geology and Earth resources Division: https://fortress.wa.gov/dnr/geology/?Theme=natural_hazards

Washington Natural Heritage Program (WNHP), WDFW, BLM and USFS. (2009). Washington Herp Atlas. Olympia, WA: Washington Department of Fish and Wildlife.

Washington State Department of Agriculture (WSDA). (2013). Integrated Pest Management Plan for Freshwater Emergent Noxious and Quarantine Listed Weeds.116 p.

Western Regional Climate Center. (2013). Arlington, WA (450257), Period of Record Monthly Climate Summary. Retrieved October 9, 2013, from The Weather Channel: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa0257

Wilkins, S., Brokaw, L., Jones, J., and Rorick, S. (2008). Benthic Index of Biotic Integrity (B-IBI) Study, Jim Creek, Oso, WA. Everett, WA. Adopt A Stream Foundation.

Zobel, J., and D. Antos. 1986. Habitat relationships of *Chamaecyparis nootkatensis* in southern Washington, Oregon, and California. Canadian Journal of Botany 64:1898–1909.