Naval Weapons Systems Training Facility Boardman
Boardman, Oregon

Integrated Natural Resources Management Plan

May 2021

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
NAVAL WEAPONS SYSTEMS TRAINING FACILITY BOARDMAN

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U.S. Navy Signature Page

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

The Boardman Integrated Natural Resources Plan meets requirements of the Sikes Act (16 U.S.C. 670a *et seq.*) as amended; Department of Defense Instruction 4715.03, Natural Resource Conservation Program; DOD Manual 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual; Chief of Naval Operations Instruction (OPNAVINST) 5090.1; and OPNAV M-5090.1, Environmental Readiness Program Manual.

Approved by:

S. D. Barnett
Rear Admiral, U.S. Navy
Commander, Navy Region Northwest

19 MAY 21
Date

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Commander, Naval Air Station Whidbey Island

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Approved by:

M. L. Arny
Captain, U.S. Navy
Commanding Officer
Naval Air Station Whidbey Island

3/23/21
Date

Recommended by:

John R. Phillips
Installation Natural Resources Manager
Naval Air Station Whidbey Island/
NAVFAC Northwest

04 February 2021
Date

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Navy Region Northwest Environmental Signatures

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

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Recommended by:

12/9/2020

Robert Senner, Ph.D. Date
Senior Natural Resources Specialist
Navy Region Northwest, Code N45

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Date: 2020.12.09 18:04:01 -08'00'

Cynthia Kunz Date
Senior Endangered Species Lead
Navy Region Northwest, Code N45

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U.S. Fish and Wildlife Service Signature Page

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

Approved by:

Marisa Meyer
for Paul Henson
State Supervisor, Oregon Fish & Wildlife Office
U.S. Fish & Wildlife Service

11/19/2021
Date

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Oregon Department of Fish and Wildlife Signature Page

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

Approved by:

Curtis E. Melcher, Director
Oregon Department of Fish and Wildlife

11/23/21
Date

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This Integrated Natural Resources Management Plan will be reviewed annually and updated as needed. A review for operation and effect will be conducted in cooperation with USFWS and ODFW, at least once every five years. The review for operation and effect will be conducted during the annual Natural Resources Conservation Metrics (Metrics) INRMP review. Mutual agreement on operation and effect must be documented in writing by the cooperating parties, preferably in the form of a new signature page for the INRMP. The new signature page shall be appended to the INRMP and uploaded to the Navy Conservation website. The section below should be used to document modifications and reviews to the plan that will improve natural resources management. It is not intended to replace the review for operation and effect.

DATE	SECTION/PAGE	COMMENT	REVIEWER
5/15/17	Appendix O	Added Conference Opinion	MCB
8/15/17	Global	Updated WGS status	MCB
2/2018	Global	Updated 5090.1C to 5090.1D where appropriate. Some not changed due to the date of plan development.	MCB
12/2/18	2.4.1	Additional text regarding the predicted impacts of climate change added	MCB
11/14/19	Appendix G	FWS Conference letter on Washington ground squirrel	NHS
11/14/19	Section 4.6.2 Fire	Fire Management Goals and Objectives	NHS
4/20	Figure 2-4	Fire History map	MW
11/20/19	Section 5.2	Coordination and Planning for Construction and Facility Maintenance	NHS
11/20/19	Section 5.3	Project Review Procedure	NHS
7/1/20	Appendices	Reorganized appendices and removed extraneous and non-sourced material to facilitate future updates.	RGS
7/1/20	INRMP	Conducted full edit, updated 5090.1D to 5090.1E, improved formatting, made citations consistent with Section 6 refs.	RGS

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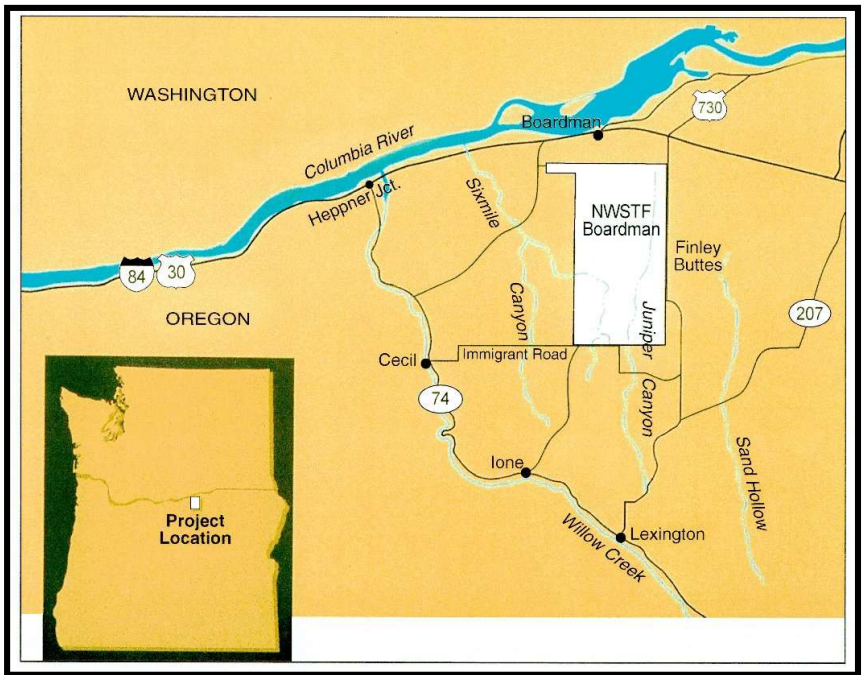

Executive Summary

This Integrated Natural Resources Management Plan (INRMP) is an update to the Naval Weapons Systems Training Facility (NWSTF) Boardman INRMP that was implemented in 2012. NWSTF Boardman is under the Command of Naval Air Station (NAS) Whidbey Island. The strategic vision and military mission for NWSTF Boardman and its associated airspace are to support naval and joint operational readiness by providing a realistic, live-training environment with the capability and capacity to support the Services' current, emerging, and future military readiness activities

This INRMP complies with the Sikes Act (16 United States Code [U.S.C.] 670 *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(a)(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 nonconsumptive 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 Oregon Department of Fish and Wildlife (ODFW).

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 ensures 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, Environmental Readiness Program Manual (2019), 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 forest management), and mission requirements of the NWSTF Boardman property.

An annual review will be conducted for relevance and effectiveness and the INRMP will be updated as needed. Changes in the military mission, training activities, or technology at NWSTF Boardman will be analyzed to assess their impact on natural resources, and the INRMP will be 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.

This document 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. This INRMP follows guidance and policy documents that collectively require a plan and management approach that integrates mission support, multipurpose use, ecosystem or landscape-level management, and environmental compliance and stewardship.

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.

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List of Acronyms and Abbreviations

AUM	Animal Unit Month
BASH	Bird Aircraft Strike Hazard
ca	Circa
CD	Compact Disc
CFR	Code of Federal Regulations
cm	Centimeter
CMA	Cooperative Management Agreement
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CO	Commanding Officer
COE	Corps of Engineers
COMPACFLT	Commander Pacific Fleet
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act
DoD	Department of Defense
DODDIR	Department of Defense Directive
DON	Department of the Navy
EA	Environmental Assessment
EO	Executive Order
EPA	Environmental Protection Agency
EPR	Environmental Program Requirements
ERL	Environmental Readiness Level
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Findings of No Significant Impact
FY	Fiscal Year
GIS	Geographic Information System
ICO	Installation Commanding Officer
INRMP	Integrated Natural Resource Management Plan
IPMP	Integrated Pest Management Plan
JAG	Judge Advocate General
LLC	Limited Liability Corporation
m^2	Square meters
MBTA	Migratory Bird Treaty Act
O&MN	Operations and Maintenance - Navy
MOU	Memorandum of Understanding
NAS	Naval Air Station
NASWHIDBEYINST	Naval Air Station Whidbey Island Instruction
NAVFAC	Naval Facilities Engineering Systems Command
NAVFAC NW	Naval Facilities Engineering Systems Command Northwest
NCOIC	Non-commissioned Officer in Charge
NDAA	National Defense Authorization Act
NEPA	National Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRM	Natural Resources Manager

NWC	Northwest Wildlife Consultants
NWTRC	Northwest Training Range Complex
ODFW	Oregon Department of Fish and Wildlife
OGC	Office of General Counsel
ONHP	Oregon Natural Heritage Program
OPNAVINST	Instruction by the Chief of Naval Operations
OR	Oregon
ORNG	Oregon National Guard
ORV	Off-Road Vehicle
OSU	Oregon State University
OWRD	Oregon Water Resources Department
pers. comm.	Personal Communication
pers. obs.	Personal Observation
PIF	Partners in Flight
PL	Public Law
RNA	Research Natural Area
SAIA	Sikes Act Improvement Act
SCS	Soil Conservation Service
SCWCS	State Comprehensive Wildlife Conservation Strategy
T&E	Threatened and Endangered
TES	Threatened, Endangered, and Sensitive
TNC	The Nature Conservancy
UAS	Unmanned Aerial System
unpubl.	Unpublished
US	United States
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

1 OVERVIEW

1.1 Purpose

The NWSTF Boardman Integrated Natural Resources Management Plan (INRMP) is a long term planning document to guide the installation commander in the management of natural resources to support the installation mission. Through implementation of this INRMP, natural resources management will be consistent with the military mission and will ensure activities are conducted in compliance with legal requirements, promoting environmental stewardship, proper management and protection of natural resources. This INRMP revises and replaces all previous versions, including the 2012 INRMP. 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 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) 5090.1E *(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.

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 covers the lands of NWSTF Boardman, located in the State of Oregon. NWSTF Boardman is under the command of NAS Whidbey Island, which is located on Whidbey Island in the State of Washington. This facility is under the control of Commander, Navy Region Northwest.

1.3 Goals and Objectives

A successfully implemented INRMP will meet two basic goals:

(1) Ensure the sustainability of all ecosystems encompassed by an installation; and
(2) Ensure no net loss of the capability of installation lands to support the DoD mission.

These two goals are closely related and not mutually exclusive. Maintenance of healthy ecosystems supports realistic military training and testing, which in turn promotes mission readiness. The basic natural resources program objectives are to support military readiness and sustainability. NWSTF Boardman's natural resource management objectives are to:

a. Meet the Navy INRMP goals as stated above.
b. Assign specific responsibility, provide centralized supervision, and assign professionally trained personnel to this program;
c. Protect, conserve, and manage the watersheds, wetlands, natural landscapes, soils, forests, fish and wildlife, and other natural resources on the installation thereby ensuring continued function and resiliency of the ecosystem.
d. Protect threatened, endangered, and sensitive (TES) species and critical habitats regulated by the Endangered Species Act (ESA).
e. Manage natural resources in a combination best serving present and future installation needs while maintaining ecological resiliency.
f. Provide for the optimum use of land and water areas and access thereto while maintaining ecological integrity.
g. Interact with the surrounding community to develop positive and productive community involvement, participation and educational opportunities.
h. Implement projects that promote the resiliency and restoration of natural conditions and maintain ecosystem services.

1.4 Responsibilities

Responsibility for implementation (OPNAVINST 5090.1E) of this INRMP is as follows:

1.4.1 Chief of Naval Operations (CNO)

CNO serves as the principal leader and overall Navy program manager for the development, revision, and implementation of INRMPs and:

a) Provides policy, guidance, and resources for the development, revision, and implementation of INRMPs and associated National Environmental Policy Act (NEPA) documents.
b) Represents the Navy on issues regarding development and implementation of INRMPs and delegates responsibility in writing.
c) Resolves high-level conflicts associated with development and implementation of INRMPs.
d) Approves all INRMP projects before INRMPs are submitted to regulatory agencies for signature.

1.4.2 Commander, Navy Installations Command (CNIC)

The Commander, Navy Installations Command (CNIC):

a) Ensures that installations under its command develop, revise, and implement INRMPs if required, and:
    1. Reevaluates the need for an INRMP at all installations that currently do not have an INRMP.

2. Following the initial evaluation, reevaluates all remaining installations that do not have an INRMP every 5 years.

b) Ensures that installations comply with DoD, Navy, and CNO policy on INRMPs and associated NEPA document preparation, revision, and implementation.

c) Ensures 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 Section 5.5.1, Project Implementation.
2. The evaluation and validation of Environmental Readiness Program Requirements (EPR) web project proposals.

d) Participates in the development and revisions of INRMPs, which involves the maintenance of a close liaison with the CNO Environmental Readiness Division, N45; Naval Facilities Engineering Systems Command (NAVFAC); and other budget submitting offices (BSOs).

e) Provides overall program management oversight for all natural resources program elements.

1.4.3 Regional Commander

The Regional Commander ensures that the INRMPs are developed, implemented, and fully supported and ensures coordination, consistency, and direct support for INRMP implementation.

The Regional Commander has the following responsibilities:

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

b) Ensures INRMPs undergo annual informal reviews as well as formal 5-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) Ensures the programming of resources necessary to maintain and implement INRMPs, which involves the evaluation and validation of EPRWeb project proposals.

d) Establishes 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.

1.4.4 Installation Commanding Officer (ICO)

The Commanding Officer, Naval Air Station, Whidbey Island shall ensure the preparation, completion, and implementation of INRMPs and associated NEPA documentation for their installations and should systematically apply the conservation practices set forth in the Plans. Their role is to:

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 natural resources management and INRMPs comply with all applicable natural resources-related legislation; EOs and Executive Memorandums; and 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 a qualified professional Natural Resources Manager responsible for the management efforts related to the preparation, revision, implementation, and funding for INRMPs, as well as coordination with subordinate commands and installations (see Appendix A for copy of designation letter).

e) Approve INRMPs via Commanding Officer signature.

An installation's Commanding Officer holds the highest-ranking position at the installation and ultimately is 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. The Commanding Officer has to ensure that a process is established for early coordination between the Natural Resource Manager (NRM) and key installation staff. The Commanding Officer must also ensure that natural resources management is integrated with other installation management activities, as well as with military training and testing activities.

1.4.5 Natural Resources Manager (NRM)

The NAS Whidbey Island NRM is designated as the NRM at Boardman. The NRM is designated in writing by the Commanding Officer. 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 Public Works Department – Environmental Division and is administratively a NAVFAC employee. The NRM is primarily responsible for:

1) Ensures the CO is informed of natural resource conditions and issues.
2) Implements strategies to achieve goals and objectives of the INRMP.
3) Avoids and mitigates potential or actual conflicts between mission requirements and natural resource mandates.
4) Prepares, revises, and implements the INRMP.

5) Coordinates with other personnel, as necessary, to implement the INRMP and accomplish the goals and objectives.
6) Ensures the INRMP is reviewed, current, and compliant in coordination with the USFWS, and ODFW.
7) Annually compiles, tracks, and maintains the INRMP metrics on the Navy Conservation website.

1.4.6 Naval Facilities Engineering Systems Command Northwest

NAVFAC NW provides oversight and support for the development, maintenance, and implementation of Command, Navy Region Northwest (CNRNW) installation INRMPs and the natural resource program. NAVFAC NW's natural resources staff are a compilation of professionally qualified foresters, botanists, fisheries specialists, marine mammal experts, avian specialists, and knowledgeable biologists for invasive species management. These natural resources subject matter experts are available to support and assist the Navy's Oregon natural resources program and associated consultations pertaining to natural resources legislation.

NAVFAC NW responsibilities are as follows:

1) Provides technical and contractual support for the preparation, development, and implementation of INRMPs and associated NEPA documents.
2) Facilitates and coordinates the issuance of INRMP-related NEPA documents.
3) Assists in obtaining Regional Commander endorsement signature of this INRMP.
4) Evaluates and disseminates information to installations concerning new technology, methods, policies, and procedures for use in the development and implementation of INRMPs or that may impact naval readiness and sustainability at NWSTF (e.g., proposed listings of threatened and endangered species, proposed critical habitat restrictions, biological opinions, NEPA mitigation measures).
5) Assists with the development of the INRMP Project Implementation Table, EPR web, and Legacy project proposals.
6) Provides technical and administrative guidance for the development and execution of contracts and cooperative agreements to develop and implement INRMPs.
7) Facilitates the acquisition of INRMP mutual agreement between the Navy, United States Fish and Wildlife Service (USFWS), and state fish and wildlife agency, as necessary.
8) Facilitates conflict resolution between the Navy, USFWS, state fish and wildlife agency, and other stakeholders, as necessary.
9) Coordinates an ecosystems approach between the installation and geographically proximate landholders to include other federal agencies, state agencies, or private entities.
10) Provides technical oversight and resources for forest management and assists in implementing habitat management actions.
11) Provides support and resources to installation wildlife program and assists with hunting and fishing fee and permit collections and distributions, as appropriate for the installation resources.
12) Assists with compiling, tracking, and maintaining INRMP metrics on the Navy's Conservation website.

1.4.7 U.S. Fish and Wildlife Service

The Sikes Act directs the 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, along with the Navy and the ODFW, indicates mutual agreement and endorsement of the INRMP by signature on the signatory pages of this INRMP. USFWS biologists may be called upon to provide assistance and support to the NRM if necessary.

1.4.8 Oregon Department of Fish and Wildlife

The Sikes Act also directs the DoD to prepare INRMPs in cooperation with the appropriate state fish and wildlife office; in this case the ODFW. 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 ODFW, along with the Navy and USFWS, indicates mutual agreement and endorsement of this INRMP via signature. ODFW biologists may be called upon to provide assistance and support to the NRM if necessary.

Commitment of Cooperating Agencies - The USFWS and ODFW 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 or ODFW 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.

1.5 Authority

The Sikes Act (16 U.S.C. 670 *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 includes hunting, fishing, trapping, and nonconsumptive uses, 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(a)(1)(B)(i).

In addition to the Sikes Act, this INRMP has been prepared consistent with guidance and regulations provided in DoD Instruction 4715.03, OPNAVINST 5090.1E, 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 INRMPs. 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 (March 18 2011, Incorporating Change 1 dated October 5, 2017 and August 31, 2018)***. 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 December 13, 2017 and Change 2 dated August 31, 2018) 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 5090.1E, Environmental Readiness Program (3 Sep 2019).*** Contains instructions on the implementation of the OPNAV M-5090.1 Environmental Readiness Program Manual.
- ***OPNAV M-5090.1 E, Environmental Readiness Program Manual (2019).*** 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.
- ***Naval Facilities Engineering Systems Command (NAVFAC) Natural Resources Management Procedural Manual (P-73, Chapter 2: Integrated Natural Resources Management Plans, 07 December 2005).*** Establishes the governing format under which the INRMP is structured. This document addresses all CNO natural resources program requirements, guidelines and standards.
- ***Memorandum on Implementation of Ecosystem Management in DoD.*** This Memorandum issued by the Deputy Under Secretary of Defense on 8 August 1994, was the first formal statement of an ecosystem management approach to land management in the DoD. Ecosystem management is to be achieved through developing and implementing INRMPs. This Memorandum contains DoD's 10 principles of ecosystem management as an attachment, which were later included as an enclosure in DoDINST 4715.03 (see below).
- ***COMNAVREGNWINST 5450.1D, Real Property Management (Apr 2015).*** Delegates and clarifies real property management authority including natural resources within the AOR of CNRNW. In addition, delegates lead management authority for natural resources issues to the installation commanding officers for resources and properties under their jurisdiction as identified in the instruction.

1.6 Management for Ecological Resilience 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. As a steward of military lands, the Navy recognizes that the installations in Navy Region Northwest are part of diverse and functioning ecosystems. Management for ecological resiliency ensures the integrity of natural ecosystems over time while meeting the needs of the military mission.

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 NWSTF Boardman. Management for ecological resilience contributes to the functioning and integrity of natural ecosystems over time while incorporating 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 ecological resilience.

The Commanding Officer, operational personnel, and other installation personnel have an influence on environmental conditions. At NWSTF Boardman, they contribute to environmental stewardship by working with the Natural Resources Manager and integrating their perspectives into the management process of the installation and through implementation of this INRMP.

1.7 Review and Revision Process

An evaluation of natural resource management at NWSTF Boardman 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. These reviews will include participation by representatives from USFWS and ODFW 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.

Annual INRMP Review and Environmental 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 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 USFWS, state fish and wildlife agencies, and other stakeholders and partners.

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.

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, and ODFW.

The annual evaluation measures successes and identifies issues resulting from INRMP implementation. The NRM at NAS Whidbey Island 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.

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, and ODFW 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 on a public website via the Navy Environmental Portal:
https://www.navfac.navy.mil/navfac_worldwide/pacific/fecs/northwest/about_us/northwest_documents/nw_natural_resources.html

1.8 Commitment of the Partner Agencies

No element of the Sikes Act is intended to either enlarge or diminish the existing responsibility and authority of the USFWS or ODFW concerning fish and wildlife responsibilities on military lands. The Sikes Act requires INRMPs to be prepared in cooperation with the USFWS and appropriate state fish and wildlife agency (ODFW). An INRMP reflects mutual agreement of the parties concerning the conservation, protection, and management of fish and wildlife resources. All partners agree to meet and evaluate this INRMP annually and make programmatic changes, as needed. In addition, USFWS and ODFW will review the INRMP as to its effectiveness and revalidate it at least once every five years.

1.9 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 resiliency 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 NWSTF Boardman will attempt to contribute beneficially to the larger ecosystem of the installation lands.

1.9.1 Natural Resources Management Strategy

The natural resources management strategy for NWSTF Boardman will consist of:

- Recognizing that the installation 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 big sagebrush and native grassland ecosystem long term monitoring efforts and evaluations.

1.9.2 Early Review and Risk Assessment

Early review of proposed actions and the assessment of environmental risk is achieved at the installation. Installation review processes requires all new projects, programs, and operations, or changes to existing projects, programs, and operations, to be reviewed by the Environmental Division staff for potential impacts to natural resources. The NRM for NWSTF Boardman reviews planned actions, assesses 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 early review process also allows the installation an opportunity to identify the appropriate NEPA documents that will be generated based on the proposed action and the alternatives.

1.9.3 Restoration and Enhancement of Resources

The NRM will stay abreast of installation military requirements and identify areas heavily impacted by the operations and thus not appropriate for restoration activities. A ranking system must be developed in order to make efficient use of diminishing budgets and to focus restoration and monitoring activities. Mission, biological, seasonal, or budgetary constraints may dictate when restoration projects can be implemented. Restoration planning must be detailed enough to allow for successful completion of the project. Monitoring for success or failure should also be a key component of any restoration or enhancement planning.

2 CURRENT CONDITIONS AND USE

2.1 General Description

The 47,432 acre NWSTF Boardman facility is located in northern Morrow County, Oregon, approximately three miles south of Boardman and 45 miles west of Pendleton (Figure 2-1). The facility is a detachment activity of Naval Air Station Whidbey Island, Oak Harbor, Washington.

2.1.1 Regional Context of Installation

Morrow County is located east of the Cascades in north-central Oregon and contains more than one million acres of gently rolling plains and broad plateaus adjacent to the Columbia River. This rich agricultural land can be roughly divided into three occupational zones: irrigation farming in the north; dry land wheat yielding to cattle ranches in the center; and timber products in the south.

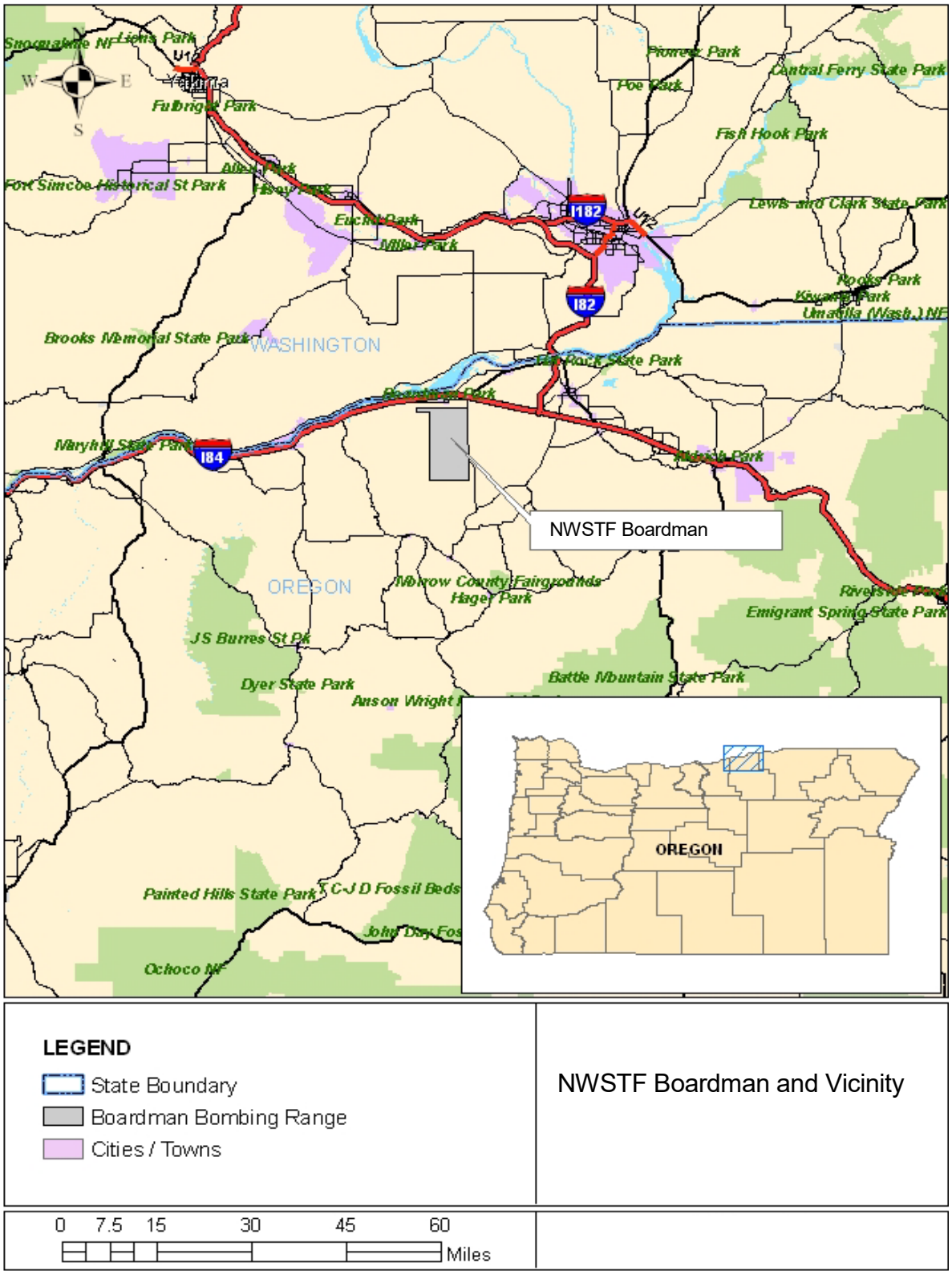
NWSTF Boardman is located within the transition zone of irrigated and dry land farming and is bordered to the north, east, and part of the northwest by irrigated agricultural properties and to the south by dry land agricultural property. The installation is bordered on the west by privately-owned land which from the west central to southwest border is undeveloped habitat. The Nature Conservancy (TNC) manages, by agreement with Threemile Canyon Farms LLC, this 23,000 acre undeveloped portion of the adjoining property as the Boardman Conservation Area as habitat for the Washington ground squirrel, birds, and plants. NWSTF Boardman together with the adjacent Boardman Conservation Area and other smaller tracts of undeveloped lands are part of one of the few remaining large blocks of undeveloped native grassland and shrub steppe habitat in the Columbia Plateau commonly referred to as the Boardman Grasslands. This represents a significant regional landscape scale native habitat resource for regional conservation efforts (Defenders of Wildlife 1998, Kagan et. al. 2000, Oregon Natural Heritage Program 2003, The Nature Conservancy 1998).

2.2 History and Military Mission

On 23 January 1941, the President issued Executive Order (EO) 8651, whereby the area now encompassing NWSTF Boardman was withdrawn from public lands to be used for aerial bombing and gunnery ranges by the War Department. Military use of NWSTF Boardman began in 1943 when the U.S. Army Air Corps, and subsequently the U.S. Air Force, used the site (approximately 96,000 acres) for aerial bombing and gunnery training until 1958 when the Navy was given permission under a permit arrangement to use the property for aerial bombing practice. The property was formally transferred from the Air Force to the Navy in November 1960. In 1963, the Navy sold the western half of the property, approximately 48,568 acres to the state of Oregon and retained approximately 47,432 acres. Until 1996, NWSTF Boardman was used regularly for bombing and gunnery practice by naval aircraft from NAS Whidbey Island. Since Navy ownership, all bombing and gunnery practice has used non-explosive ordnance for training purposes and high explosive ordnance has not been used. Since the early 1990s, NWSTF Boardman has been used by the Navy, Oregon National Guard (ORNG), and other Services (e.g., Marine Corps, Air Force, and U.S. Air Force Reserve) for a variety of land based and aviation military readiness activities. Prior to 2002, grazing was allowed through an agricultural lease on much of the lands of NWSTF Boardman. An area along the north boundary was also leased for crop farming. Both leases were terminated in 2002.

The Navy's mission is to organize, train, equip, and maintain combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. This mission is mandated by federal law (Section 10 U.S.C. 5062), which ensures the readiness of the United States' naval

Figure 2-1. Location of NWSTF Boardman.



forces. The Navy executes this responsibility by establishing and executing training programs and ensuring naval forces have access to the ranges, operating areas, and airspace needed to develop and maintain skills for conducting naval activities.NWSTF Boardman and its associated airspace are important to military readiness because of the unique training environment it provides. It serves as the principal regional range for aviation units located at NAS Whidbey Island and is used for training by ORNG units. The range and its associated airspace also support occasional training requirements of other Department of Defense units and the Special Use Airspace is used by DoD offices to conduct Unmanned Aerial System (UAS) testing and training. Accordingly, the strategic vision and mission for NWSTF Boardman and its associated airspace is to support naval and joint operational readiness by providing a realistic, live-training environment with the capability and capacity to support the Services' current, emerging, and future military readiness activities. NWSTF Boardman and its associated airspace have a unique combination of attributes that make it a strategically important training venue for the Services. It plays a vital role in the execution of the military readiness mandate. This training area is the Pacific Northwest's only venue for Basic phase/Unit-level air-to-ground bombing practice for naval aviation squadrons and is one of the only western U.S. locations for low altitude tactics training. Training at NWSTF Boardman and its associated airspace is critical to the preparation of the Services for advanced level training and pre-deployment certification. Renewed air-to-ground training activities are likely to meet future military training requirements.

2.3 Operations and Activities

A detachment of Navy personnel are stationed at NWSTF Boardman. Their responsibilities are to the coordinate use of the range and provide for the safety of users, maintain buildings, roads, wells, fences and other infrastructure, and to provide security for installation assets. They also watch for wildfires but have limited response capabilities should fires occur. Range facilities consist of two target spotting towers, a headquarters compound consisting of several buildings that house offices and workshops, several wells and water pipelines, and gravel and dirt roads. There are no housing units located on the range; all personnel live off the installation. The Navy detachment currently consists of six enlisted personnel under the command of a noncommissioned Officer in Charge who reports directly to the Operations Officer at NAS Whidbey Island in Washington State.

The Nature Conservancy, through a long-standing Memorandum of Agreement with the Navy, conducts research in three Research Natural Areas (RNAs) on the bombing range (see appendix A for documentation). These RNAs are used for research on grazing/native plant relationships, noxious weed control studies, and other vegetation and wildlife studies.

2.4 General Physical Environment

The landform of NWSTF Boardman has been directly shaped by the Bretz floods of 12,000 years ago, plus the consequential development of a series of prehistoric lakes collectively called Lake Condon (Allen et al. 1986). The northern two-thirds of the facility gently rises in broad, flat alluvial terraces from approximately 400-feet elevation at the northern boundary to about 700 feet. It largely represents an area scoured by the last Bretz floods that deposited in its wake sandy and gravelly alluvium soils (McClelland and Bedell 1987). In places, the sand forms extensive dune systems.

The southern one-third of the facility is much hillier and ranges in elevation from 700 to 950 feet; this is a buildup of lacustrine silt deposits from the old Lake Condon. The 150-foot deep Juniper Canyon is a prominent feature here, with slopes to 20 percent, although the upper reaches of Well Springs canyon and Six-Mile canyon also provide distinct topographical relief.

2.4.1 Climate

The climatic conditions at NWSTF Boardman can be described as semi-arid with hot, low precipitation summers and relatively cold winters (McClelland and Bedell 1987). The average annual precipitation at Boardman is from about nine inches on the north end increasing to eleven inches at the facility's southern border (McClelland and Bedell 1987). Most of the precipitation falls in the winter and spring. The frost free period is 180 to 200 days. Southwesterly winds prevail through most of the year with winds in excess of 25 miles per hour common from March to July. Much of the landforms, especially the extant dunes systems, have been shaped by these winds.

The Columbia Gorge is a major east-west passageway connecting the region with the Willamette Valley and Oregon coast. Vigorous winds are common in and around the Gorge. A major effect of the Gorge is a moderation of air temperatures near the Columbia by allowing maritime air to reach the area from the west; this can occur both in summer and winter. Occasionally, however, large-scale easterly flow brings very cold continental air to the region, resulting in extremely cold conditions. During such periods, the cold air passes westward through the Gorge, creating extreme conditions in the western valleys as well.

In general, climate change impacts within the Columbia Basin are not well understood. However, increases in fire frequency due to prolonged drought conditions are likely over time and could result in changes to vegetative communities.

The nearest climatological reporting station to NWSTF Boardman is located about 3 miles north of the installation. Climate data for this station, derived from 1971-2005 records, are shown in Table 2-1.

Table 2-1. Climatic Data for Boardman, Oregon.

Mean maximum daily temperatures	65.7 degrees F
Mean minimum daily temperatures	40.5 degrees F
Mean maximum monthly temperature: July	89.2 degrees F
Mean minimum monthly temperature: January	25.9 degrees F
Extreme maximum temperature: August	108 degrees F
Extreme minimum temperature: December and February	-15 degrees F
Mean annual precipitation	8.61 inches
Mean maximum monthly precipitation: November	1.22 inches
Mean minimum monthly precipitation: July	0.28 inches
Mean annual snowfall	8.4 inches

Source: National Climatic Data Center 2006

2.4.2 Wildland Fires

NWSTF Boardman has an extensive history with wildland fires. Historically, the area was comprised of fire-adapted habitats with fire return intervals from around 20-50 years. With the widespread introduction of invasive plant species and non-native annual grasses resulting from prior grazing activities, the fuel loading of understory vegetation has greatly changed and fires now tend to be more frequent, more severe, and can be long-term or permanent habitat-altering events. In addition to past grazing activities, wildland fire has altered the sage steppe ecosystem. Studies conducted after the 1998 fire showed that avian species and Washington ground squirrel occurrence and densities can be affected by the habitat-altering effects of a large, hot-burning wildland fires (Humple and Holmes 2001, Marr 2001). Wildland fires can result from a natural ignition source (e.g., lightening) or from a manmade ignition source (e.g., ordnance use). Most major fires since 1998 have ignited from lightning strikes. Exceptions include a 2009 fire for which the ignition source is unknown and a 2018 fire resulting from a live-fire exercise conducted by the Oregon Air National Guard. Additional anthropogenic ignitions (welding, manure piles) have originated from outside the NWSTF Boardman boundaries. Since 1998, more than 85% of NWSTF Boardman acreage has been burned by wildland fires, which have caused short and long-term habitat alteration. The fires range in size but the most impacting factors are the large, repeated fires occurring in vulnerable big-sagebrush habitat. The list below provides known wildland fires from 1998 to 2018. Major fires at NWSTF Boardman have been monitored and mapped from 1998 to 2012 (Figure 2-2).

Wildland Fires since 1998

Year of Burn	Acres	Ignition Source and Location
1998	17,514	Lightning strike
2002	1,639	Lightning strike
2007	11,664	Lightning strike
2008	30,612	Lightning strike
2009	618	Unknown
2015	16,350	Lightning strike
2018	25	Lightning strike
2018	11,500	Live fire exercise (Oregon Air National Guard)
2019	3	Unknown

2.4.3 Geology

NWSTF Boardman is underlain by Columbia River basalt deposited during the Miocene epoch to maximum depths of 4,000 feet (McClelland and Bedell 1987). These deposits are overlain by lacustrine silts deposited to depths of 1,000 feet during the Bretz floods and Lake Condon formation (Figure 2-3). Lacustrine deposits nearest the Columbia River were eventually washed away during sporadic flood events leaving behind sandy alluvium. This sandy material was eventually reworked by prevailing winds and redeposited over some of the lacustrine deposit farther south of the Columbia River (McClelland and Bedell 1987), including the northern half of the facility. The southern half of the facility is also covered with loess re-deposits, mostly silty loams. Consequently, all surface soils on the facility are wind deposits with very high wind erosion potential.

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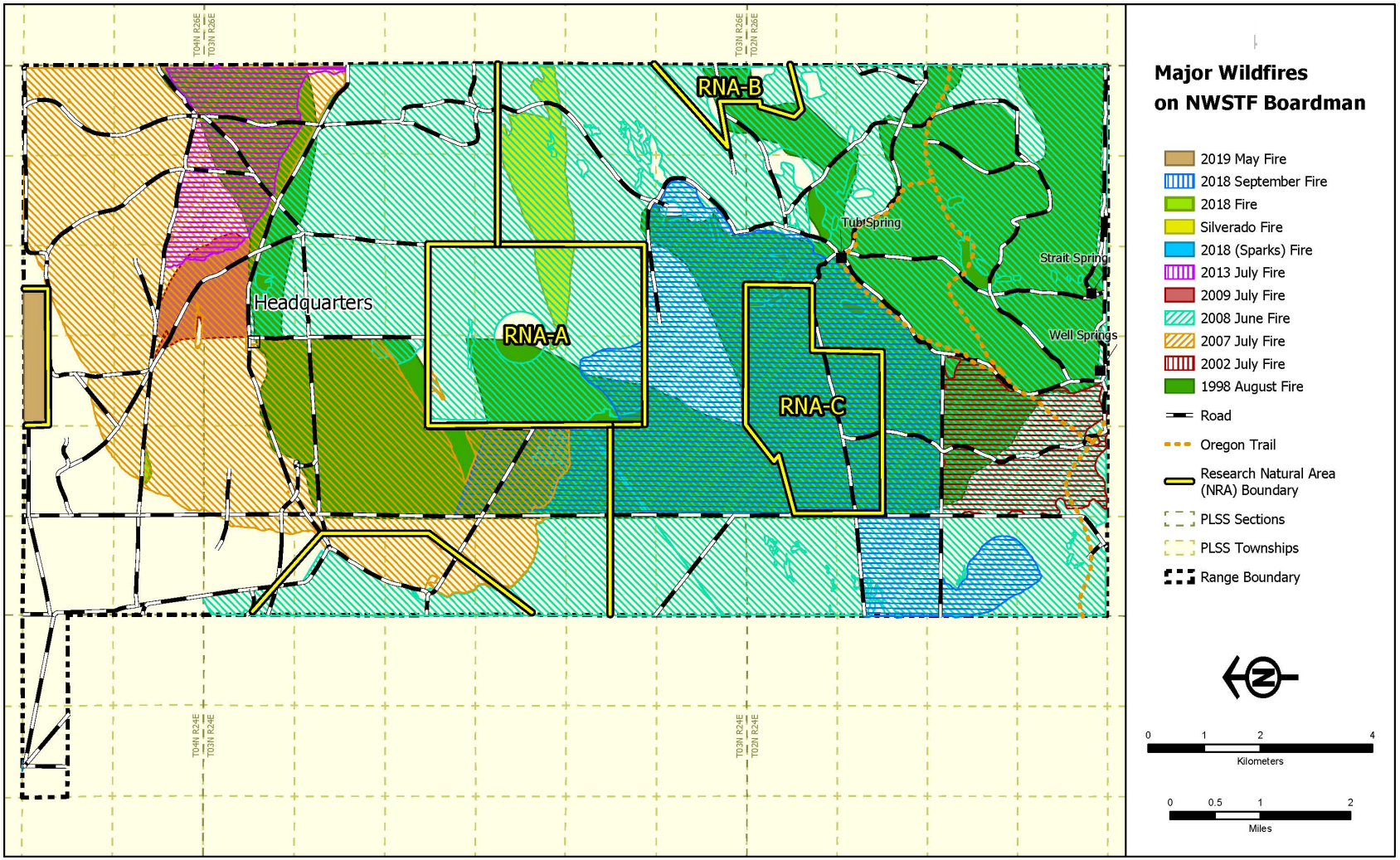
Figure 2-2. Major Wildland Fires on NWSTF Boardman

Integrated Natural Resources Management Plan
Naval Weapons Systems Training Facility Boardman



Prepared by: Naval Facilities Engineering Command Northwest 2019

December 2019

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Blowing sand

Blowing sand is a common occurrence in the NWSTF Boardman area and occurs every year during higher wind events. The quantity of blowing sand can increase after large fires or other vegetation clearing events because of the destabilizing factor of removing vegetation. Complaints and requests for the Navy to act to reduce blowing sand from leaving the installation are common. Many suggested techniques to stabilize blowing sand would actually prevent or delay native vegetation from reestablishing itself, which is not consistent with the objectives of this management plan. Spreading or disking straw, hydroseeding, aerial seeding, and similar techniques over large areas are logistically difficult, and could increase unnatural organic material levels in the soil, introduce non-native seed sources, increase soil nutrient levels, and further disturb subject areas. These types of actions would set back the recovery of desired native plant species, increase the competitive advantage to invasive/noxious weeds, and cause other effects that are inconsistent with the goals and objectives to provide resilient native habitats for realistic military training. Any sand stabilizing activities need to be evaluated for consistency with this plan and weighed against the potential benefits of the stabilizing action. Placement of small scale and localized mechanical soil stabilizing features after a wildfire (such as drift fencing) could provide localized benefits in problem soil movement areas while limiting the effect of retarding native revegetation. The NRM should be engaged in developing any stabilizing activities to provide guidance on limiting natural resource impacts from any proposed actions and to develop alternatives and locations for suitable work consistent with the goals and objectives of this plan. Restoring stabile native vegetation is the ultimate solution to reducing blowing sand issues on NWSTF Boardman.

2.4.4 Soils

Three major soil associations occur on the facility as shown in Figure 2-4: Quincy-Koehler, Sagehill-Taunton, and Warden (SCS 1983, McClelland and Bedell 1987). The Quincy-Koehler association consists of soils on alluvial sand over alluvial gravel deposits on gently sloping terraces. On the facility, the association includes about 55 percent Quincy soil, 35 percent Koehler, and a combined 10 percent for Burbank, Hezel, Quinton, and Royal. These deep, loamy fine sand soils dominate the northern half of the facility.

Southward on the facility, the Quincy-Koehler association is replaced by the more sandy loam Sagehill-Taunton association. Soils in this association were formed on loess over lacustrine, or a hardpan, and dominate the terrace front of the facility south end. Major soils include Sagehill (65 percent), Royal (20 percent), Taunton (10 percent), and Ellum (5 percent). These soils are deep with a sandy loam or fine sandy loam surface.

The southern one-quarter of the facility is almost entirely Warden soils (90 percent). This is a deep, well-drained soil with a silty loam surface. Warden soils developed in loess over lacustrine silt and form the terrace tops above Juniper Canyon and other canyons of the south end. Lesser (less than 10 percent) represented soils include Lickskillet and Xeric Torriorthents. Lickskillet soils are shallow, stony soils composed of loess and basalt residuals. These soils are found on west- and south-facing slopes of Juniper Canyon and are punctuated with rock outcroppings. Xeric soils are deep wind and water lain accumulates in dry canyon bottoms. Because of high summer temperatures and excessive draining, these soils are unusually dry.

In some locations, wind and water processes have dramatically altered the surface layers of native soils, including where wind-borne sand has accumulated into dunes devoid of vegetation. Dunes are largely found on the north end of the facility and in middle Juniper Canyon. “Alkaline” soils, also

Figure 2-3. Geology of the Boardman Region

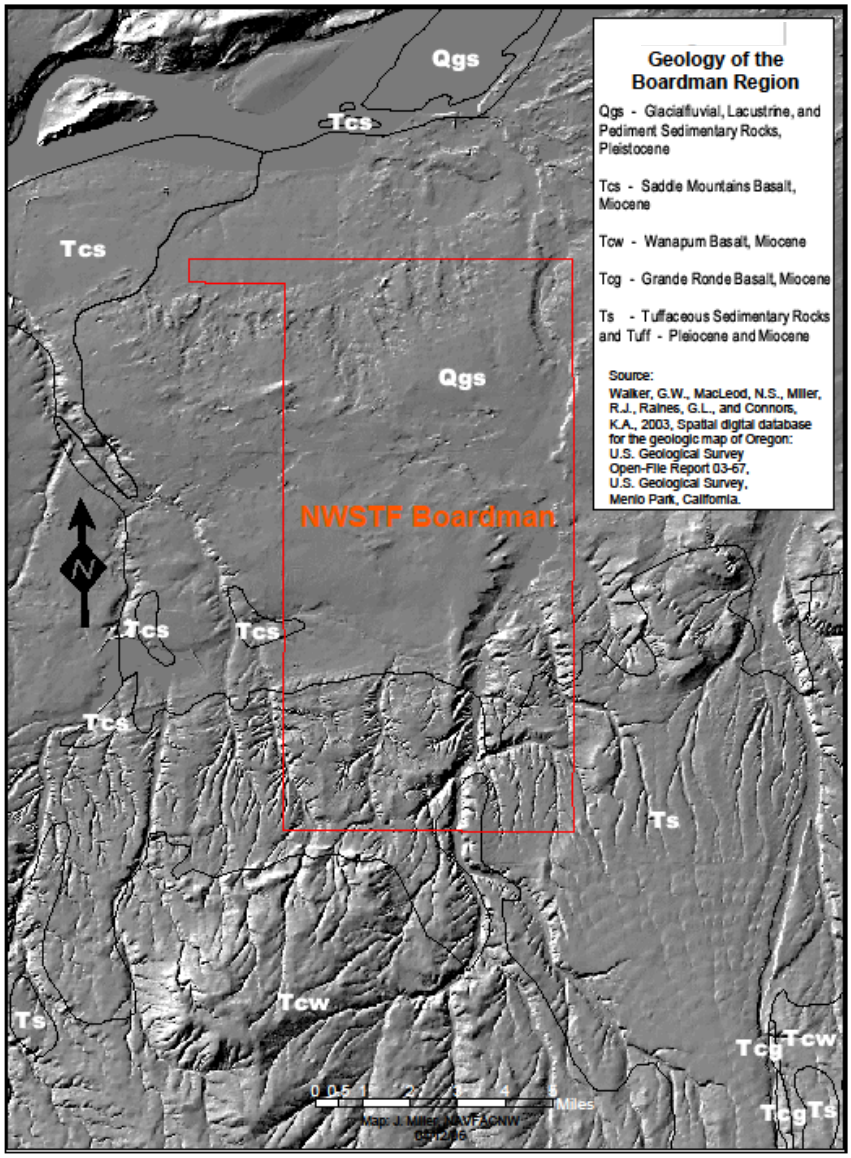
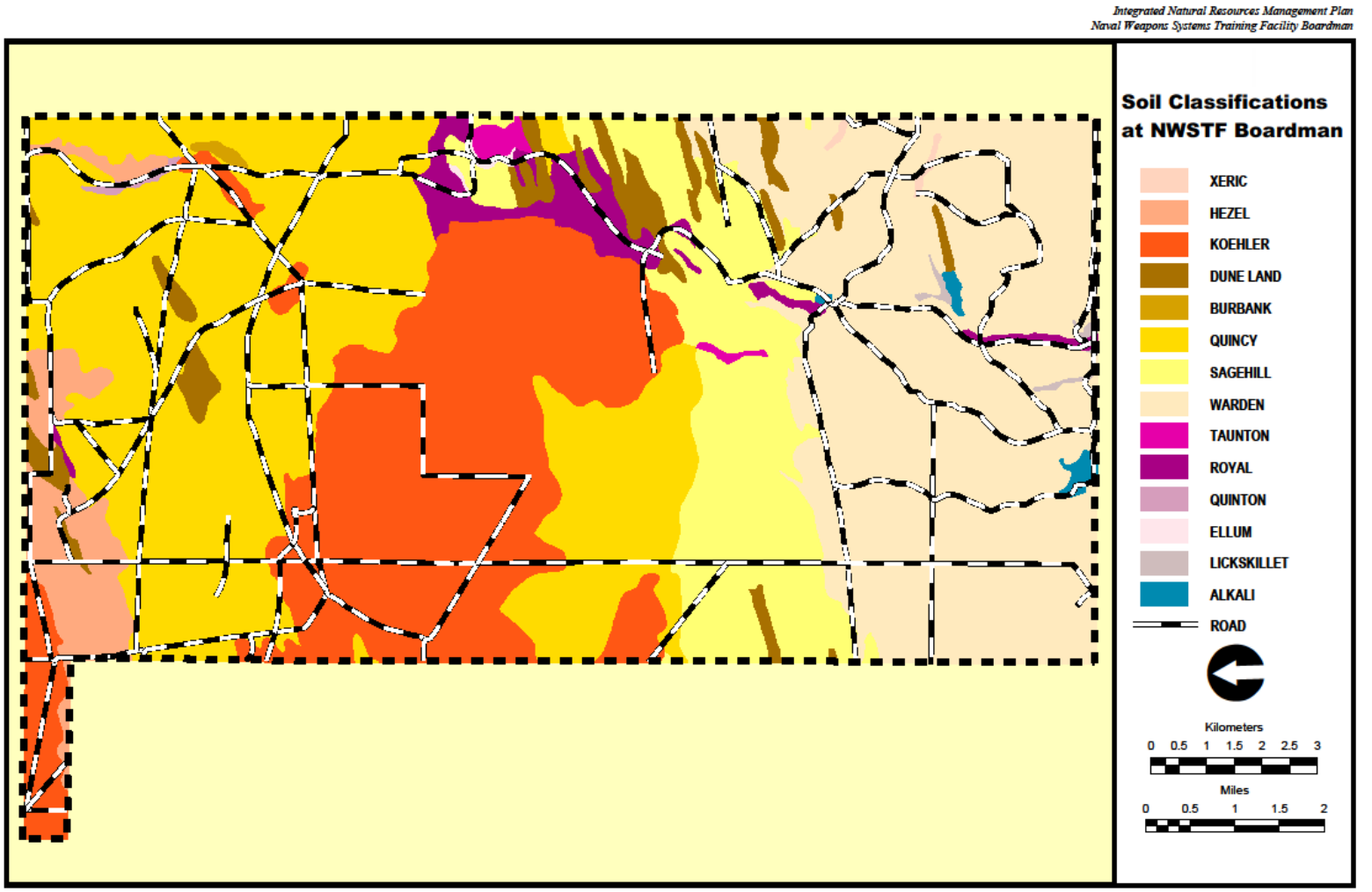


Figure 2-4. Soils Classification at NWSTF Boardman



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bare of vegetation, can be found on the south end of the facility. These alkaline soils are found near Tub Spring where the surface soil has eroded away revealing calcareous lacustrine silt under layers high in sodium and calcium. More classic alkaline soil is found at Well Springs where excessive evaporating of rain and spring water has allowed the accumulation of salts, especially sodium, on the surface horizon.

Biological Soil Crusts

Biological soil crusts are very important to the stability of the soil complexes at NWSTF Boardman. They stabilize the soil and prevent water and wind erosion. Biological soil crusts at NWSTF Boardman are primarily comprised of cyanobacteria, mosses, and lichens, and will be discussed in more detail in Section 2.6.3.

2.5 Water Resources

Water resources of NWSTF Boardman are shown in Figure 2-7. The man-made water distribution system has not functioned regularly since the program ceased in 2002. With cessation of the grazing program, water developments were abandoned. No recent assessment has been made as to the status and functioning of any part of the system. The only natural surface water occurs as rainfall runoff, creating intermittent flows in Juniper and Well Springs canyons. In some years, the flow is sufficient to leave behind pools of standing water. Natural flow once occurred at Tub, Well, and Strait Springs on the south end of the facility, but has dried up since domestic wells were drilled south of the facility during the 1930s to 1950s.

NWSTF Boardman has manmade water features as shown in Figure 2-5. Oregon Trail Pond, located one mile east of Juniper Canyon, and Well Springs Canyon Pond, located at the head of Well Springs Canyon, were created for use by cattle, but also provided water for coyotes, deer, and other animals inhabiting the range. A pair of western sandpipers were observed at Oregon Trail Pond. With the halt to grazing leases, these two ponds are no longer maintained to provide water. Toad Pond was a small watered depression, fenced to exclude livestock, purposely built in 1996 to provide breeding habitat for great basin spadefoot toads (*Spea intermontana*). The only water source came from a well and was piped from the well to the depression. The system has not contained water for several years and has not been regularly functioning since the grazing program ceased in 2002. When the pond was maintained with water, it served a variety of wildlife including mule deer, pronghorn antelope, blackbirds, waterfowl, swallows, and herons. Cattails, a wetland obligate plant, was observed growing in the pond (J. Miller personal observation, 2006), but the pond is not a naturally occurring wetland, and existed only with constant maintenance. Soils in the depression are not “hydric,” one of the three parameters necessary to be classified as a jurisdictional wetland (the other two are hydrology and presence of hydrophytic vegetation).

Operable water wells occur at four locations. Exposed risers occur intermittently along the waterlines that used to provide water access for livestock. One of the risers feeds a small depression in Juniper Canyon (Toad Pond), but the system has not regularly functioned since the grazing program ceased in 2002. Two excavated stock ponds, one at the head of Well Springs Canyon and the other centered over the Oregon Trail east of Juniper Canyon (Oregon Trail Pond), capture seasonal rainwater.

The Columbia River basalt aquifer, which underlies the installation, is a confined aquifer consisting of numerous Miocene basalt lava flows and a few tuffaceous sedimentary interbeds. These lava flows and sedimentary interbeds comprise five separate geologic formations. Together these formations are probably greater than 5,000 feet thick beneath the Deschutes-Umatilla Plateau. The Oregon Water Resources Department (OWRD) has designated a large Critical Groundwater Area just east

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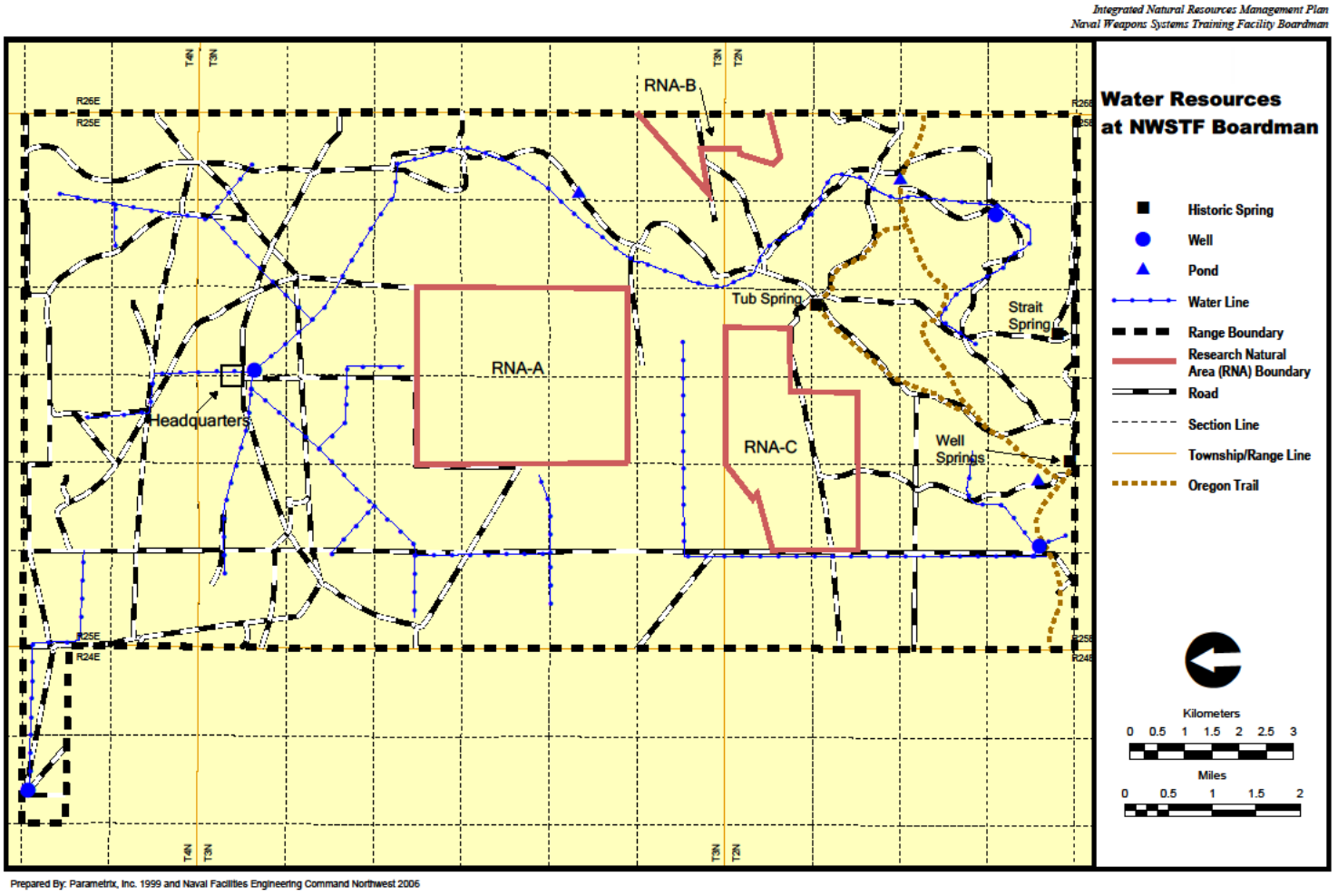
Figure 2-5. Water Resources at NWSTF Boardman



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of the range's eastern boundary and a Limited Groundwater Area just south of the range's southern boundary (OWRD 2011a).

Additional groundwater pumping in a Classified Groundwater Area is restricted to a few designated uses (OWRD 2011b). A Critical Groundwater Area is one where pumping of groundwater exceeds the long-term natural replenishment of the underground water reservoir. This legal designation is designed to prevent excessive declines in ground water levels.

2.6 General Biotic Environment

NWSTF Boardman is located in the Columbia Basin Ecoregion, shown in Figure 2-6. The Columbia Basin Ecoregion occupies about two-thirds of eastern Washington and extends into north central Oregon. The topography of the lower Columbia Basin ranges from sandy plains and plateaus to mountain slopes and rocky ridge lines. Elevations range from 500 feet along the Columbia River to more than 3,000 feet. Rattlesnake Mountain, at 3,600 feet, is the highest point in the lower Columbia Basin.

Figure 2-6. The Columbia Basin Ecoregion

The extremes of the lower Columbia Basin's heat and cold and scarcity of precipitation determine the number and kinds of plants that grow. Vegetation is described broadly as shrub-steppe. Shrub-steppe is the largest natural grassland in North America, extending from southeastern Washington and eastern Oregon, through Idaho, Nevada, and Utah, western Wyoming, and Colorado. Shrub refers to the most abundant plant species that grows in this ecoregion. "Steppe" means a vast treeless plain. In the Mid-Columbia Basin, shrub-steppe winters are cold and wet with strong winds and blowing snow. Summers are hot and dry with temperatures that can reach above 100 degrees Fahrenheit during the day, then cool at night. The dominant shrubs include big sagebrush, spiny hopsage, bitterbrush, black greasewood, and threetip sagebrush. Native grasses are mostly large bunchgrasses. Vegetation also includes flowering forbs. Riparian vegetation consists of reeds, rushes, cattails, and deciduous trees and shrubs. The types of plants that grow in this region determine, in part, the number and species of wildlife that live here. In general, the lower Columbia Basin provides habitat for approximately 40 species of mammals, 246 bird species (depending on

the time of year), 5 species of amphibians, 10 species of reptiles, 100 species of insects, and 44 species of fish.

2.6.1 Threatened and Endangered (T&E) Species and Species of Concern

The bald eagle (*Haliaeetus leucocephalus*) has been de-listed under the Endangered Species Act, but is federally protected under the Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668d) and the Migratory Bird Treaty Act (16 U.S.C. §§ 703-712). The Washington ground squirrel (*Urocitellus [Spermophilus] washingtoni*), Oregon state-listed endangered species, resides on the installation. Table 2-2 shows known and potential listed, candidate and sensitive species at NWSTF Boardman.

Table 2-2. Threatened, Endangered, Candidate, Species of Concern, and Sensitive Species.

Species	Status	
	Federal	State
Bald Eagle [1]	De-listed under ESA; federally protected under Bald and Golden Eagle Protection Act and the MBTA	Threatened under Oregon State Protection Rules
Golden Eagle	Federally protected under Bald and Golden Eagle Protection Act and the MBTA	- -
Northern Sagebrush Lizard	Species of Concern	Sensitive - Vulnerable
Ferruginous Hawk	Species of Concern and the MBTA	Sensitive - Critical
Swainson's Hawk	Species of Concern and the MBTA	Sensitive - Vulnerable
Upland Sandpiper	MBTA- -	Sensitive - Critical
Long-billed Curlew	Species of Concern and the MBTA	Sensitive - Vulnerable
Burrowing Owl	Species of Concern and the MBTA	Sensitive - Critical
Loggerhead Shrike	Species of Concern and the MBTA	Sensitive - Vulnerable
Brewer's Sparrow	Species of Concern and the MBTA	
Black-throated Sparrow	- - MBTA	Sensitive - Peripheral
Sage Sparrow	Species of Concern and the MBTA	Sensitive - Critical
Grasshopper Sparrow	MBTA- -	Sensitive - Vulnerable
Willow Flycatcher[1]	Species of Concern and the MBTA	Sensitive - Vulnerable
Yellow-breasted Chat[1]	Species of Concern and the MBTA	Sensitive - Critical
Washington Ground Squirrel	Not warranted	Endangered
Laurence's Milk-vetch[1]	Species of Concern	Threatened
White-tailed Jackrabbit[1]	- -	Sensitive - Vulnerable
Disappearing Monkeyflower[1]	Species of Concern	Candidate
Little Mousetail[1]	Species of Concern	Candidate

[1] Potentially occurring at NWSTF Boardman.

2.6.2 Wetlands and Ephemeral Aquatic Areas

There are no jurisdictional wetlands that identified on NWSTF Boardman. NWSTF Boardman has manmade water features as shown in Figure 2-7.

The historic springs found in the south portion of the installation no longer flow due to groundwater agricultural extractions from the aquifer outside the boundary of NWSTF Boardman. The periphery of the springs or possibly the entire spring depression areas would probably have been once classified as wetlands, but no longer meet the criteria for wetland classification because the requisite water supply and facultative vegetation are no longer present.

2.6.3 Flora

All of NWSTF Boardman falls within the sagebrush/wheatgrass vegetation climatic climax zone, which derives its name from the big sagebrush/bluebunch wheatgrass plant association dominating the loamy-soiled sites of this zone (Poulton 1955). The term "climatic climax zone" follows Daubenmire (1970) and refers to the climatic limits of the dominant plants found in a region. Plant associations, often referred to as "habitat types" by synecologists (Poulton 1955, Daubenmire 1970), are a finer classification better reflecting the actual floristic composition of a distinct area based on the interplay of site-specific soils and macroclimate and, in some cases, grazing and fire. Each of the plant associations falls under either a zonal or edaphic series. Zonal refers to the influence of major soil types termed "zonal" by soil scientists, while edaphic refers to associations influenced by soils that are shallow or abnormal in physical or chemical properties. Plant associations can also include "phases," or unique climatic-soil-grazing combinations that favor establishment of dominating plants not otherwise found in the plant association.

Six major plant associations occur on NWSTF Boardman. These include the zonal plant association big sagebrush/bluebunch wheatgrass and the edaphic series associations bluebunch wheatgrass/Sandberg's bluegrass, big sagebrush/western needle-and-thread grass, antelope bitterbrush/needle-and-thread grass, needle-and-thread grass/Sandberg's bluegrass, and snowy buckwheat/Sandberg's bluegrass. Lesser represented communities include the matchweed (an introduced species) variant of the big sagebrush/bluebunch wheatgrass association and relict stands of western juniper/big sagebrush/bluebunch wheatgrass association. Large portions of nearly all of these associations are currently in a cheatgrass zootic climax. Finally, there are some largely unvegetated sand dune and "alkali" areas.

Sagebrush/wheatgrass and wheatgrass/bluegrass plant associations dominate the southern half of NWSTF Boardman where soils are deeper and loamier. The presence of sagebrush differentiates these communities. Sagebrush is more prevalent in the draws and lowlands where deep, subsurface water resources are present. Both of these communities have been severely impacted by grazing (ca. 1870s to 1950s) and now are largely held in a cheatgrass zootic climax. Healthy stands of wheatgrass are largely limited to small patches on north-facing slopes, while sagebrush/wheatgrass association stands were invaded with cheatgrass. Additionally, frequent range fires have depleted the sagebrush population on the facility.

Moving south to north on the facility, the soils become sandier resulting in a replacement of the sagebrush/wheatgrass and wheatgrass/bluegrass plant associations with the sagebrush/needle-and-thread grass and needle-and-thread grass/bluegrass associations. Prior to the invasion of alien weedy annuals around the turn of the century, much of the land now supporting these associations was characterized as isolated patches of western needle-and-thread surrounded by blowing sand. Outlines of the extensive dune systems that dominated this portion of the range are still evident in aerial photographs. While much of the original needle-and-thread stands have been replaced by dense stands of cheatgrass, needle-and-thread appears to also be establishing in areas of former dunes now stabilized by weedy annuals, including cheatgrass. Good to nearly pristine original stands of needle-and-thread can still be found on the center portion of the range, especially where historically-protected from grazing in the RNAs. The resilience of needle-and-thread, compared to bluebunch wheatgrass, to withstand grazing probably resides in its lesser palatability to livestock. However, gray and green rabbitbrush now dominate large portions of these communities because of disturbance from fire and historic grazing.

On the farthest northern edge of NWSTF Boardman, the sandiest soils supporting the bitterbrush/needle-and-thread association are found and, where parent soils are slightly rocky, small

patches of buckwheat/bluegrass plant associations. Minimal needle-and-thread is found in these communities because it has either been replaced by cheatgrass, Russian thistle, and other alien weedy annuals, or has not yet colonized these areas since dune stabilization. Finally, due east of RNA-C is a small community of matchweed, a small, non-native shrub that apparently established in the John Day River drainage in the late 1940s and has been moving eastward since (Poulton 1955). This plant is an indicator of previous severe grazing (Poulton 1955).

In their pristine state, apparently none of these plant associations supported a diverse floristic composition, largely because of harsh climatic conditions and the deep soil lichen layers that developed between the grasses (Daubenmire 1970). Usually no more than one shrub and one or two species of grass, along with soil lichens and bare ground, accounted for greater than 90 percent of the ground cover (Poulton 1955). Phlox, lomatium, yarrow, and various members of the pea family were the most conspicuous forbs. However, livestock trampling of the lichen layer and intensive grazing of the palatable forage species encouraged the invasion of alien weedy annuals such as cheatgrass, Russian thistle, tumblemustard, and whitlow-grass. The number of unpalatable native species has dramatically increased, such as hairy golden-aster in the sagebrush/wheatgrass plant associations, and fiddleneck tarweed, lance-leaf scurf-pea, and hairy plantain in the needle-and-thread grass associations.

A list of plant species known to occur on NWSTF Boardman may be found in Appendix E.

There are no Federally listed threatened or endangered species of vascular plants, lichen, or fungi occurring on the facility. The only plant with official status occurring in the Columbia Basin portion of Morrow County that could occur on the facility is Laurence's milk-vetch, an Oregon State Threatened species. However, McClelland and Bedell (1987) and Quade (1994) did not list this species on their extensive lists of vascular plants occurring on the facility and surveys conducted in 2003 and 2004 did not find the species (Figure 2-9). Two rare species (Eastman 1990), the stalked-pod milk-vetch and Columbia milk-vetch, are known to occur on the facility (McClelland and Bedell 1987, Quade 1994). Neither species is considered by the Oregon Natural Heritage Program to be in imminent endangerment. Interestingly, several species of milk-vetch, Laurence's milk-vetch included (Parish et al. 1996), are toxic to livestock, hence the local name of locoweed. Any attempt to eradicate or control milk-vetch (six species have been identified on the facility) for the sake of livestock needs to consider the rare status of the above species.

In 2003 and 2004, field surveys of NWSTF Boardman were conducted to update information on all special status plant species to meet needs in the Endangered Species Act, Sikes Act, and any Cooperative Agreement obligations (see Figure 2-7). Two rare plants, *Astragalus sclerocarpus* (stalked-pod milk-vetch) and *A. succumbens* (Columbia or crouching milk-vetch), were found throughout NWSTF. These plants are on the Oregon Natural Heritage Plant (ONHP) List 4 which contains taxa which are of conservation concern but are not currently threatened or endangered. This includes taxa which are rare but currently secure, as well as taxa which are declining in numbers. Two other notable occurrences are *Hymenopappus filifolius* (Columbia cut-leaf), which was reclassified as common during the 2001 Oregon rare plant review and now has no special plant status, and *Astragalus carcinus* (Buckwheat milk-vetch). Although *A. carcinus* is not a rare plant it is a notable collection because it was not previously identified from the Oregon side of the Columbia River as indicated by Aaron Liston, Department of Botany & Plant Pathology, Oregon State University, Corvallis. No plant surveys of NWSTF Boardman have been conducted since the 2003-2004 surveys.

Figure 2-7. Results of 2003-2004 Rare Plant Survey

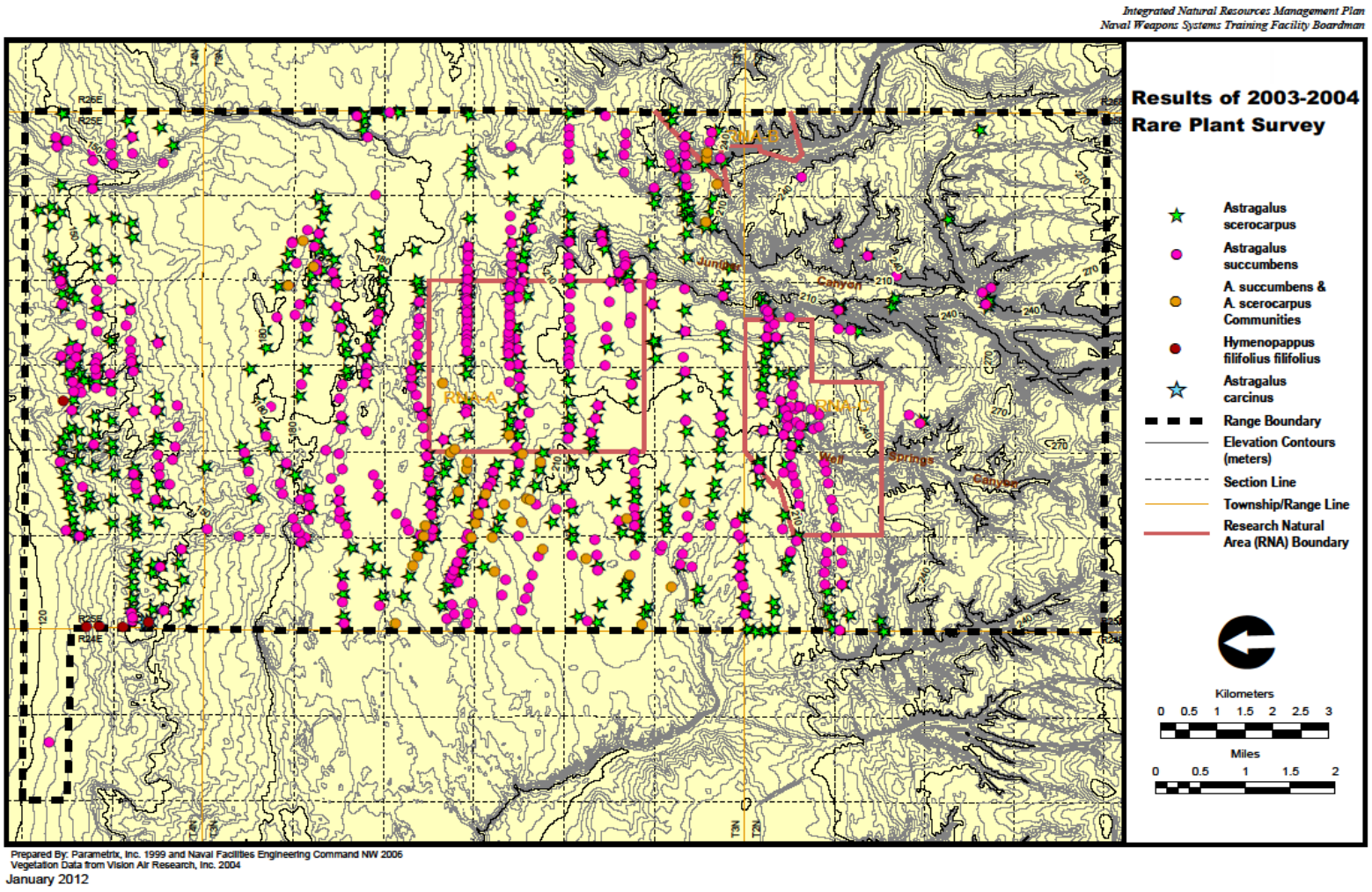

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Table 2-3. Rare Plant Species Occurring or Potentially Occurring on NWSTF Boardman.

Species	Status	
	Federal	State
Laurence's Milk-vetch[1] (*Astragalus collinus* var. *laurentii*)	Species of Concern	Threatened
Stalked-pod Milk-vetch (*Astragalus sclerocarpus*)	- -	Rare
Columbia Milk-vetch (*Astragalus succumbens*)	- -	Rare
Disappearing Monkeyflower[1] (*Mimulus evanescens*)	Species of Concern	Candidate
Little Mousetail[1] (*Myosurus minimus ssp. apus var. sessilflorus*)	Species of Concern	Candidate

[1] Potentially occurring at NWSTF Boardman.

The rare plant survey field personnel also made a judgment as to the quality of the habitat at each point they sampled in 2003-2004 prior to the two large wildfires in 2007 and 2008. At each point a 3 meter radius plot was estimated and plants were visually identified within the plot. Figure 2-8 shows the results based on the following criteria:

- L Low – Area entirely comprised of exotic species
- ML Medium Low – Exotic species dominate with native plant species evident
- M Medium – Area a mix of native plant species and exotic species
- MH Medium High – Native species dominate but few exotic species present
- H High – A full component of native grasses with no exotic species present

Research Natural Areas

The Research Natural Areas (RNAs) are part of a federal government system established for research and educational purposes. Natural features are preserved for scientific purposes and natural processes are allowed to dominate. The RNA program was created to: 1) preserve examples of all significant natural ecosystems for comparison with those influenced by man, 2) provide educational and research areas for ecological and environmental studies, and 3) preserve gene pools of typical and endangered plants and animals.

Three RNAs were established on the NWSTF in 1978 and are co-managed by The Nature Conservancy (TNC) under a long-standing Cooperative Management Agreement (CMA) with the Navy. The RNAs on the NWSTF were some of the first established on DoD lands. TNC activities in the RNAs include research and monitoring of the native habitat types and wildlife species, as well as control of noxious weeds.

At Boardman, RNA-A encompasses the main target area of the bombing range and contains highly disturbed areas.. All three RNAs have been fenced to exclude domestic grazing activities. McClelland and Bedell in 1987 recommended moving RNA-A or eliminating it because of the highly disturbed quality due to the bombing. The Nature Conservancy, as recently as 2011, also recommended that the RNA-A be moved (L. Nelson, pers. communication, 2011).

Local Navy staff will work with The Nature Conservancy on a proposal to move RNA-A from the main target and to identify the specific boundaries of a new location that is more representative of the unique habitat types the RNAs are designed to protect. An area in the northwest portion of the

NWSTF or directly west of the current RNA would protect exceptional examples of several critically imperiled plant community types, as defined by the Oregon Natural Heritage Information Center and NatureServe including:

- *Purshia tridentata/Agropyron dasystachyum – Hesperostipa comata – Oryzopsis hymenoides* (Columbia River bunchgrass dunes – Antelope bitterbush/thickspike wheatgrass – needle-and-threadgrass – Indian ricegrass),
- *Purshia tridentate/Hesperostipa comate* (Antelope bitterbrush/needle-and-threadgrass, and
- *Hesperostipa comata – Poa sandbergii* (needle-and-threadgrass – Sandberg's bluegrass)

Vegetation Monitoring Program

In 1987, a vegetation/range monitoring program was developed to track changes in grassland and shrub-steppe condition. This program at NWSTF Boardman was designed to 1) interpret patterns of livestock utilization and 2) measure changes in the plant communities. In 1987, data was collected at 18 permanently marked locations around the installation (McClelland and Bedell 1987). In 2008, the 18 plots were revisited and the 1987 survey was replicated. In the intervening 21 years, several large fires have burned through the site, military training activities have been reduced, and the grazing program has ceased.

The 2008 surveys provide valuable data on the changes to range plant communities since 1987. The data collected by The Nature Conservancy staff in 2008 will now be considered a new baseline to compare subsequent monitoring. The monitoring plan protocols should be used to conduct future surveys in order to document changes and overall health of the plant communities of the range. The monitoring frequency may be increased following habitat-changing events, such as wildfires.

The Nature Conservancy repeated the surveys of the vegetation monitoring plots in 2010 and 2011. The data showed a trend of increasing vegetated cover and reduced bare ground. Perennial native vegetation cover also appears to be increasing. These results are likely a response to the removal of grazing from the range in 2001 and recovery responses from the 2007 and 2008 wildfires. The 18 plots are spaced around the installation and provide opportunity to validate and calibrate any new aerial mapping of the vegetation and habitats of NWSTF Boardman.

Invasive Plant Species/Noxious Weeds

Noxious weeds and invasive plants species can degrade wildlife habitat quality and unnaturally increase fuel loading and wildfire risk in heavily infested areas. Reducing the spread of noxious weeds and attempting to eradicate "class A" species are a goal of this management plan and supports the general enhancement of wildlife habitats on the installation. Several noxious weed species are widespread on the range and, as a result, potential control sites for data collection are limited.

To obtain a snapshot of noxious weed issues on the installation, an installation-wide mapping of noxious weeds was conducted in 1997 and the results are shown in Figure 2-9. Without complete control, noxious weeds spread over time through seed dispersal into disturbed areas (e.g., road edges, fire breaks) or dispersal after wildfires. Continual monitoring is necessary to track control success, identify new infestation areas, and prioritize control actions.

Figure 2-8. Results of 2003-2004 Rare Plant Survey – Habitat Quality

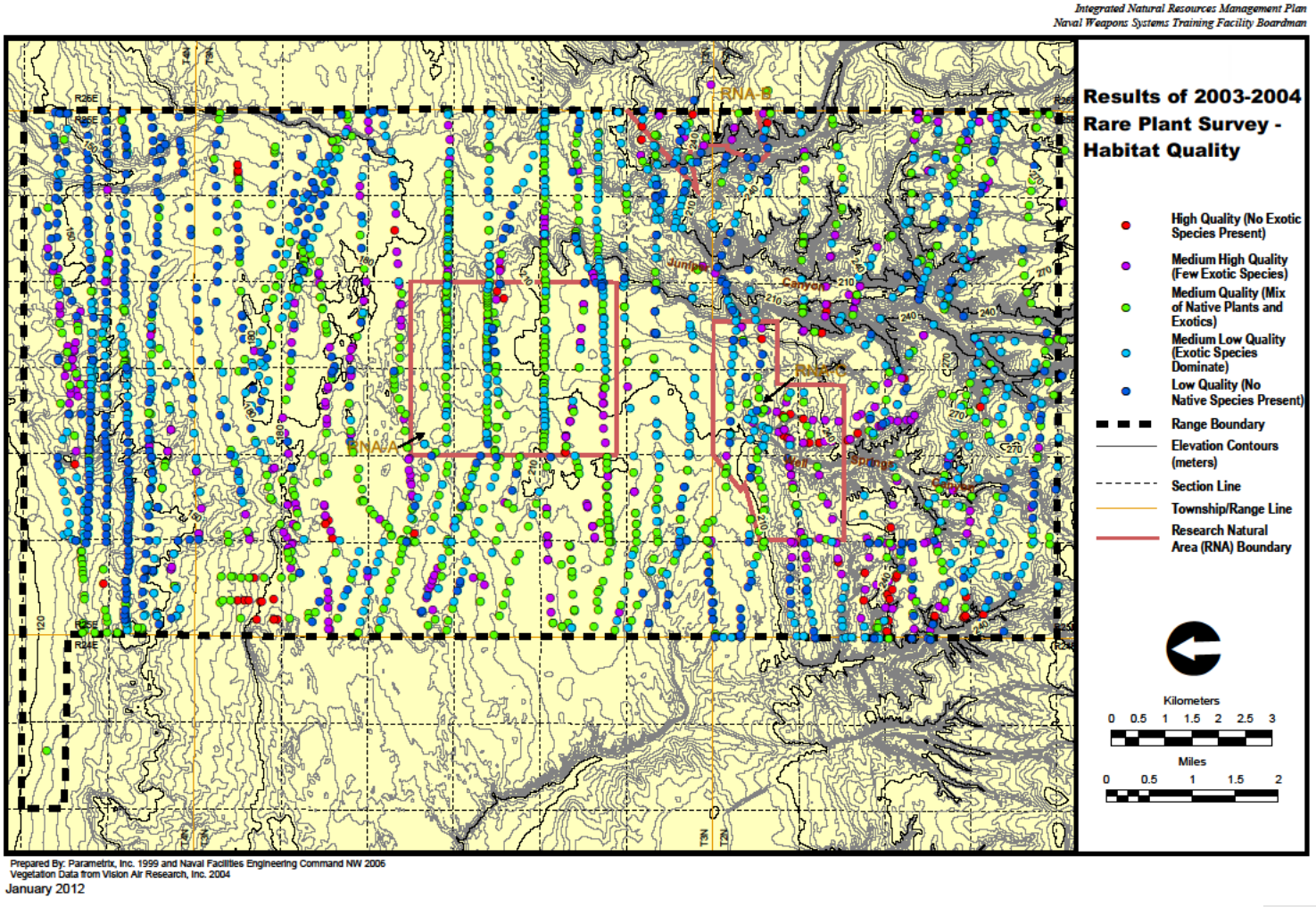
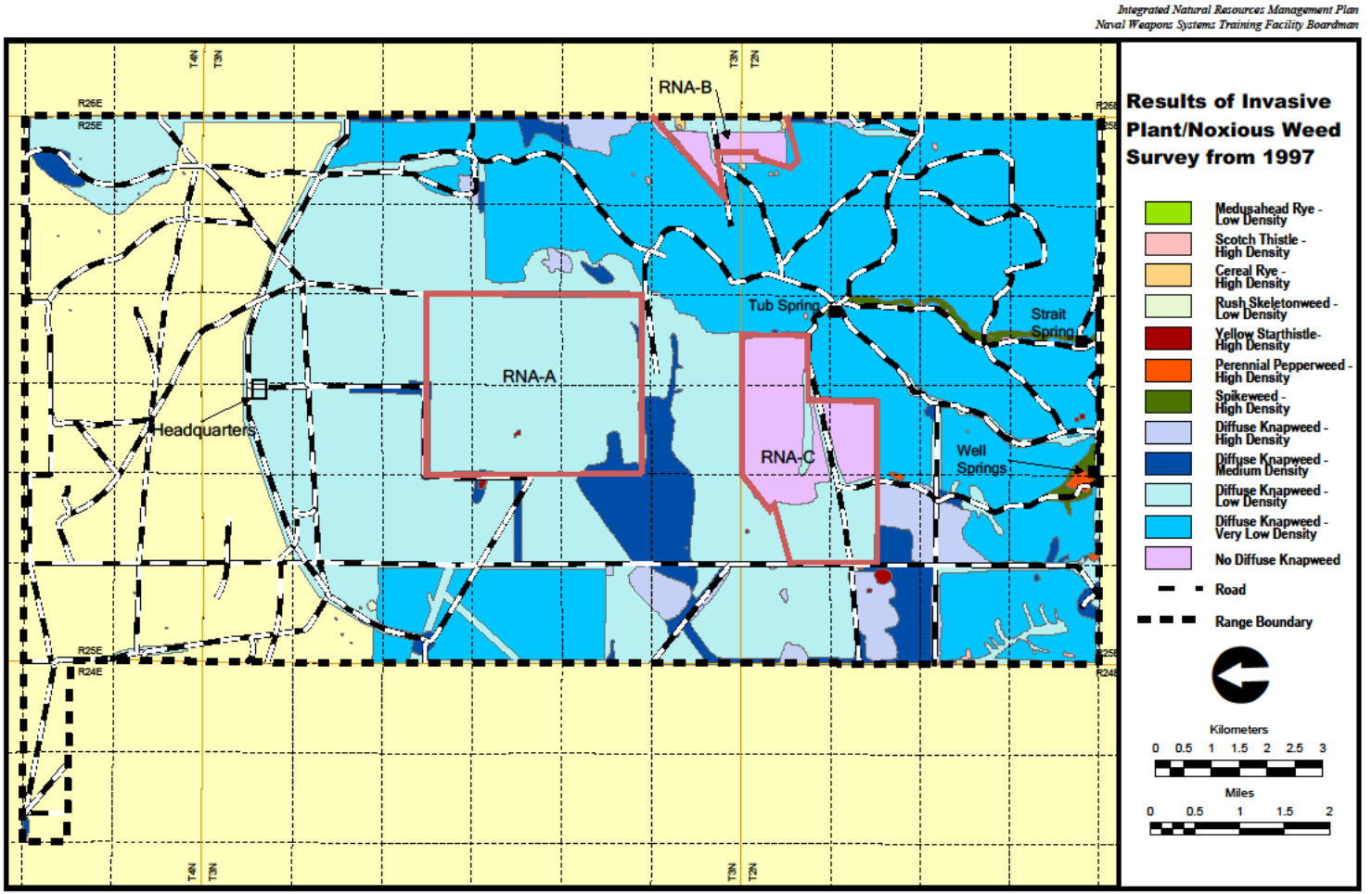


Figure 2-9. Results of Invasive Plant/Noxious Weed Survey from 1997



Biological Soil Crusts

The following biological soil crust discussion is based on information contained in Rosentreter et. al. (2007). Biological soil crusts are an intimate association between soil particles and cyanobacteria, algae, microfungi, lichens, and bryophytes (in different proportions) which live within or on top of the uppermost millimeters of soil. These communities have been known by a variety of names, including cryptobiotic, cryptogamic, and microbiotic soil crusts. They are found in all dryland regions of the world, including the polar regions, and in all vegetation types within these lands. In these landscapes, biological soil crusts often cover all soil spaces not occupied by trees, grasses, or shrubs and can comprise over 70% of the living ground cover.

Biological soil crusts develop in a particular successional sequence. Once the large filamentous cyanobacteria stabilize the soil, single-celled cyanobacteria appear. When in the soil, the single cells often form a long thread of hollow round balls, surrounded by a gelatinous sheath. Unlike the larger cyanobacteria, these smaller species are fairly immobile and stay on the soil surface where they can obtain sufficient light. Lichens and mosses colonize after the cyanobacteria. Unlike cyanobacteria, lichens and bryophytes have almost all of their photosynthetic tissue on or above the soil surface. Both phycolichens (lichens with green algal photobionts) and cyanolichens (lichens with cyanobacterial photobionts) occur in a range of growth forms, or morphological groups (crustose, squamulose, foliose and fruticose). Annual short mosses and perennial short and tall mosses also occur in soil crust communities as well.

The presence of these organisms on the soil surface increases soil stability. Because they are photosynthetic they also contribute carbon to the underlying soils. Free-living and lichenized cyanobacteria can also convert atmospheric nitrogen into bio-available nitrogen, and thus are an important source of this often limiting nutrient. All these organisms also secrete compounds that increase the bio-availability of phosphorus. Lichen morphological types with a more discontinuous cover (crustose, squamulose) allow water, gases, and seedlings to pass through to the soil surface, whereas mosses and lichens with a more continuous cover (foliose, fruticose) often block the flow of materials to the soil surface.

Because biological soil crust organisms are only metabolically active when wet, as the amount of precipitation increases, so does the level of biological soil crust development and lichen and moss cover. However, biological soil crust cover is restricted in areas where vascular plant cover is high because biological soil crust organisms have a limited ability to grow upwards from the soil surface and cannot compete for light. Thus, the most conspicuous development of biological soil crusts occurs in hot, cool, and cold drylands where plants are widely spaced.

Biological soil crusts are found on almost all soil types. Green algae are favored on more acidic and less salty soils, whereas cyanobacteria are favored on alkaline soils and soils with high salt content. Within a given climate zone, the cover of lichens and mosses generally increases with higher clay and silt content and lower sand content, as this also increases the stability and water-holding capacity of the soil. However, biological soil crust cover and development is limited on clay soils with a high shrink-swell coefficient. Habitats within a site that are moister (e.g., under plant canopies, thin plant litter, on north/northeast exposures) generally support a greater cover of lichens and mosses.

The external morphology of biological soil crusts depends on climate, species composition, and disturbance regimes. The general appearance of biological soil crust can heavily influence ecosystem function by influencing how materials (e.g., water, seeds, plant litter, nutrient-rich dust and soil) move across or are captured by the surface. Roughened surfaces slow material

movement and increase the capture of resources, whereas a very smooth surface can have the opposite effect. Based on morphology, four categories of biological soil crust are defined as: smooth, rugose, pinnacled, and rolling. Smooth biological soil crusts occur in hot deserts where soils do not freeze and in recently disturbed areas. They are almost exclusively cyanobacteria, algae, and fungi. Chemical crusting is also common in this crust type. The other three biological soil crust categories generally have lichens and mosses in addition to the cyanobacteria and fungi. Rugose biological soil crusts have low surface roughness generally created by scattered lichen or moss clumps. Pinnacled and rolling biological soil crusts are present only where frost-heaving occurs. Pinnacled crusts have up to 40% lichen-moss cover and can be up to 15 cm high. Rolling biological soil crusts occur where high precipitation results in an extensive cover of lichens and moss, and the frost-heaving of these surfaces results in a gently rolling surface about 5 cm high. This classification is highly generalized, and all four categories are connected by intermediate crust types.

NWSTF Boardman is located on the Columbia Plateau in a cool semi-desert environment and as such, biological soil crusts are primarily in a rolling morphology. Biological soil crusts are extremely important to soil stability. Crust disruption often destabilizes underlying soils, leaving adjacent crusts vulnerable to burial by wind and water-moved sediments. When soils are moist, the large filamentous cyanobacteria can respond to burial by moving up to 5 mm every 24 hours. When dry, these organisms are not able to move. Burial kills non-mobile photosynthetic components of the crust, including mosses, lichens, green algae, and smaller cyanobacteria (Campbell 1979). All studies of wind erosion indicate that disturbed soils are more susceptible to wind erosion than undisturbed soils when dry. When crusts are crushed or absent, soil particle movement is initiated at lower wind speeds, as resistance to wind erosion increases with better soil crust development. Well-developed crusts (with lichens and mosses) on both silt and sandy soils have 2 to 130 times greater resistance to soil erosion than less well-developed crusts or bare soil (Williams et al. 1995b; McKenna-Neuman 1996; Belnap and Gillette 1997, 1998; Leys and Eldridge 1998). Because of this, soil crusts also play an important role in habitat quality.

2.6.4 Habitat Types

Habitat types are units that can be mapped with discrete characteristics. They also provide a specific set of components important as life requisites for specific wildlife species. The wildlife habitat types described in this section were classified based on their discrete structures and borders and mapped via ground-truthing studies and aerial photograph interpretation. Orthophotographs were digitized in the 1990s and registered using six known elevation and location points distributed across the facility. These maps (Figures 2-10 through 2-19) are presented in this chapter as the best available data. However, habitat changes in the last thirty years have made the maps inaccurate if not obsolete. These changes include the termination in 2002 of grazing and farming leases and large fires that occurred in 1998, 2007, and 2008. These events resulted in changes to vegetation that likely affect wildlife habitat. The maps have been included in this INRMP as a historical perspective. New habitat mapping efforts are recommended.

Ten major habitat types were identified and mapped for this project in 2012 and have not been updated since 2012. Most habitat types were based loosely on the plant communities described in section 2.6.3 using vegetative structure and floristic composition as classification parameters. The buckwheat and matchweed communities were considered too small and too indistinguishable in aerial photographs to be considered in the habitat mapping. Figures 2-12 through 2-21 provide the historical maps showing the distribution of the habitat types (based on the 1990s information–see discussion above). Each habitat type is described below:

Sagebrush - Sagebrush stands, comprising about 7,415 acres, can be found throughout much of the facility, but are most prevalent in and near Juniper Canyon. Sagebrush can be structurally separated into a lowland type of larger plants with an understory of cheatgrass or sandy bare ground, and a structurally shorter upland type with lichen typically covering the understory. Birds such as the black-billed magpie, Brewer's blackbird, lark sparrow, and loggerhead shrike appear to prefer the larger lowland sagebrush, while the sage sparrow and Brewer's sparrow may prefer the upland sage.

Bitterbrush - Antelope bitterbrush dominates (2,555 acres) the sandy-soiled region in the northern edge of the facility. Structurally it can become very tall (>six feet) and is sometimes co-dominated with gray rabbitbrush. The larger bitterbrush plants provide nesting habitat for black-billed magpies, black-throated sparrows, and loggerhead shrikes, and perching habitat for burrowing owls. It also provides important cover for black-tailed jackrabbits and northern sagebrush lizards.

Bunchgrass - Bunchgrass habitat types include areas on the central and northern portion of the facility, dominated by western needle-and-thread grass, and on the southern end by bluebunch wheatgrass. Bunchgrass habitats cover approximately 12,100 acres of the facility. Portions of these habitats have been purposely historically protected from grazing and have provided past opportunities to compare wildlife use in grazed versus un-grazed areas. Wildlife species typically found here include the grasshopper sparrow and Washington's ground squirrel.

Open Low Shrub - The low shrub habitat type (9,150 acres) includes areas throughout the facility dominated by gray rabbitbrush, although green rabbitbrush and matchweed may comprise a significant portion of the shrub component. The presence of rabbitbrush on the facility, extensive in some areas, is largely a result of past fires as both rabbitbrush species are fire-tolerant (Daubenmire 1970), especially compared to other dominant shrubs. The black-tailed jackrabbit, northern pocket gopher, gray partridge, and western meadowlark are among the dominant wildlife species found here.

Annual Grass/Forb - Annual grass/forb habitats are the areas on the facility dominated by cheatgrass, or codominated with the perennial Sandberg's bluegrass, usually associated with weedy forbs such as lance-leaf scurf-pea, fiddleneck tarweed, Jim Hill mustard, whitlow-grass, and hairy plantain. These are the most extensive habitats comprising nearly one-third (15,600 acres) of the facility. These habitats typify areas that were once heavily disturbed by grazing or have invaded sandy areas that they have subsequently stabilized. This habitat type provides nesting habitat for long-billed curlews, burrowing owls, horned larks, and western meadowlarks, and Great Basin pocket mice are very common here.

Juniper - The juniper habitat type includes both the small juniper "forest," found in the Juniper Canyon, and the scattered juniper trees, found on the periphery of Juniper Canyon and the western edge of the facility. In 1999, there were 188 mature juniper trees found on the facility (because most junipers are scattered and largely fall within another habitat type, acreage was not calculated). While of these trees have since died, a number of young junipers have been found (J. Miller pers. observations, 2006), and therefore, a new survey of junipers was executed in 2018 and the survey results are currently being updated for inclusion in this INRMP. Junipers provide nesting habitat for Swainson's hawks, ferruginous hawks, ravens, long-eared owls, western kingbirds, and black-billed magpies. They also provide shade for mule deer and cover for porcupines.

Ponds - There are three ponds on the facility (see Section 2.5 and Figure 2-7).

Human Structures/Disturbed - There are numerous building complexes on the facility: (1) the current headquarters with a prefab office building; (2) a Quonset hut, large shop, and observation tower; (3) the old headquarters with two storage buildings; (4) a large shop at headquarters and (5) a barn on the south central border. In addition, there is a single observation tower remaining in the southeastern corner of the target area that has been used for several years by nesting ravens. Facilities that were removed in 2002 include a sheep camp with small camper trailers and sheep sheds and a mobile home with horse corrals and a tack shed. The old headquarters compound in the northwest corner of the range was demolished and removed in 2009. While some of these dwellings provide habitat for a variety of non-native pests such as starlings, house sparrows, and house mice, they also provide nesting habitat for kestrels and barn swallows and cover for Nuttall's cottontails. Disturbed soil areas include the old moving target indicator track, the main bulls-eye, the cattle corrals, and former used weapons accumulation areas. Together, the structured and disturbed soil areas comprise about 145 acres.

Agriculture (Croplands) - Two agriculture cropland parcels, totaling 240 acres, were previously leased to local farmers for producing crops and stabilizing blowing sands (agricultural outleasing was closed in 2002 for unexploded ordnance safety requirements). Approximately 175 acres of these parcels were circle irrigated with the remaining area composed of shrub-steppe. This habitat has not been studied on the facility to determine wildlife use. Since 2002, several annual plant species have been recolonizing the former agricultural fields.

Dune - Dune habitats, found mostly on the north central end of the facility and within central Juniper Canyon, comprise about 210 acres. Sagebrush lizards are commonly found along the dune edges.

Alkali - Alkali habitats, totaling approximately 45 acres, occur in southern Juniper Canyon and at Well Springs. These habitats, devoid of vegetation, are described in further detail under the Geology and Soils section. The short-horned lizard is one of the few wildlife species found here.

2.6.5 Fauna

Fish

NWSTF Boardman has no water bodies that support any fish species.

Figure 2-10. Habitat Types, Map 1

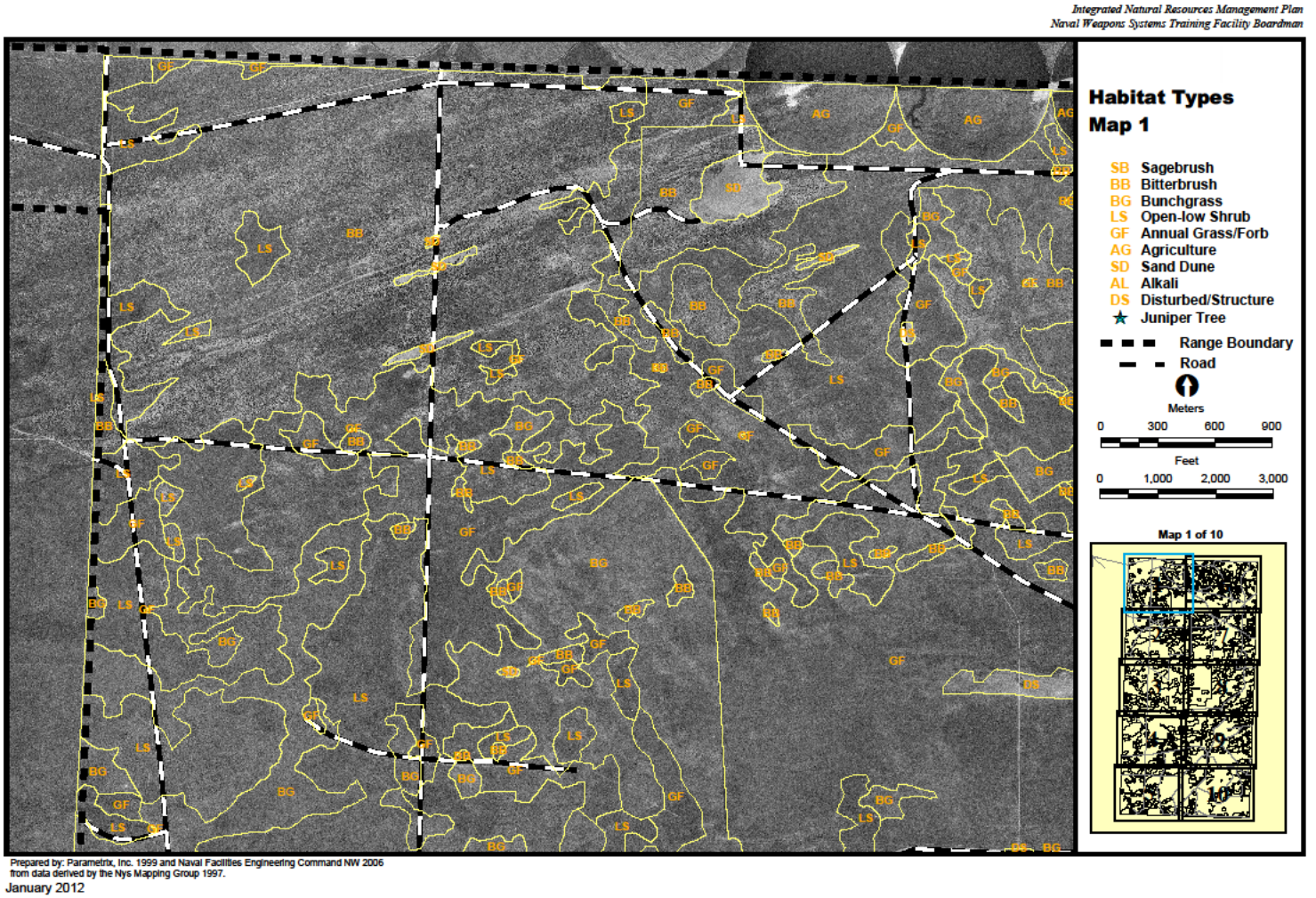


Figure 2-11. Habitat Types, Map 2

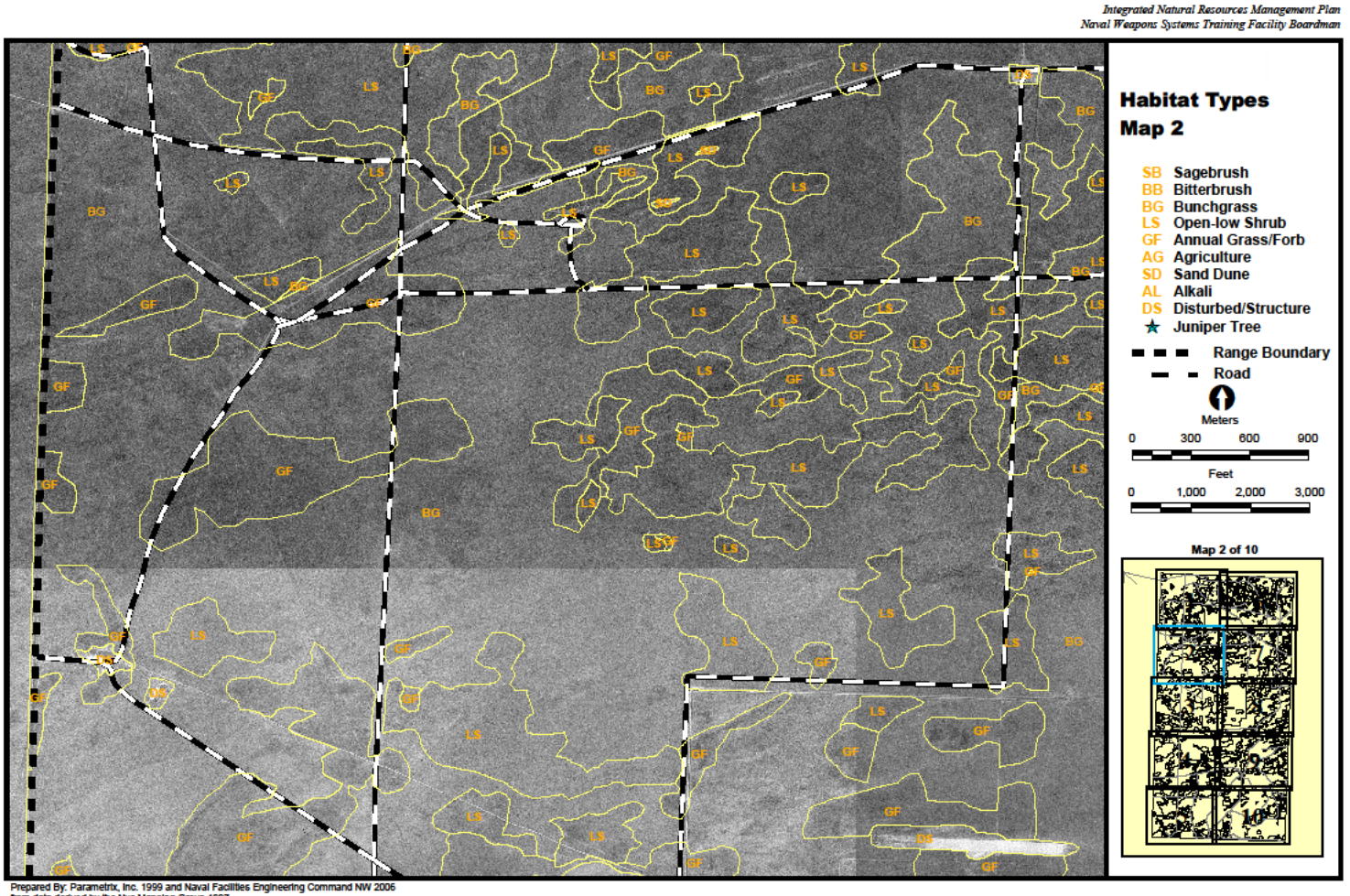


Figure 2-12. Habitat Types, Map 3

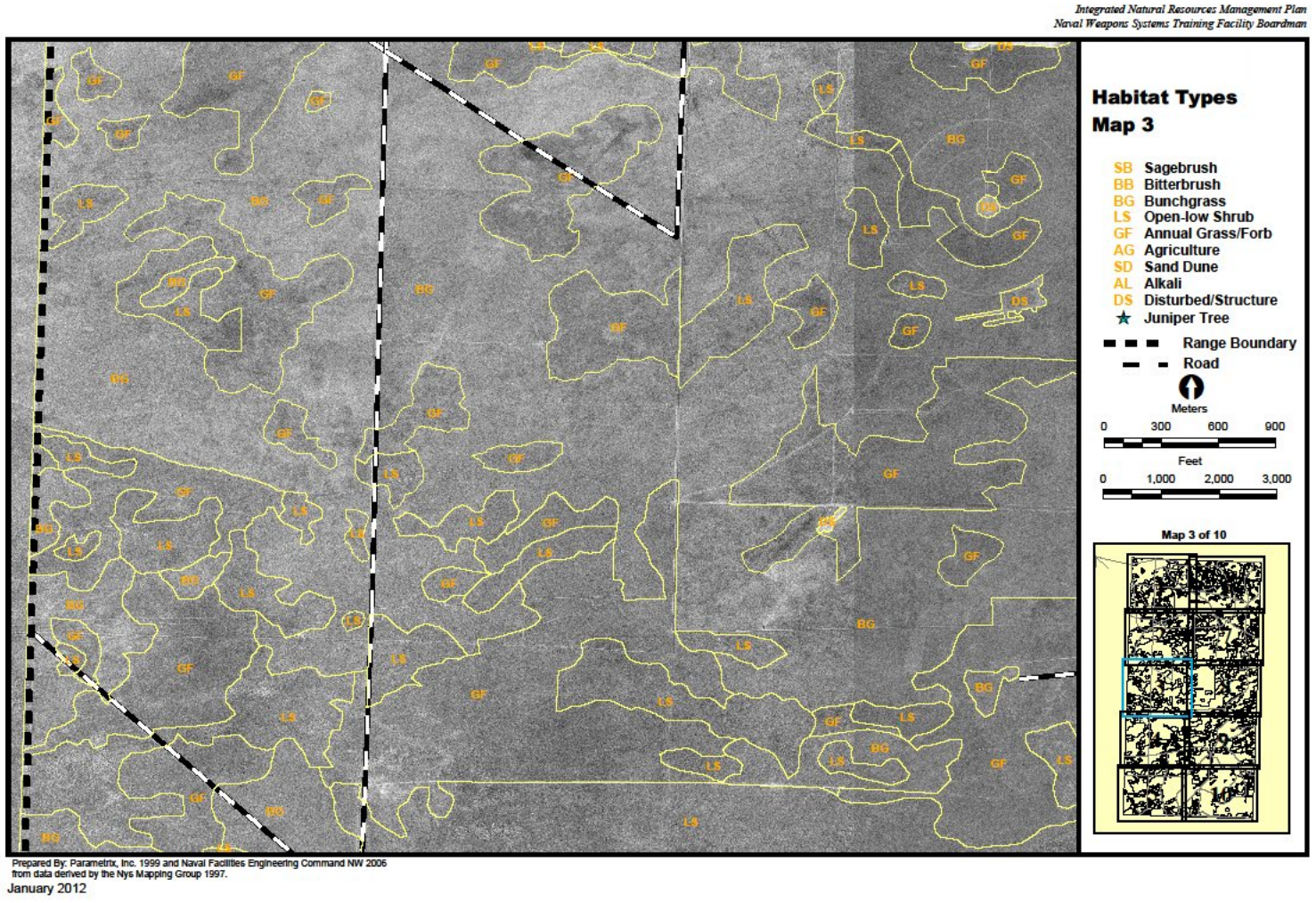


Figure 2-13. Habitat Types, Map 4

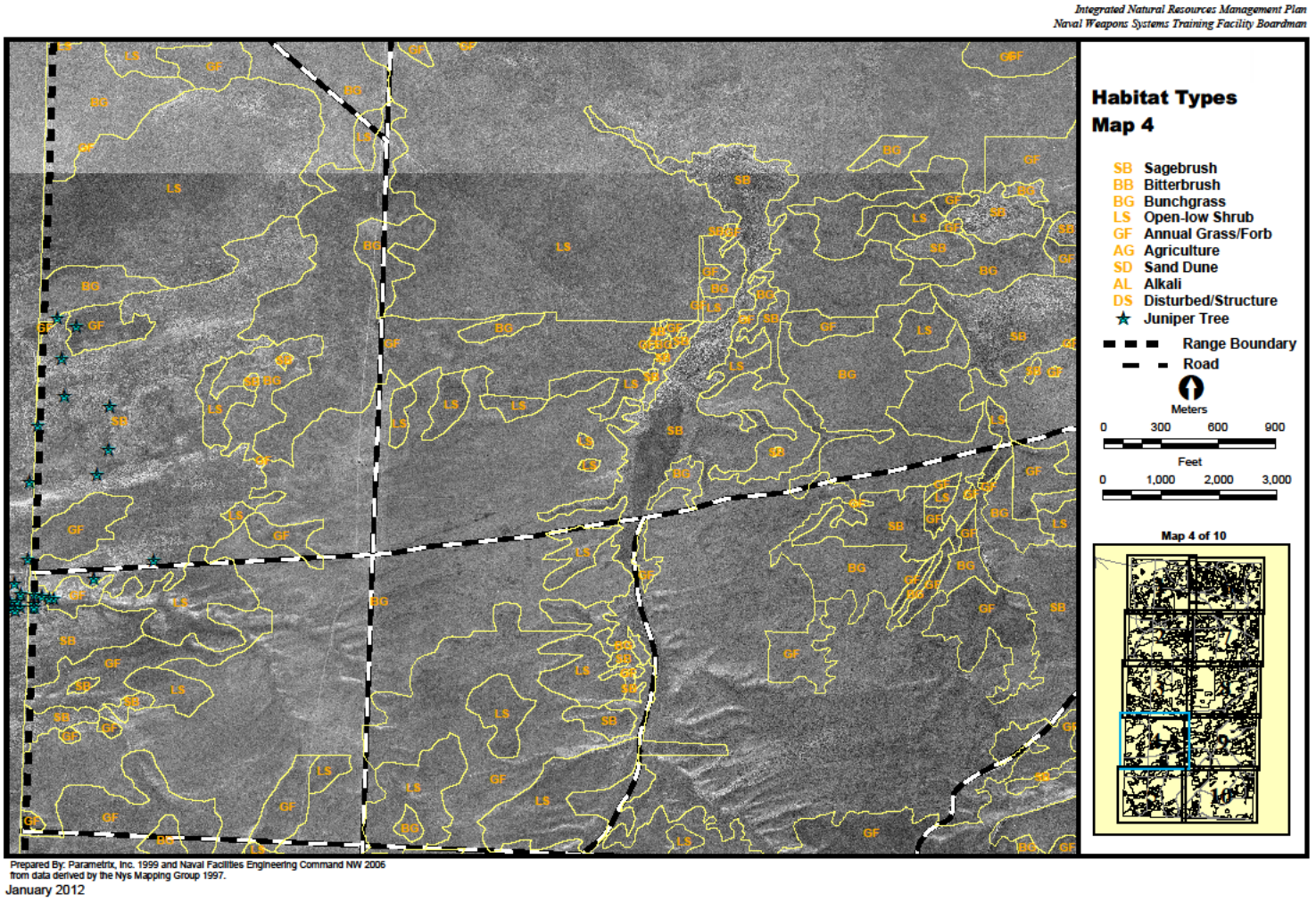


Figure 2-14. Habitat Types, Map 5

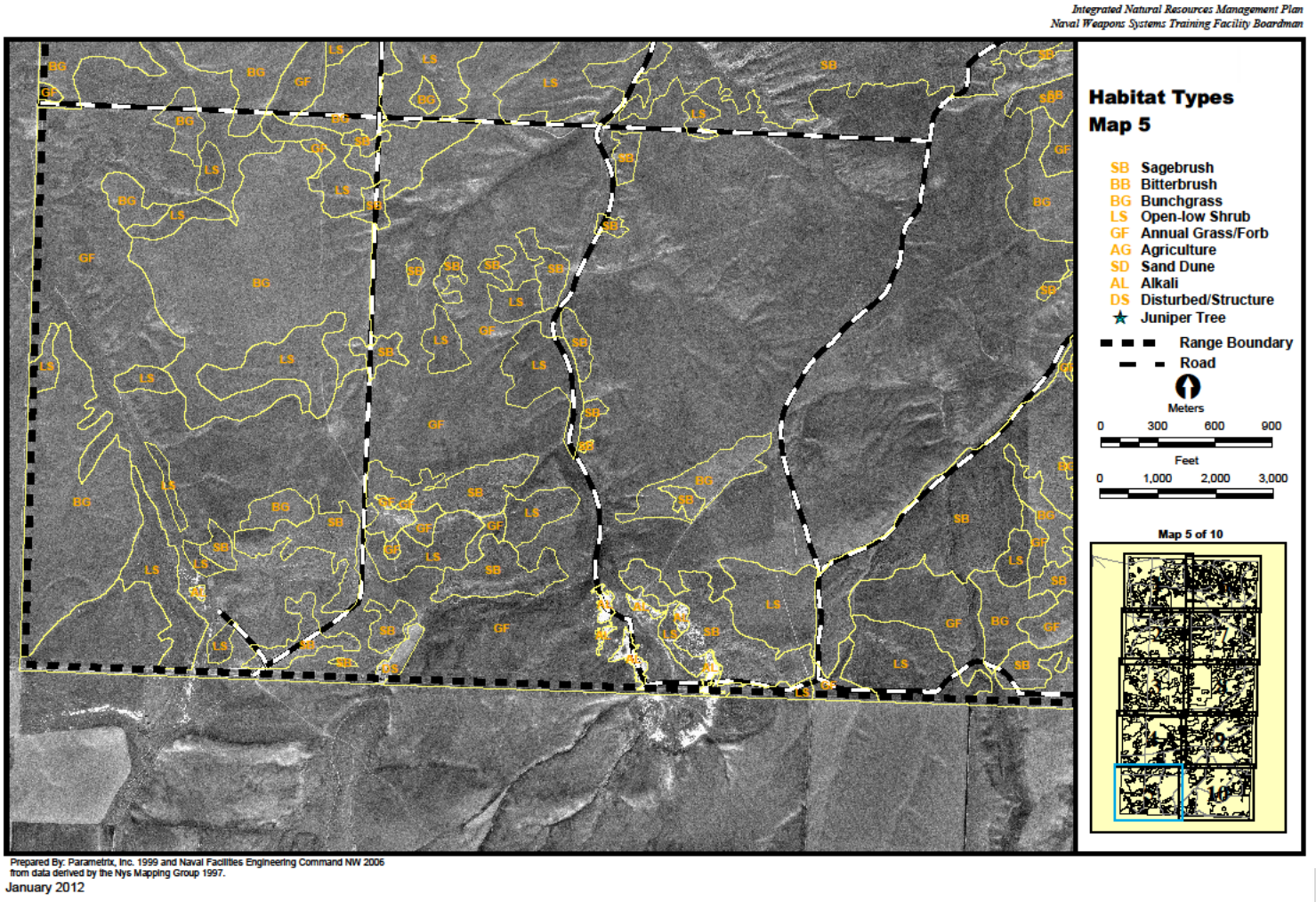


Figure 2-15. Habitat Types, Map 6

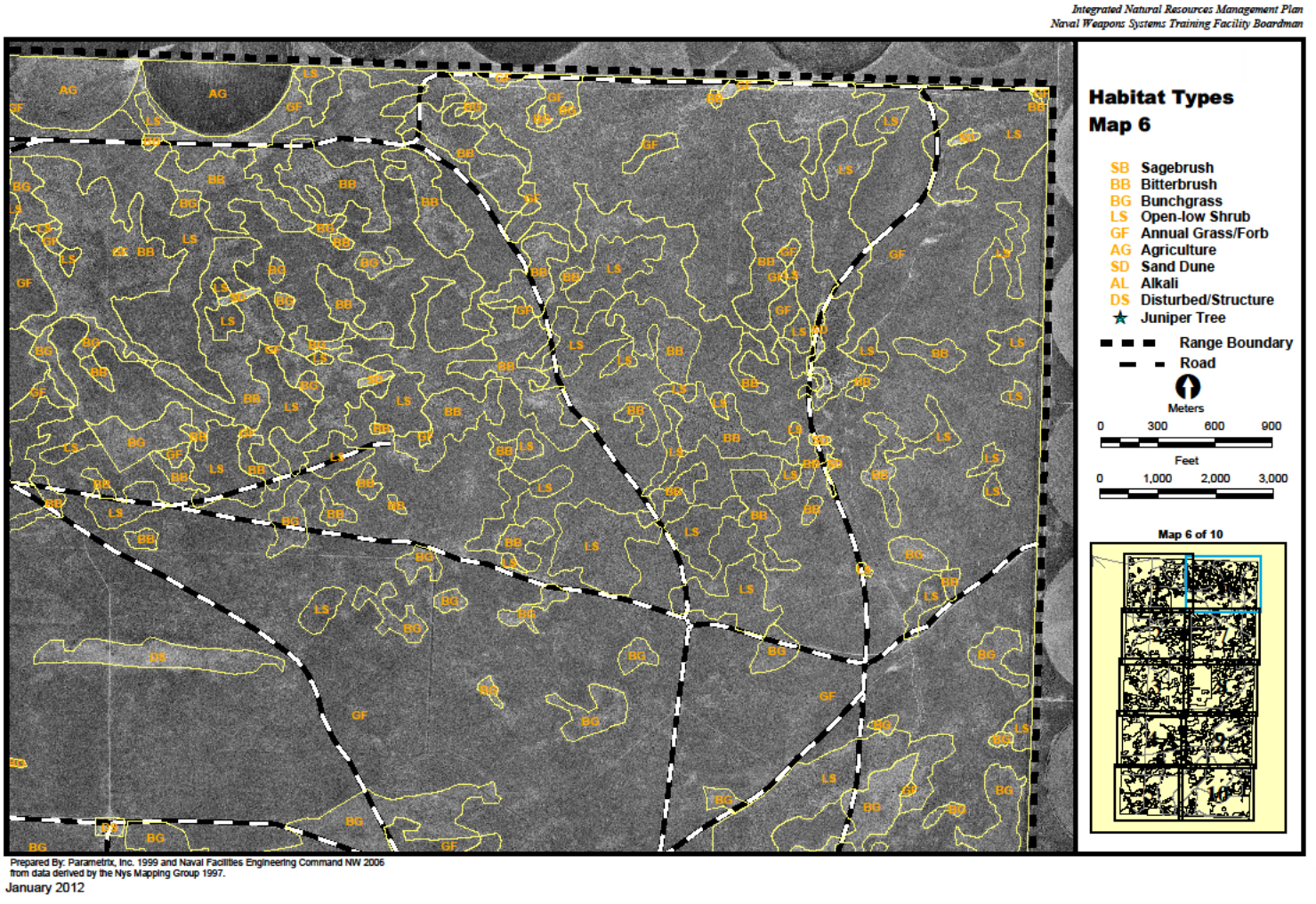


Figure 2-16. Habitat Types, Map 7

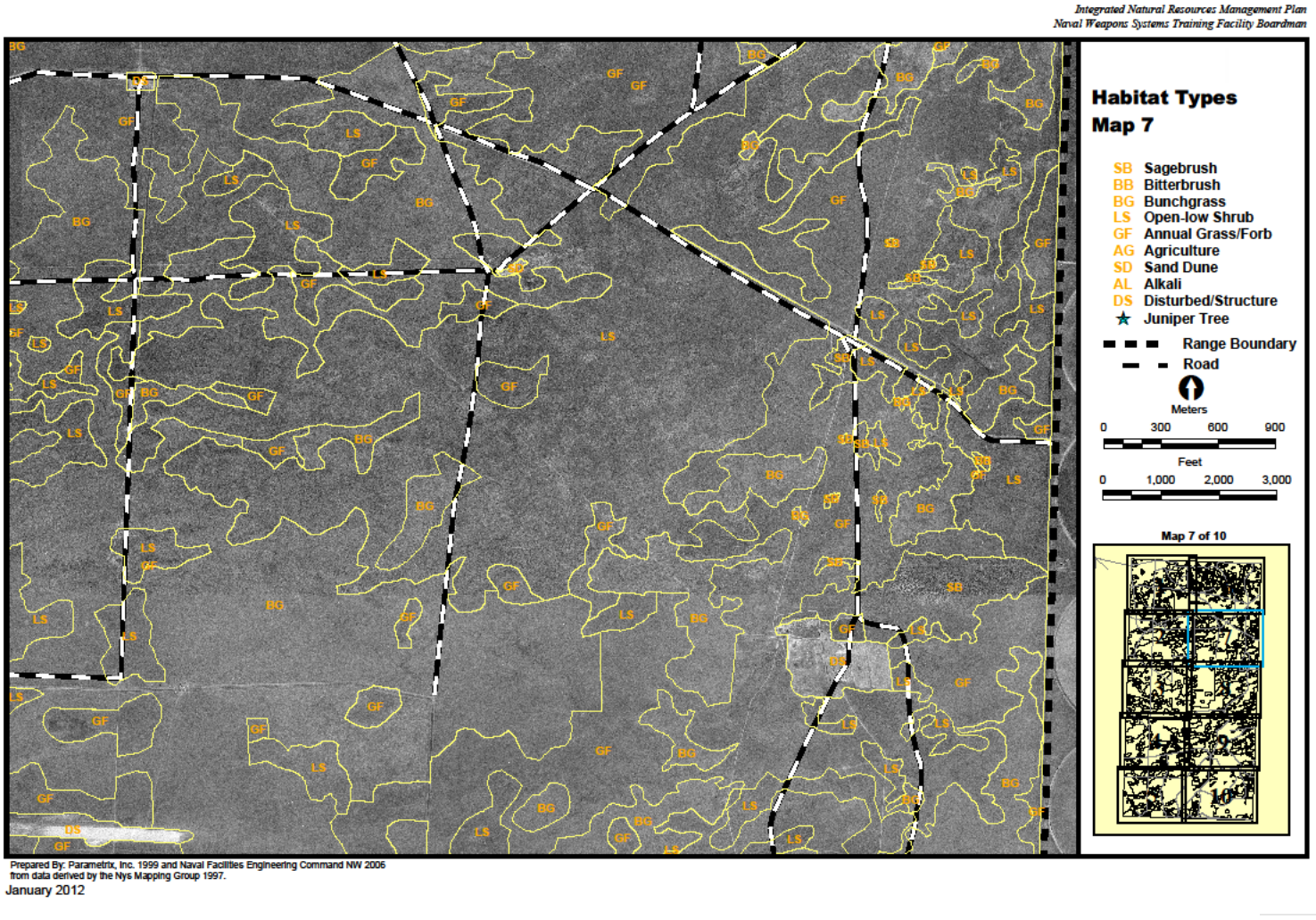


Figure 2-17. Habitat Types, Map 8

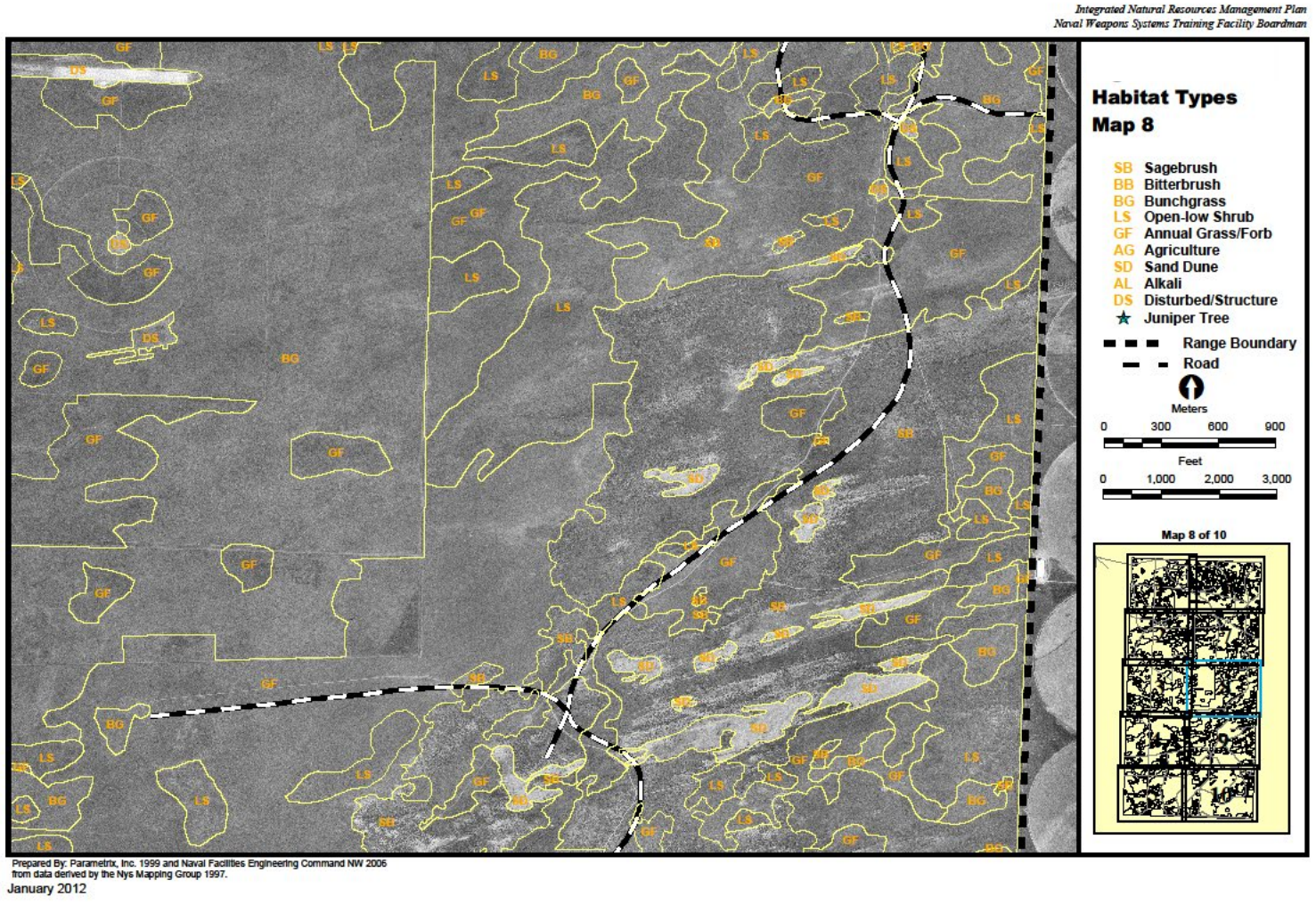


Figure 2-18. Habitat Types, Map 9

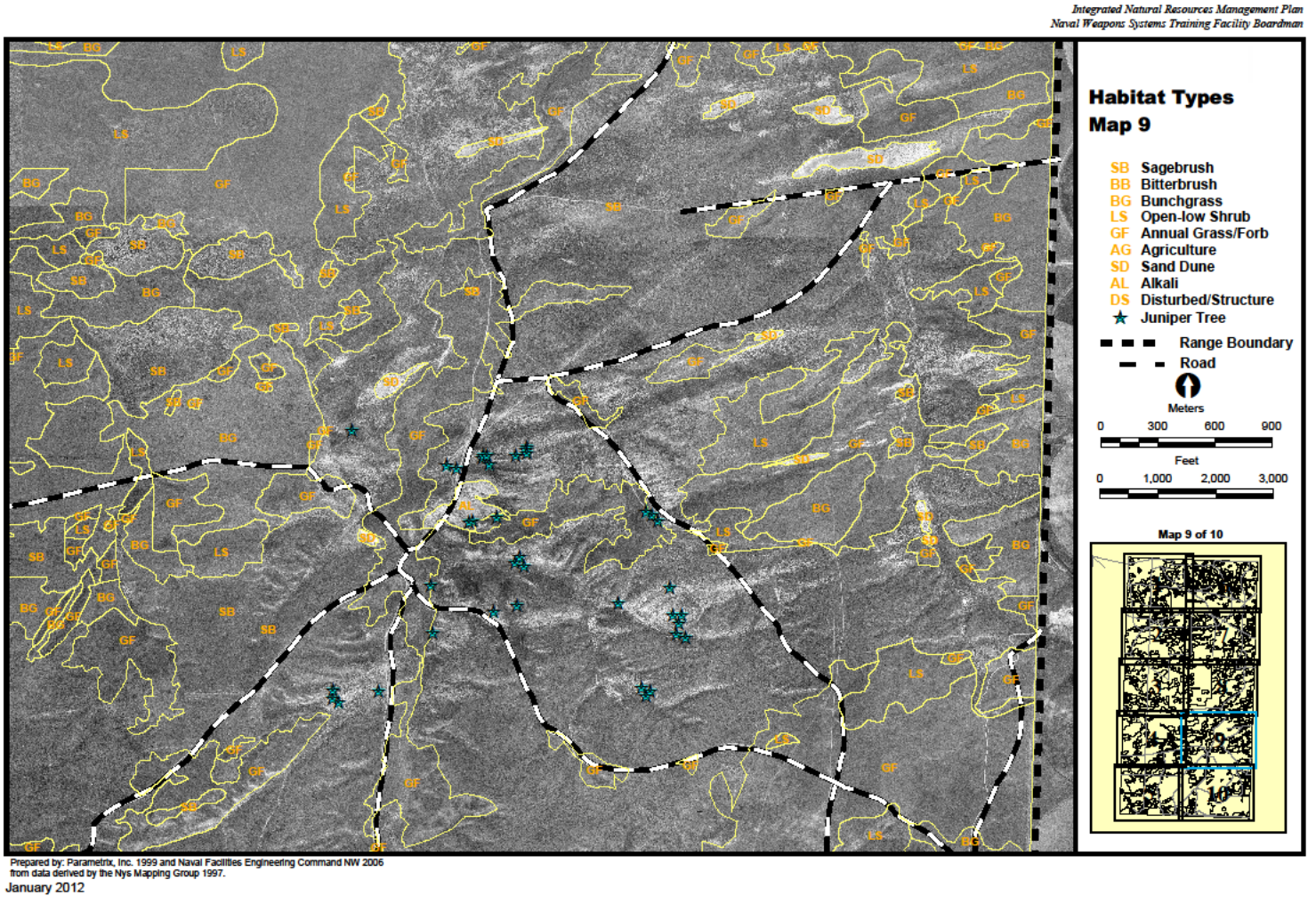
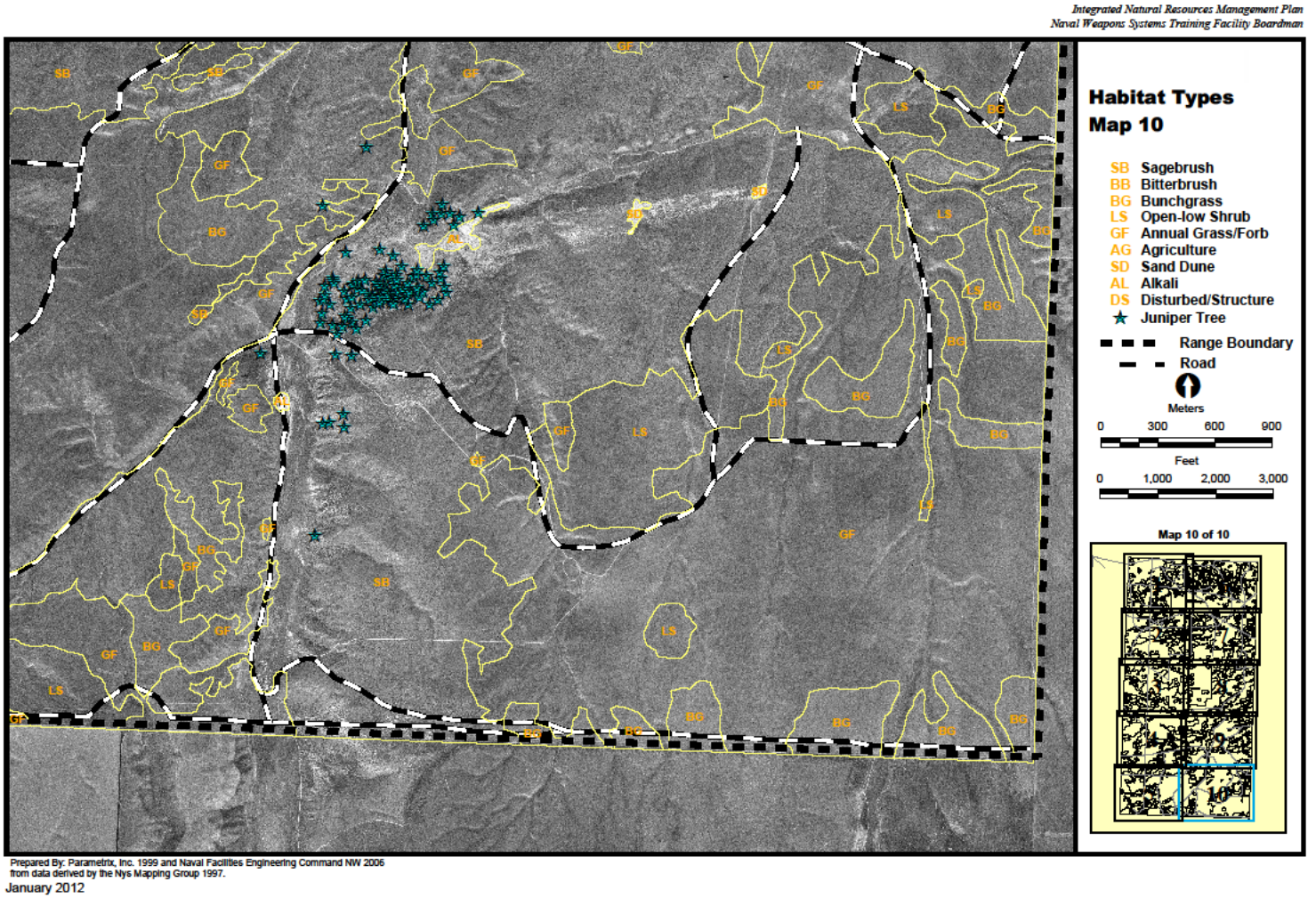
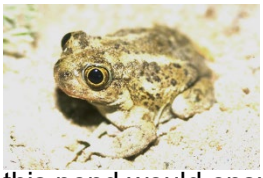


Figure 2-19. Habitat Types, Map 10



Amphibians

One amphibian, the Great Basin spadefoot toad (*Spea intermontana*), occurs on the facility. Great Basin spadefoots occur primarily in shrub-steppe. A variety of aquatic habitats are used for breeding including slow flowing springs, seasonal pools, irrigation ditches, and ponds. Spadefoots are nocturnal and completely terrestrial, only returning to water for breeding. Spadefoots presently utilize only intermittent ponds that develop in Juniper Canyon during wet years for breeding. Spadefoots utilized Toad Pond while it functioned, and the relevance of the loss of this pond is that a perennial breeding area for this amphibian has been removed. Returning function to this pond would ensure a perennial habitat for spadefoot breeding, especially during years where intermittent water fails to provide successful breeding habitat. Spadefoots are adapted to survive in arid climates by spending long periods of time buried under ground, and therefore, can suffer mortality when surface and subsurface soils are crushed. They are able to quickly bury themselves in loose soils by using their hind legs in a circular motion to back into the soil. They can remain buried for months at a time and can tolerate high levels of water loss. Spadefoot activity is reported to be primarily associated with rains and periods of high humidity; however, in many areas of the Columbia Basin, it is common to find individuals on roads at night without precipitation.



Great basin spadefoots start breeding in late March in the Columbia Basin. Typically, all breeding is completed in a period of a few days. Breeding duration at each site varies with conditions such as water temperature and hydro-period. Eggs hatch typically in 2-3 days, but development can take longer if water temperatures are cooler. Tadpole development typically takes 1-2 months, but can accelerate under high temperatures if pool evaporation threatens to strand developing larvae. Spadefoots remain active until late October-early November.

Reptiles

Three lizards and three snakes have been verified as occurring on the facility (Table 2-4).

Table 2-4. Reptiles known to inhabit NWSTF Boardman.

Short-horned Lizard (GF, SB, SD, AL)	Racer (GF, BG, LS, BB, SB, JU)
Northern Sagebrush Lizard (SB, BB, SD)	Gopher Snake (GF, BG, LS, BB, SB, JU)
Side-blotched Lizard (GF, SB)	Western Rattlesnake (GF, SB)

Habitat Types: GF = annual grass/forb, BG = bunchgrass, LS = open low shrub, BB = bitterbrush, SB = sagebrush, JU = juniper, SD = sand dune, AL = alkali.

Short-horned Lizard - The distinctive short-horned lizard, commonly called a "horned toad," is occasionally observed on the facility. This lizard may be more common on the facility than is apparent because their cryptic color patterns make them difficult to detect. Although short-horned lizards may occur anywhere on the facility where there is soil loose enough for them to burrow, they have been most often observed in open sagebrush communities in the vicinity of Juniper Canyon (especially the south half) or in the sandy bitterbrush community of the north end of the facility. Short-horned lizards are vulnerable to being crushed from surface and subsurface soil compaction. Many of the sightings have been of the animals on the roads, especially on the old Oregon Trail. Several horned lizards have been found skewered on barbed wire or dead sagebrush by loggerhead shrikes, a major predator of this species on the facility. Short-horned lizards commence breeding immediately following emergence from hibernation in spring, but do not bear young until late summer or early fall. Grasshoppers, crickets, harvester ants, and beetles are important prey items for this species.

Northern Sagebrush Lizard - Northern sagebrush lizards are the most commonly observed and probably the most ecologically important reptile on the facility due to their high population levels and source of food for predators. Their importance at NWSTF Boardman led to targeting this species for special study in 1995 (Green et al. 1995). The results of the 1995 study on the facility showed that sagebrush lizards were found almost exclusively in big sagebrush or bitterbrush shrub communities with an approximate 50-60 percent of sandy bare ground. They largely avoided areas of high grass, litter, and lichen coverage. In general, sagebrush lizards were found where large shrubs covered semi-active dune systems. A sensitive species survey for sagebrush preferring species was conducted in 2009 by Oregon State University and The Nature Conservancy after the 2008 wildfire that burned much of the remaining sagebrush habitat (The Nature Conservancy 2009). Many detections of sagebrush lizards were recorded mostly in and around the remaining unburned patches of sagebrush habitat (see Figure 2-20 and Appendix D for full report). Figure 2-22 shows the distribution of this lizard on the facility.

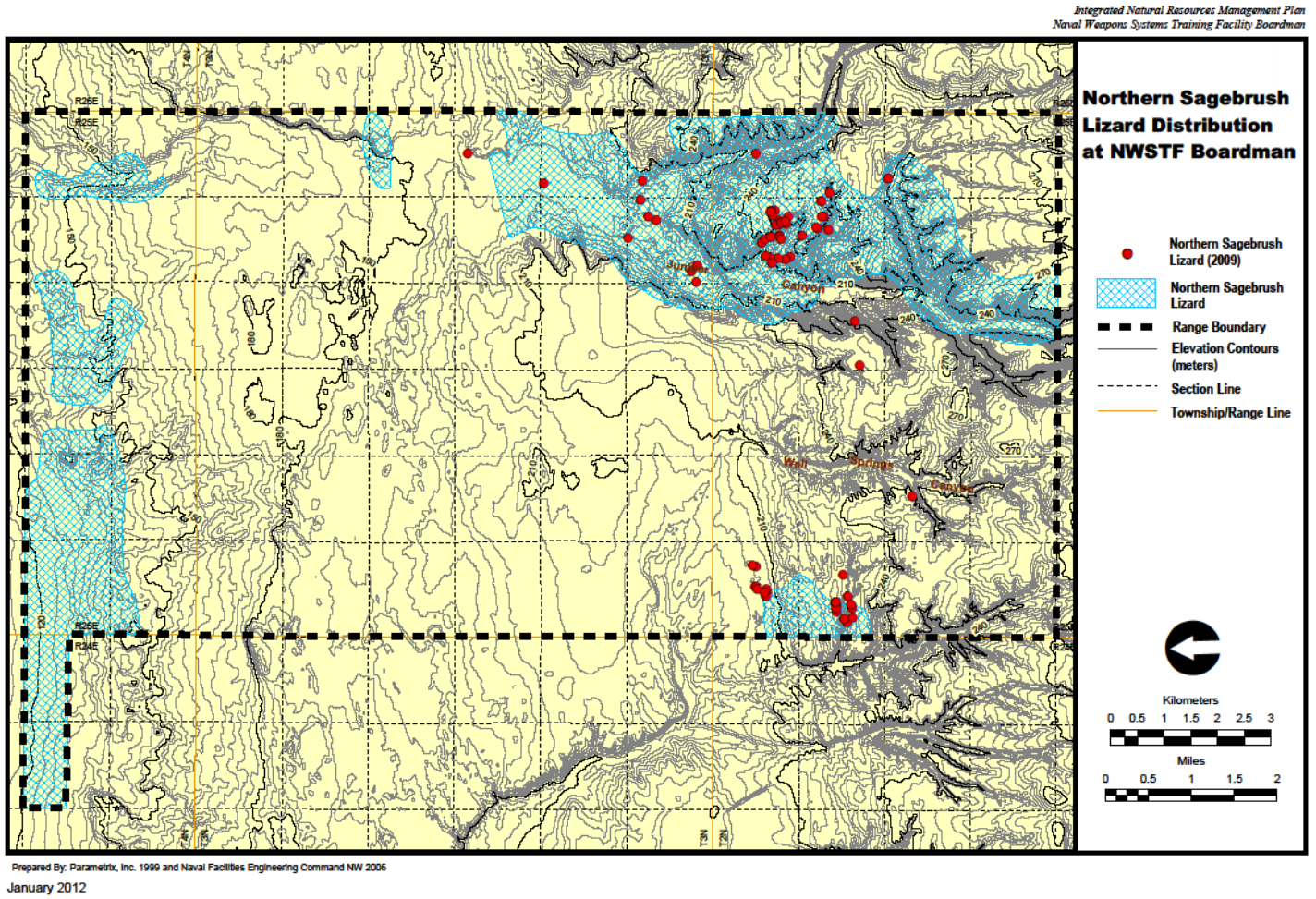
Observations of lizards skewered on barbed-wire fences indicate that the loggerhead shrike is an important predator of sagebrush lizards. Sagebrush lizards are also probably important in the diet of racers, gopher snakes, and possibly American kestrels. Green et al. (1993) did not find sagebrush lizards in local owl diets, possibly because the lizards are highly diurnal (and the owls are not).

Side-blotched Lizard - Side-blotched lizards occur at four small, isolated populations on the facility. In all cases, they have been found in association with road cuts where they used exposed rodent and arthropod burrows for cover. Two of the populations were also associated with sagebrush. A population along Juniper Canyon Road near the Oregon Trail crossing is probably more associated with adjacent rocks than the actual road cut. Ants, beetles, true bugs, grasshoppers, and spiders dominate the diet of this species.

Racer - The racer is relatively common inhabitant of the facility. It has been observed in the cheatgrass and bitterbrush habitats on the north end of the facility and in the sagebrush habitats of Juniper Canyon. This fast-moving snake feeds primarily on large insects (especially grasshoppers), small lizards, and mice (Brown and Parker 1982, Nussbaum et al. 1983). Northern sagebrush lizards are probably an important prey item.

Gopher Snake - Gopher snakes are the most commonly observed snake on the facility. These generally diurnal snakes feed largely on mice (Brown and Parker 1982, Diller and Johnson 1988) and have been found in all habitat types on the facility. As described elsewhere (Nussbaum et al. 1983), these snakes spend half or more of the year wintering in abandoned mammal burrows. Females also nest in abandoned mammal burrows, sometimes communally with other gopher snakes or other snake species (Nussbaum et al. 1983).

Figure 2-20. Northern Sagebrush Lizard Distribution an NWSTF Boardman



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Western Rattlesnake - Grazing lessees have described occasional encounters with western rattlesnakes on the facility, and G. Green photographed a large adult at a rock outcrop in south Juniper Canyon in May 1995. It is unlikely that this species is common on the facility; its distribution is limited by the sporadic presence of rock outcrops. Like other local snakes, it spends over half the year in winter dens, commonly with other snakes. Local rattlesnakes probably feed largely on ground squirrels and mice (Diller and Johnson 1988).

Mammals

At least 20 species of mammals occur on the facility, 18 of which are expected to breed and occur year-round (Table 2-5). Because of the lack of detailed habitat use information available on the smaller species and the wide range of habitat use by the larger species, habitat use by mammals was not quantified.

Table 2-5. Mammals Known to Inhabit NWSTF Boardman.

Vagrant Shrew	Sagebrush Vole
Black-tailed Jackrabbit	Montane Vole
Nuttall's Cottontail	House Mouse
Washington Ground Squirrel	Porcupine
Northern Pocket Gopher	Red Fox[1]
Great Basin Pocket Mouse	Coyote
Ord's Kangaroo Rat	Long-tailed Weasel
Western Harvest Mouse	Badger
Deer Mouse	Rocky Mountain Elk[1]
Northern Grasshopper Mouse	Mule Deer
Bushy-tailed Woodrat	Pronghorn Antelope

[1]Probably not breeding at NWSTF Boardman.

Vagrant Shrew - The presence of the vagrant shrew on the facility is based upon one found in the diet of a pair of burrowing owls nesting on the north end of the facility in 1981 (G. Green, unpubl. data), and two found in the diet of Juniper Canyon barn owls in 1997 (see Appendix D for details). This shrew is perhaps the most ubiquitous shrew in the Pacific Northwest, using a wide variety of habitats. However, the arid shrub-steppe habitats occurring on the facility is unlikely to support significant populations of this species due to lack of water.

Black-tailed Jackrabbit - The black-tailed jackrabbit is one of the more common mammals on the facility, especially during years of peak densities. Like other hares, black-tailed jackrabbit populations fluctuate greatly over an approximate six-to-ten year cycle (Gross et al. 1974).

Black-tailed jackrabbits are largely distributed throughout the facility wherever bitterbrush, sagebrush, and rabbitbrush cover occurs. Previous studies (Orr 1940, Lechleitner 1958) have shown that jackrabbits commonly forage at night in grasslands, then retreat back to shrub habitats by day. These rabbits are generalist herbivores, but are regionally selective. A majority of publications identify forbs and grasses are most important to the diet during the spring, while shrubs become important during the fall and winter. Although apparently not highly preferred, Sandberg bluegrass was also found in the diet in bitterbrush communities. Stewart and Hull (1949) have suggested that jackrabbit grazing, especially during peak densities or in combination with livestock

grazing, can strongly influence the development and maintenance of cheatgrass cover by removing perennial grasses and preventing them from invading cheatgrass communities.

Black-tailed jackrabbits likely constitute the major food source for coyotes, golden eagles, ferruginous hawks, and winter populations of rough-legged hawks on facility, and somewhat important to the diet of Swainson's hawks (Stoddart 1970, Wagner and Stoddart 1972, Smith and Murphy 1973, Platt 1976, Fitzner et al. 1977). The annual use of the facility by relatively high numbers of immature golden eagles is probably directly attributable to the presence of jackrabbits. Furthermore, a decrease of nesting by ferruginous hawks on facility in 1995 might also be attributed to the very low densities of jackrabbits that year. Recent large mammal surveys have indicated that jackrabbit populations have been drastically reduced (ODFW pers. comm. 2020).

Nuttall's Cottontail - The Nuttall's cottontail is relatively common on the facility, especially around buildings, stockpiles, and used munitions accumulation areas, which they use for shelter. This rabbit is also common in the dense sagebrush areas of south Juniper Canyon where they inhabit abandoned badger burrows, especially in road cuts. They have also been found sheltering under caliche (hard calcareous deposits) extrusions in Juniper Canyon. Nuttall's cottontails are not known to excavate their own underground burrows (Chapman 1975). Orr (1940) found that while these cottontails preferred grass over all other vegetation in the spring and early summer, sagebrush and juniper were important the remainder of the year, which may account for the rabbit's presence in south Juniper Canyon. Golden eagles, Swainson's hawks, ferruginous hawks, and coyotes are likely the major predators of cottontails on the facility.

Washington Ground Squirrel - The Washington ground squirrel inhabits arid sagebrush and grassland regions of the Oregon and Washington Columbia Plateau (Rickart and Yensen 1992). Their range is restricted, however, to the sandy soil regions of the Columbia Basin south and east of the Columbia River (Bailey 1936, Howell 1938). Washington ground squirrels are an important component in the diet of local predators, especially badgers, ferruginous hawks, and golden eagles (G. Green, pers. obs.). Presently, one of the largest collection of colonies occurs at NWSTF Boardman (Quade 1994), where it has become a focal species in recent years.

Olterman and Verts (1972) concluded that this species no longer occurred in Oregon based on a 1971 search. However, Rohweder et al. (1979) "rediscovered" the squirrel on NWSTF Boardman in 1978. In the following year, Carlson et. al. (1980) found 17 colonies in Oregon, including several at NWSTF Boardman. Ten years later, Betts (1990) confirmed the presence of 35 colonies in Oregon, but he showed that most known historical sites in Oregon and Washington no longer support Washington ground squirrels. Quade (1994) followed up on the Carlson et al. (1980) studies and found squirrel densities at the original colony sites to be low. However, Quade (1994) did find Washington ground squirrels at 19 additional locations at NWSTF Boardman. Furthermore, Eric Greene (E. Greene, pers. com., Greene et. al. 2009) located and studied 59 colonies at NWSTF Boardman in 1996 and 1997 and found that the majority occurred in sagebrush habitats interspersed with bunchgrasses. A survey for Washington ground squirrels in the general vicinity of the proposed locations for potential Oregon National Guard range support facilities was conducted in the Spring of 2005 (NWC 2005). This survey identified a large number of potentially active burrows in the northern part of the installation.

Figure 2-23 shows a composite map of known Washington ground squirrel locations at NWSTF Boardman from a compilation of all incidental sightings, all recorded historic colony locations, and

the results of surveys conducted in 2006 by ODFW. Washington ground squirrels appear to prefer deep loamy soils for burrowing. The higher density of this species in the southern part of the NWSTF Boardman, as shown in Figure 2-21, likely corresponds to the presence of gradually deeper loamy soils (Warden soil – see Figure 2-6) toward the south on the range (Marr 2001, see Appendix C for full report). This region of the range also tends to receive a little more precipitation than areas farther north, which may also be a reason the population appears denser in the southern portion of the range. The blue dots in Figure 2-21 indicate locations where squirrels have been present in the past and are part of regular survey efforts. In some cases, the dots represent colonies. In other cases, they represent only an incidental sighting, where there may be a colony.

Several recent graduate researchers studied Washington ground squirrels at NWSTF Boardman. Klein (2005) investigated dispersal patterns of Washington ground squirrels and found that juvenile male dispersal ranged from 40-3521 m. from the natal burrow with an average dispersal distance of 880 m. (see Appendix C for full report). Delavan (2008) studied Washington ground squirrel home range size and movement patterns on NWSTF Boardman and surrounding areas and found that core use areas for individual squirrels ranged from 46-8181 m^2 and home range size ranged from 435-77,021 m^2 (see Appendix C for full report).

Results of the above studies indicate that (1) Washington ground squirrel populations have rebounded at NWSTF Boardman after an apparent decline in the 1980s and early 1990s (probably due to drought conditions during those years) and (2) the facility supports the majority of Oregon's remaining populations of this squirrel. However, during a brief site visit in 1998, ground squirrel experts Drs. Paul Sherman (Cornell) and Eric Yensen (Albertson College, Idaho) were not encouraged by what they saw in terms of long-term survival of the species on the facility. To them, squirrel densities appeared low as compared to inhabited areas in Washington State.

Like most rodent species, Washington ground squirrel populations are expected to be regularly or intermittently cyclical based on environmental factors, both physical (precipitation, etc.) and biological (food quantity, diseases, etc.). Based on the results of previous survey work, dispersal distances, and home range size, it is reasonable to assume the all of NWSTF Boardman is suitable Washington ground squirrel habitat (especially during high years of a population cycle). At lower ends of a population cycle, it would be expected that the species use of NWSTF Boardman would shrink into “core” areas that provide higher quality and more stable habitat during those less than optimal conditions. Maintaining habitat quantity and quality for both end of the population cycles is vitally important to maintaining a long-term viable Washington ground squirrel population at NWSTF Boardman and adjacent suitable habitat.

Washington ground squirrels are important components of ecological ecosystems. Washington ground squirrels are a prey base for predator food chains, reduce soil compaction, loosen and aerate soils, and increase the rate of water infiltration into soil. Additionally, they increase soil fertility, bring nutrients from deep soil layers to the surface, increase plant productivity, increase plant diversity by bringing buried seeds near the surface, and increase diversity of microhabitats. Predation of Washington ground squirrels by badgers creates burrows that are reused by many species including snakes, lizards, ground squirrels, insects, and burrowing owls (USFWS 2011).

Washington ground squirrel surveys will be conducted at necessary repeated time intervals in order to determine the activity status of historical Washington ground squirrel sites. Using the ODFW monitoring protocol, surveys will provide information confirming species presence, geographic extent of active sites, estimates of burrow abundance at active sites, and can be compared to previous survey work for the species. Survey protocol can be found in Morgan and Nugent (1999) and Greene (1999) (see Appendix C for full reports). Further modifications of those survey

protocols may be made in coordination with ODFW and USFWS to adapt them to meet future monitoring goals.

On April 12, 2012, the Navy submitted a request for early conferencing to the USFWS for the purpose of determining the potential effects to the Washington ground squirrel from the Navy's proposed action to increase military readiness activities on the NWSTF Boardman in cooperation with the Oregon National Guard (U.S. Navy 2013). This formal conference was requested to streamline future compliance with section 7 of the ESA for the action should the Washington ground squirrel be listed under the ESA. USFWS provided a Conference Opinion in December 2013 (Appendix B). The Navy determined, and the USFWS agreed, that the impacts associated with the proposed military readiness activities at NWSTF Boardman are likely to adversely affect Washington ground squirrel. USFWS formatted the Conference Opinion to facilitate adoption as a Biological Opinion under appropriate circumstances should the Washington ground squirrel be listed under the ESA.

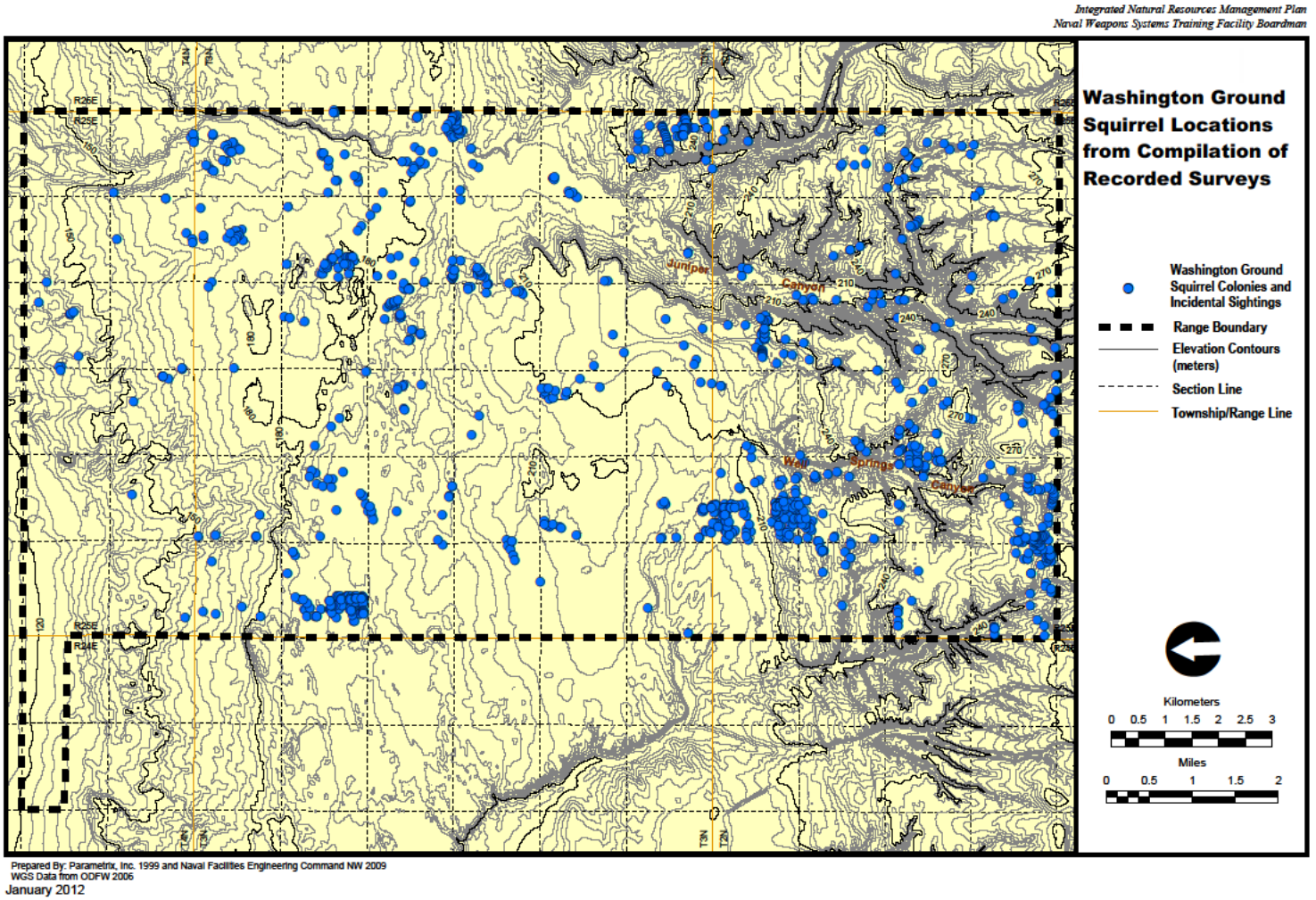
Northern Pocket Gopher - While no formal distribution or density surveys for northern pocket gophers have been conducted on the facility, they probably occur in all habitats except the highly arid sand habitats. This species has a very broad range of soil tolerance compared to other North American gophers (Miller 1964). It prefers easily-dug soils with large herbage yields (Reid 1973), especially succulent forbs, the preferred food (Chase et al. 1982). On the facility, pocket gophers appear to be most common in the sagebrush, rabbitbrush, and bunchgrass habitats (G. Green, pers. obs. 1998) where forb densities are high and vegetation roots help to prevent burrow cave-ins in the friable soils. They appear to be least common in the sandy bitterbrush and cheatgrass habitats and where a long history of livestock use has compacted the soils. Green et al. (1993) found pocket gophers to be five times more common in the diets of burrowing owls inhabiting silty loam soil habitats than in habitats underlain with loamy sand soils.

Green et al. (1993) found this species to contribute less than one percent of the frequency of burrowing prey captures in the Columbia Basin of both Oregon and Washington, but because of their relatively large body size, they contributed 20 percent of the biomass. Among mammalian prey alone, which accounted for 87 percent of the total biomass, gophers contributed approximately 50 percent of the biomass consumed. In addition, pocket gophers contributed nearly half of the total biomass of prey consumed by barn owls in Juniper Canyon in 1995 (G. Green, unpubl. data, see Appendix D for details). In addition to owls, pocket gophers are probably an important prey item for badgers (Criddle 1930) and ferruginous hawks (Fitzner et al. 1977).

Great Basin Pocket Mouse - Great Basin pocket mice are prevalent throughout the facility but most especially in the sandier soils in the north end where they comprised over 90 percent of the small mammal captures during studies conducted in the early 1980s (Green 1983, Small and Verts 1983, Verts and Carraway 1986). O'Farrell et al. (1975) and Rogers and Hedlund (1980) found similar numerical dominance by pocket mice in the shrub-steppe of south-central Washington. Several researchers have noted this heteromyid's preference for sandy soils (Dalquest 1948, O'Farrell et al. 1975, Feldhammer 1979). On the central and southern portions of the facility, pocket mice share their numerical dominance with western harvest and deer mice.

Green et al. (1993) found that the pocket mice clearly dominated the diet of burrowing owls inhabiting sandy soil habitats in the Columbia Basin. This was most evident from the portion of the database specific to the north end of NWSTF Boardman where pocket mice comprised greater than 90 percent of the owl's small mammal diet. They were also the most common small mammal in the diet of barn and long-eared owls in Juniper Canyon from 1995 to 1997, when they numerically comprised 46-75 percent of the total diets (G. Green, unpubl. data, see Appendix D for details).

Figure 2-21. Washington Ground Squirrel Locations from Compilation of Recorded Surveys



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In 1980, pocket mice comprised 86 percent of the long-eared owl diet (G. Green, unpubl. data, see Appendix D for details).

Annual variations in pocket mice populations are apparently strongly correlated with winter precipitation and its influence on seed resources, especially cheatgrass, the primary food resource for pocket mice in the Columbia Basin (Kritzman 1974), and perennial grasses such as western needle-and-thread and bluebunch wheatgrass. Insects are also important in the spring prior to seed ripening (Kritzman 1974, O'Farrell et al. 1975). Although pocket mice can be captured year-round, the majority of these mice are active only during the warmer 8-9 months of the year. Much of the late summer activity is limited to below-ground where the small mammals are able to conserve moisture and get their food from seed caches filled earlier in the year. Regardless of their temporal and spatial variation in numbers and activity, facility-wide they are ecologically and energetically the most important vertebrate. In addition to the owls mentioned above, gopher snakes, rattlesnakes, American kestrels, long-tailed weasels, and badgers probably prey heavily on pocket mice.

Ord's Kangaroo Rat - The commonality of Ord's kangaroo rats on the facility is a bit of an enigma. Trapping studies by Green (1983), Small and Verts (1983), and Verts and Carraway (1986) found Ord's kangaroo rats to comprise only one to two percent of all small mammals captured on the north end of the facility. However, studies of the diets of local owl populations suggest a higher contribution of the kangaroo rats to the small mammal community. Green et al. (1993) found Ord's kangaroo rats to comprise five to six percent of diet of burrowing owls in the Oregon Columbia Basin (from 1980 to 1981), including the north end of the facility. Diet studies conducted on owls inhabiting Juniper Canyon from 1994 to 1997 showed the annual contribution of kangaroo rats to the total small mammal diet of barn owls to range from two to twelve percent (G. Green, unpubl. data, see Appendix D for details). For long-eared owls the kangaroo rats contributed one to nine percent of the diet, except in 1995 when they were 27 percent. It is likely that the Sherman livetraps used in the trapping studies were less effective in capturing this large heteromyid than the owls.

Ord's kangaroo rats are well adapted to open sandy areas in arid regions (Kritzman 1977), such as found on the north end of the facility and in Juniper Canyon. They construct elaborate underground burrows that are deep enough to maintain moisture. Field observations (G. Green, pers. obs.) suggest that sandbanks and roadcuts are important in burrow site selection. Kangaroo rats are also very nocturnal and, like most heteromyids, are able to metabolize their moisture needs from dry foods. Because of their size, approximately 53 g (Marks 1983), their biomass contribution to the diet of many owl predators is much higher than their numerical contribution.

Western Harvest Mouse - While the presence of western harvest mice has long been suspected for NWSTF Boardman based on their presence in similar habitats in Washington (Gano and Rickard 1982), no harvest mice were captured by Green (1983), Small and Verts (1983), or Verts and Carraway (1986) during their large trapping studies on the north end of the facility. In addition, Green et al. (1993) did not find the harvest mouse in the diet of burrowing owls nesting on the north end of the facility. The first recorded observation for this species on the facility was by Quade (1994) who captured harvest mice in RNA-B in 1994 (exact number not given).

In addition, harvest mice were found to comprise 30 percent of the diet of barn owls and 16 percent for long-eared owls in Juniper Canyon in 1994. However, by 1995, the composition of harvest mice dropped to two percent for barn owls, then to 15 percent and 11 percent in 1996 and 1997. The presence of harvest mice in long-eared owl diets also dropped (six percent) in 1995, but stayed low for 1996 (two percent) and 1997 (eight percent). Also, no harvest mice were found from long-eared owl pellets collected at the same Juniper Canyon site in 1980. Consequently, harvest mice

may have been uncommon facility-wide in the early 1980s, but were relatively common on the south-central part of the facility in the 1990s, although fluctuations in the population appear to occur annually. Western harvest mice prefer grassy habitats (Webster and Jones 1982) and have probably benefited from the establishment of the RNAs and the subsequent buildup of dense stands of western needle-and-thread grass. Development of dense grass stands in the past decade may account for the differences in long-eared owl diets between 1980 and 1994.

Deer Mouse - The ubiquitous deer mouse is relatively common in the shrub and dense grass habitats of the south end of the facility. Quade (1994) found deer mice on all of her trapping grids in the western needle-and-thread grass-dominated RNAs, and Green found deer mice to comprise 53 and 31 percent of the diet of long-eared and barn owls respectively in south Juniper Canyon in 1994. However, on the sandy soils of the north end of the facility, this mouse is relatively rare as this region is dominated by arid land adapted heteromyids like pocket mice and kangaroo rats. For instance, in over 1,800 nights of trapping, Small and Verts (1983) captured 244 individual small mammals (98 percent pocket mice), but only one deer mouse. In a follow up study at the same location on the north end of the facility, Verts and Carraway (1986) captured 306 mice (97 percent pocket mice) of which none were deer mice. Similarly, Green (unpubl. data, see Appendix D for details) found deer mice to be a rare component (less than one percent) in the diet of burrowing owls inhabiting the north end of the facility.

Northern Grasshopper Mouse - The northern grasshopper mouse is largely predatory in nature. Approximately 80 percent of its diet is comprised of large ground-dwelling arthropods and 10 percent other small rodents (Ingles 1965). Like most predators, grasshopper mice occur at relatively low densities (Nowack 1991). Small and Verts (1983) captured only two grasshopper mice out of a total 244 small mammal captures, and Verts and Carraway (1986) captured only two out of 306 total captures. Quade (1994) also captured grasshopper mice at RNA-B and RNA-C, but provided no numbers. Similarly, owl diet studies on the facility only found one grasshopper mouse in the food remains from burrowing owls on the north end in 1981, and one from 1994 and two from 1996 long-eared owl pellets in Juniper Canyon (G. Green, unpubl. data, see Appendix D for details). It is likely that this species is ubiquitous on the facility, but occurs in densities too low for frequent detection. This species is highly territorial and has a home range of about five to seven acres (Nowack 1991), which, for instance, is 60 to 120 times greater than calculated home ranges for pocket mice in Oregon (Feldhammer 1979).

Bushy-tailed Woodrat - A bushy-tailed woodrat was observed in 1996 in association with juniper trees on the western edge of the facility. It also likely occurs, or has occurred, in the rocky outcroppings where traces of urine deposits (appearing as white encrustations serving as territorial markers) have been found. Juniper trees, rock outcroppings, and abandoned buildings are favored denning sites for this species in eastern Oregon (Verts and Carraway 1998). Although this species was not found in the diet of Juniper Canyon long-eared and barn owls, other owl diet studies in eastern Oregon (see Verts and Carraway 1998) have shown that owls smaller than great horned owls rarely capture this large rodent.

Sagebrush Vole - The sagebrush vole was identified by Quade (1994) as an unrecorded species of small mammal that she expected to be present on NWSTF Boardman, although none were recorded during trapping efforts by Green (1983), Small and Verts (1983), Verts and Carraway (1986), and Quade (1994). However, G. Green found a sagebrush vole in the pellet remains from a long-eared owl roost site in Juniper Canyon. Also, Quade (1994) identified grass runways characteristic of this species in Well Springs Canyon (which has not been trapped); however, the more common montane vole also constructs grass runways.

Montane Vole - The montane vole was not captured during any of the previous small mammal trapping studies (Green 1983, Small and Verts 1983, Verts and Carraway 1986, Quade 1994) conducted on the facility; however, it has regularly appeared in the diet of burrowing, long-eared, and barn owls (Green 1983, Green et al. 1993). Their absence from the trapping data probably reflects a patchy distribution and possibly a characteristic avoidance of live-traps. Their habitat is described as grassy meadows with grass dense enough to support runways and with water available (Johnson and Johnson 1982). These conditions, at best, are patchy on the grazed portions of the facility, but do occur, in part, in the bunchgrass-dominated RNAs and immediately off-facility in the agricultural areas.

House Mouse - The introduced house mouse is commonly found in the vicinity of human habitations in eastern Oregon and probably occurs among the buildings of the old headquarters and the sheep corrals. House mouse presence on the facility was confirmed by Quade (1994), when she captured a single animal on the south end (RNA-C).

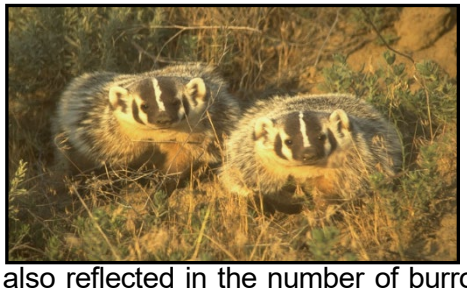
Porcupine - The porcupine normally inhabits the forested environments of eastern Oregon although scattered numbers are occasionally found in the shrub-steppe habitats of the Columbia Basin (G. Green, pers. obs.). McClelland and Bedell (1987) and Quade (1994) both listed this species as occurring on the facility, although Quade did not observe porcupines in 1994. A dead individual was observed in 1995 wedged in the crotch of a juniper tree in Juniper Canyon (G. Green, pers. obs.) and a live animal observed between Well Springs Canyon and Juniper Canyon in May 1995 (A. Holmes, pers. comm.), confirming their presence.

Red Fox - The range of the red fox in northeastern Oregon historically did not extend into north Morrow County (Samuel and Nelson 1982). However, agricultural development along the Columbia River has provided suitable habitat for this species allowing the Rocky Mountain subspecies to extended its range into the Boardman area. In the past decade, numerous damage complaints from this fox have been received from the Boardman area. The population appears well entrenched in the lower Willow Creek drainage 12 miles to the west (R. Morgan, pers. comm. 1998). Furthermore, two red fox pups were found dead on Highway 730 (Bombing Range Road), three miles south of the facility by ODFW biologists. Its presence on the facility was confirmed in 1995 with the capture of a single individual on the north end during coyote control efforts by Wildlife Services (B. Gibson, pers. comm. 1998). There is concern that as this population builds further, foxes may become a serious threat to ground-nesting birds on the facility, including long-billed curlews and burrowing owls, especially on the north end of the facility. For this reason alone, local fox populations should be closely monitored and, if necessary, controlled if they become established on the facility.

Coyote - The coyote is an opportunistic predator that probably survives on a diet made up largely of small mammals, rabbits, and pheasants, although they also prey on curlews, burrowing owls, and a variety of other birds and reptiles. Fluctuating rabbit populations probably influence the reproductive potential of coyotes. Coyotes den throughout the facility, although denning success is greatly influenced by its proximity to roads and associated human disturbance.

Long-tailed Weasel - The long-tailed weasel is a species that may be a common inhabitant of the facility but because of its secretive habits is rarely seen. Its requirement of a constant supply of water (Hamilton 1933) may limit seasonal use of the range. Its presence on the facility was confirmed by a sighting of a single animal in Juniper Canyon in May 1995. Based on diet information collected elsewhere (Svendsen 1982), local long-tailed weasels would be expected to forage largely on various species of mice, Washington ground squirrels, and juvenile Nuttall's cottontails.

Badger - The badger is, next to the coyote, the most dominant predator on the facility. It most certainly is the major predator of Washington ground squirrels and other fossorial rodents (Lindzey 1982). In addition, badgers are a keystone species, in that its burrows provide habitat for a variety of other wildlife, including burrowing owls. In fact, burrowing owls on the facility are virtually dependent on badgers for providing nesting burrows (Green and Anthony 1989).



Badger densities in shrub-steppe habitats in Idaho and Utah were found to range between 1 and 16 animals per square mile (Lindzey 1971, Messick 1981). Lindzey (1978) found an average of 0.6 open entrance badger burrows per acre in Utah. In comparison, badger burrow studies on the facility found 0.16 open burrows per acre in 1996, and 0.44 per acre in 1997. This dramatic increase in apparent badger use was also reflected in the number of burrowing owl nest lost to badgers-two in 1996 and ten in 1997 (Holmes and Geupel 1998). (The paradoxical relationship between burrowing owls and badgers still favors the owls since an increase in badgers equates to an increase in nesting burrows, and the high reproductive output of successfully nesting birds compensates for losses due to predation.)

Rocky Mountain Elk - Although elk were not normally be considered an inhabitant of north Morrow County, a few animals were consistently observed in Elk Canyon, Juniper Canyon, and the agricultural areas east of the facility. Since the last update, ODFW has regularly surveyed the facility and Rocky Mountain elk are now a regular inhabitant. The herd has rapidly expanded since 2012 (ODFW 2020). Elk use the facility as a winter range and typically depart in the late spring as temperatures on the facility rise.

Mule Deer - Mule deer are a permanent inhabitant of the facility, although population numbers have never been confirmed. Deer, including does with small fawns, have been observed throughout the sagebrush habitats of Juniper Canyon. Deer are most conspicuous during the winter months when an estimated 100-200 animals use the facility. However, deer are much less observed during the spring and summer, either because they are scattered and more secretive or they move off the facility entirely. Some deer may avoid the facility during the spring when forage quality is higher on nearby crop fields. Lack of water on the facility in the late summer may also limit deer use at this time.

Pronghorn Antelope - There is much confusion on how prevalent pronghorn were in the Columbia Basin prior to arrival of European man. Daubenmire (1970) believed that any pronghorn that were present in the Columbia Basin in the early 1800s were very few and confined to the driest part of the steppe. However, Lewis and Clark indicated that pronghorn were apparently plentiful along the lower reaches of the Snake River in 1806 (Thwaites 1905). Also, pronghorn apparently survived in north Morrow County until 1946 when the last animal was observed on Finley Buttes, approximately two miles east of the facility (R. Morgan, pers. comm. 1998). Presently, pronghorn are increasing in numbers in south Morrow County and some of these animals may have moved to northern Morrow County. Pronghorn are now spotted with some regularity on NWSTF Boardman, and there may be two distinct herds with a total of 30 animals (J. Phillips, pers. comm. 2008).

Birds

Since 1979, at least 81 species of birds have been recorded on the facility, 33 of which nest there (Table 2-6). Sagebrush habitats support the highest number of species (54) and confirmed breeders (21) (see Table 2-6) followed by annual grass/forb (35/8), bitterbrush (33/9), and juniper habitats (27/9). Sagebrush, bitterbrush, and juniper habitats exhibit high structural diversity and consequently, more niches for different bird species. In general, species diversity was highest in the shrub habitats, while densities of breeding birds were highest in the grassland habitats (Holmes and Geupel 1998). Four species (western meadowlark, grasshopper sparrow, horned lark, and long-billed curlew) comprised over 98 percent of the breeding pairs found in grassland and open low shrub (rabbitbrush) habitats (Holmes and Geupel 1998). Although grasshopper sparrows were more common in the ungrazed habitats, the reverse was true for long-billed curlews (Holmes and Geupel 1998).

Western meadowlarks were the dominant breeding bird in all shrub habitats as well, accounting for 48-77 percent of the sightings (Holmes and Geupel 1998). In grazed sagebrush habitats lark sparrows were the only other dominant breeder; while in ungrazed, sagebrush grasshopper sparrows and horned larks were dominants. In the upland sagebrush habitats, characteristically different from other sagebrush habitats with its low vegetative groundcover, sage, lark, and grasshopper sparrows joined meadowlarks as dominant breeders (Holmes and Geupel 1998). Meadowlarks, lark sparrows, and Brewer's blackbirds were dominants in the bitterbrush.

Following are detailed accounts of the major bird species and assemblages found at NWSTF Boardman. Much of the information in the accounts comes from studies specifically conducted on the facility including Green and Anthony (1989, 1997), Green and Morrison (1983), Green et al. (1993), Holmes and Geupel (1998), Humple and Holmes (2001), Pampush (1980), and Pampush and Anthony (1993). Full copies of Green and Anthony (1989), Holmes and Geupel (1998), and Humple and Holmes (2001), Pampush (1980), and Pampush and Anthony (1993) are located in Appendix D for reference.

Hawks - Eleven species of hawks have been recorded on the facility. The juniper trees in Juniper Canyon provide very important breeding habitat for ferruginous and Swainson's hawks (Green and Morrison 1983, Holmes and Geupel 1998). Approximately seven pair of Swainson's hawks and two or three pair of ferruginous hawks nest here each year (Holmes and Geupel 1998). At least one pair of Swainson's hawks has used one of three artificial nesting platforms that have been provided in the area. Figure 2-22 shows all the locations that ferruginous and Swainson's hawks have nested in the past based on observations of existing nests. Like many raptors, both species rarely use the same nest in consecutive years. Ferruginous hawk nests persist much longer than Swainson's or other hawk nests, due to their being built with stronger (usually sagebrush) materials (Green and Morrison 1983).

Table 2-6. List of birds observed at NWSTF Boardman in 1979 - 2012.

Species	Habitat								Migratory Behavior
	GF	BG	LS	BB	SB	ST	JU	PO	
American Crow	P		P	P					R
American Goldfinch		P			P				R
American Kestrel					P	CB	P		R
American Robin					P		P		R
Barn Owl	P	P			CB				R
Barn Swallow	P	P			P	CB			M
Black-billed Magpie	P	P	P	CB	CB	CB	CB		R
Brown-headed Cowbird	PB	PB	PB	PB	CB			P	M
Brewer's Blackbird	P			PB	CB			P	R
Brewer's Sparrow					CB				M
Black-crowned Night Heron								P	M
Black-throated Sparrow				PB	CB				M
Blue-winged Teal								P	R
Bullock's Oriole				PB			CB		M
Burrowing Owl	CB	CB	PB	CB	CB				M
California Gull	P		P	P					M
California Quail		PB			PB				R
Caspian Tern	P		P	P					M
Chipping Sparrow			P	P	P				M
Chukar					PB				R
Cliff Swallow		P			P				M
Common Nighthawk	P	PB	P	P	PB				M
Common Poorwill				P					M
Common Raven	P	P	P	P	P	CB	CB		R
Cooper's Hawk							P		M
Dark-eyed Junco					P				M
Eastern Kingbird							P		M
European Starling	P				CB	CB	P		R
Ferruginous Hawk	P	P	P		P		CB		M
Fox Sparrow					P				M
Golden-crowned Kinglet					P		P		R
Golden Eagle	P	P	P	P	P		P		R
Gray Flycatcher		P		P	PB		P		M
Gray Partridge			CB	CB	CB				R
Grasshopper Sparrow	CB	CB	CB	PB	CB				M
Horned Lark	CB	CB	CB	CB	CB				R
House Sparrow						CB			R
Killdeer	CB							P	M
Lark Sparrow			PB	CB	CB				M
Lewis' Woodpecker							P		M
Loggerhead Shrike				CB	CB		CB		M
Long-billed Curlew	CB	CB	PB	PB	CB				M
Long-eared Owl	P	P			CB		CB		R
MacGillivray's Warbler							P		M
Mallard	CB							P	M
Merlin	P				P		P		M
Mountain Bluebird	P				P				M
Mourning Dove	P			CB	CB		CB	P	M
Northern Flicker					P	P	P		R

Table 2-6. (continued).

Species	Habitat								Migratory Behavior
	GF	BG	LS	BB	SB	ST	JU	PO	
Northern Harrier	PB	PB	PB	PB	P		P		R
Northern Pintail	CB								M
Northern Rough-winged Swallow					CB				M
Orange-crowned Warbler							P		R
Prairie Falcon	P		P		P				R
Red-tailed Hawk	P	P	P	P					M
Red-winged Blackbird				P				P	M
Ring-billed Gull	P								M
Ring-necked Pheasant	PB	PB	PB	PB	CB				R
Rock Wren					PB				R
Rough-legged Hawk	P	P	P	P	P				M
Sage Sparrow					CB				M
Sage Thrasher				P	CB				M
Say's Phoebe					P				M
Savannah Sparrow	PB	PB	PB						M
Sharp-shinned hawk							P		M
Short-eared Owl	P	CB	P	PB	P				R
Spotted Sandpiper								P	M
Spotted Towhee					P		P		M
Swainson's Hawk	P	P	P		P		CB		M
Townsend's Solitaire					P		P		R
Turkey Vulture					P				M
Upland Sandpiper	P								M
Vesper Sparrow					PB				M
Violet-green Swallow					P				M
Western Kingbird				CB	PB	CB	CB		M
Western Meadowlark	CB	CB	CB	CB	CB				R
Western Sandpiper								P	M
Western Tanager							P		M
White-crowned Sparrow			P	P	P				M
Wilson's Warbler				P					M
Yellow-headed Blackbird								P	M

Key: habitat[1], breeding status[2], and migratory behavior[3].

[1] GF = annual grass/forb, BG = bunchgrass, LS = open, low shrub, BB = bitterbrush, SB = sagebrush, ST = human structure, JU = juniper trees, PO = ponds.
[2] P = present, but does not breed in this habitat, PB = possible or probable breeder, CB = confirmed breeder.
[3] R = resident, M = migrant.
Source: Holmes and Geupel (1998), G. Green, R. Morgan, pers. observations.

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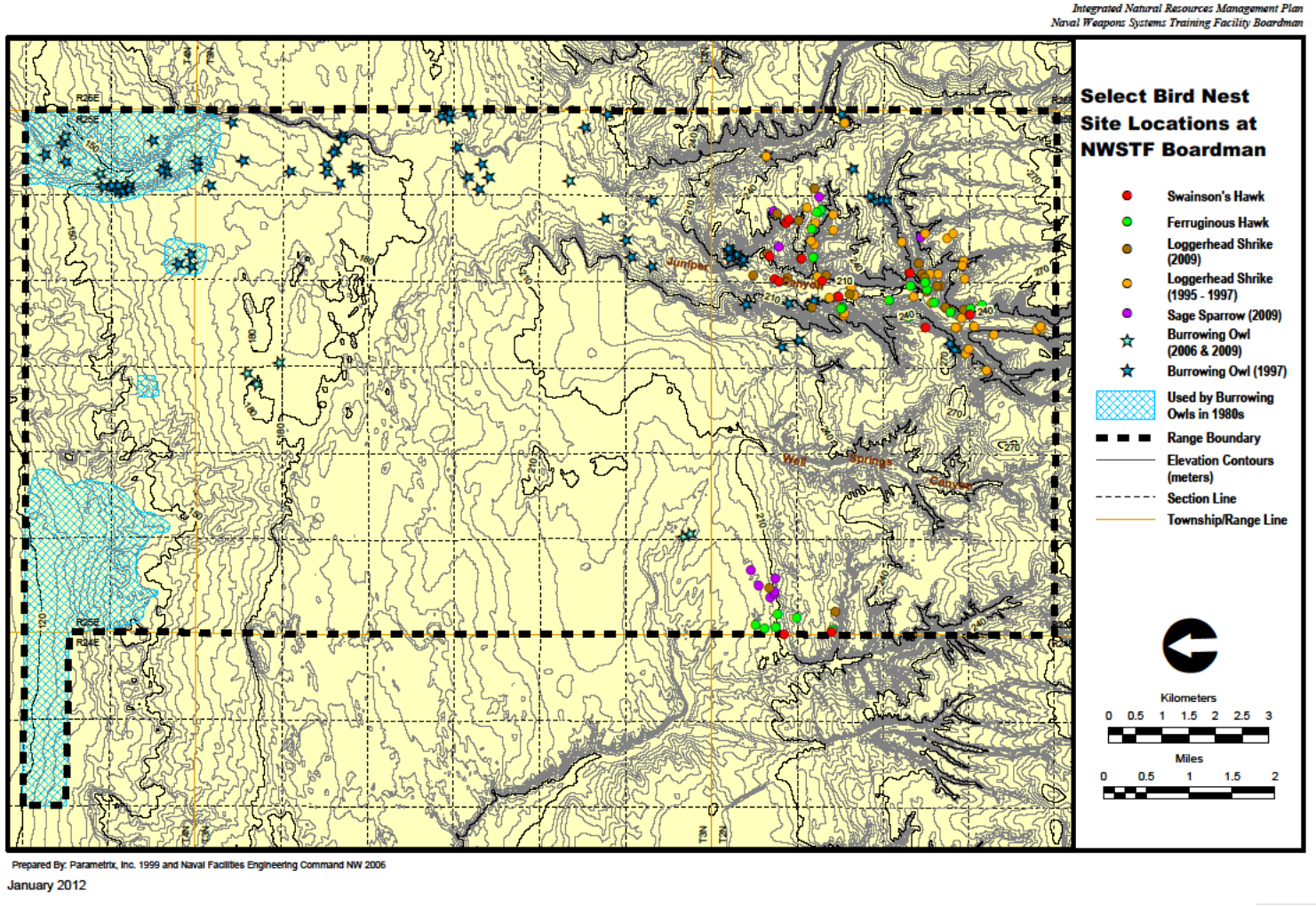
Figure 2-22. Select Bird Nest Site Locations at NWSTF Boardman



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The ODFW is in the planning phase of a ferruginous hawk telemetry study covering parts of the Columbia Basin. This study will look at the effects of regional development projects around northcentral Oregon on nesting hawks. The Navy will partner with ODFW and Washington Department of Fish and Wildlife using NWSTF as a control area for this project. The only other hawk breeding on the facility is the American kestrel. Kestrels have been found breeding at the Old Headquarters storage building and in a gravel pit. Although unconfirmed, it is probable that northern harrier also breed on the facility. Red-tailed hawks also occur year-round on the northern edge of facility, but breed off-site in the deciduous trees near Boardman. The northern rough-legged hawk is a common winter resident, while prairie falcons, merlins, Cooper's hawks, and sharp-shinned hawks have been observed during the spring migration period.

Eagles - Golden eagles, mostly non-breeding immatures, occur year-round at NWSTF, especially in the vicinity of Juniper Canyon. Immature golden eagles are generally excluded from breeding territories (Steenhof et al. 1983); thus, the lack of a breeding territory on the facility probably accounts for the high use by immature birds. Given the importance of the facility for immature golden eagles, it is recommended that the construction of nesting platforms or other management actions that might attract a breeding pair not be undertaken. Winter reports of bald eagles have not been confirmed.

Long-billed Curlew - The long-billed curlew is the fourth most common bird at NWSTF Boardman during the breeding season (Holmes and Geupel 1998) with an estimated 300 to 400 pairs nesting here each year. The facility supports one of the largest populations of breeding curlews in the world (G. Pampush, pers. comm.). Pampush and Anthony (1993) studied curlews at NWSTF from 1978 to 1980 and Holmes and Geupel (1998) from 1995 to 1997. Both parties found curlew nest densities highest in the annual grass habitats followed in importance by grazed bunchgrass, open low shrub, and open bitterbrush. Figure 2-25 shows the nesting distribution of this bird on the facility. Curlew annual nesting success on the facility is varied, ranging between 21 and 88 percent (Pampush and Anthony 1993, Holmes and Geupel 1998, Holmes 2011). Holmes (2011) suggested that there is a weak correlation between taller habitat types (such as bunchgrass and croplands) having higher nesting success than habitats with shorter structure (such as cheatgrass dominated areas). Avian (crows and ravens) and mammalian (coyotes and badgers) predators appear to be equally responsible for most of the curlew nest losses (Holmes and Geupel 1998). In a study of migration routes of long-billed curlews, Point Reyes Bird Observatory placed GPS transmitters on 10 curlews from NWSTF Boardman. All the curlews tagged from NWSTF Boardman migrate to and winter in the Central Valley of California (G. Page, pers. comm.). The USFWS has completed a draft action plan that describes research and conservation needs to achieve long-term rangewide conservation for the long-billed curlew. Suggested research actions and activities are specified in the Conservation Action Plan for Long-billed Curlews, located at:

http://www.fws.gov/mountain-prairie/species/birds/longbilled_curlew/Action_Plan.pdf

Other Shorebirds - Other shorebirds found on the facility are the killdeer, upland sandpiper, spotted sandpiper, and western sandpiper. Killdeers have nested near the Juniper Canyon horse corrals and the Old Headquarters buildings. They have also been regularly observed near other corrals and at the sheep camp where, presumably, they breed. A single upland sandpiper was observed in association with an unpaired curlew on the northern end of the facility both in 1995 and 1996 (see Figure 2-25). Western sandpipers have been observed at the Oregon Trail pond (G. Green, pers. obs. 1997) and spotted sandpipers at Toad Pond (A. Holmes, pers. obs. 1998).

Burrowing Owl - The burrowing owl is the most common owl found on the facility with 71 nesting attempts recorded in 1997 (Holmes and Geupel 1998; Figure 2-24). Green and Anthony (1989) studied burrowing owls on the facility 1980-1981, and found the owls to prefer annual grass or open bitterbrush habitats for nesting. Most owl pairs on the facility nested in old badger burrows, and utilized a nearby shrub (dead or alive) for perching. Green and Anthony (1989, 1997) have shown the near dependence of burrowing owls on badgers for providing nesting burrows, despite badgers being the primary predator of owl nestlings. Diet studies by Green et al. (1993) found that while burrowing owls on NWSTF Boardman feed on a wide variety of prey, pocket mice, pocket gophers, crickets, and grasshoppers are the most important prey species.

Green and Anthony (1989), Holmes and Geupel (1998) and Holmes et. al. (2003) found burrowing owl nesting success on the facility to vary between 47 and 65 percent. Since that time Holmes (2018) estimated the nesting success increased to approximately 82% with an estimated density of Green and Anthony (1989) and Holmes and Geupel (1998) found adult abandonment to be the primary cause of nesting failure, followed by predation (usually badgers), and trampling in of the burrow by livestock. A dramatic increase in badger use was noted in 1997, which coincided with an increase in the percentage of nests lost to badgers, from zero and five percent in 1995 and 1996, respectively, to 29 percent in 1997. Both studies found moderate to high re-use of burrows still open and available for nesting, but approximately half the burrows used were trampled or silted in by the following year. Holmes et. al. (2003) estimated that the nest reuse ranged between 57 and 87 percent. A sensitive species survey for sagebrush preferring species was conducted in 2009 by Oregon State University and The Nature Conservancy after the 2008 wildfire that burned much of the remaining sagebrush habitat (The Nature Conservancy 2009). Six nesting locations were recorded which were spread around the installation in mostly open grassland dominated habitats (see Figure 2-24 and Appendix D for full report). The most recent burrowing owl surveys were completed in 2019 and will be included in future updates of this INRMP. Conway et. al (2010) studied the migratory linkage between burrowing owl populations on DoD installations and surround lands, including NWSTF Boardman. Burrowing owls in southcentral Washington and northcentral Oregon appear to share migratory linkages with breeding birds from the Central Valley of California and southcentral Canada. The USFWS has completed a status assessment and conservation plan for the burrowing owl in the United States. This assessment contains conservation measures and biological information that would be applicable to NWSTF Boardman burrowing owl management.

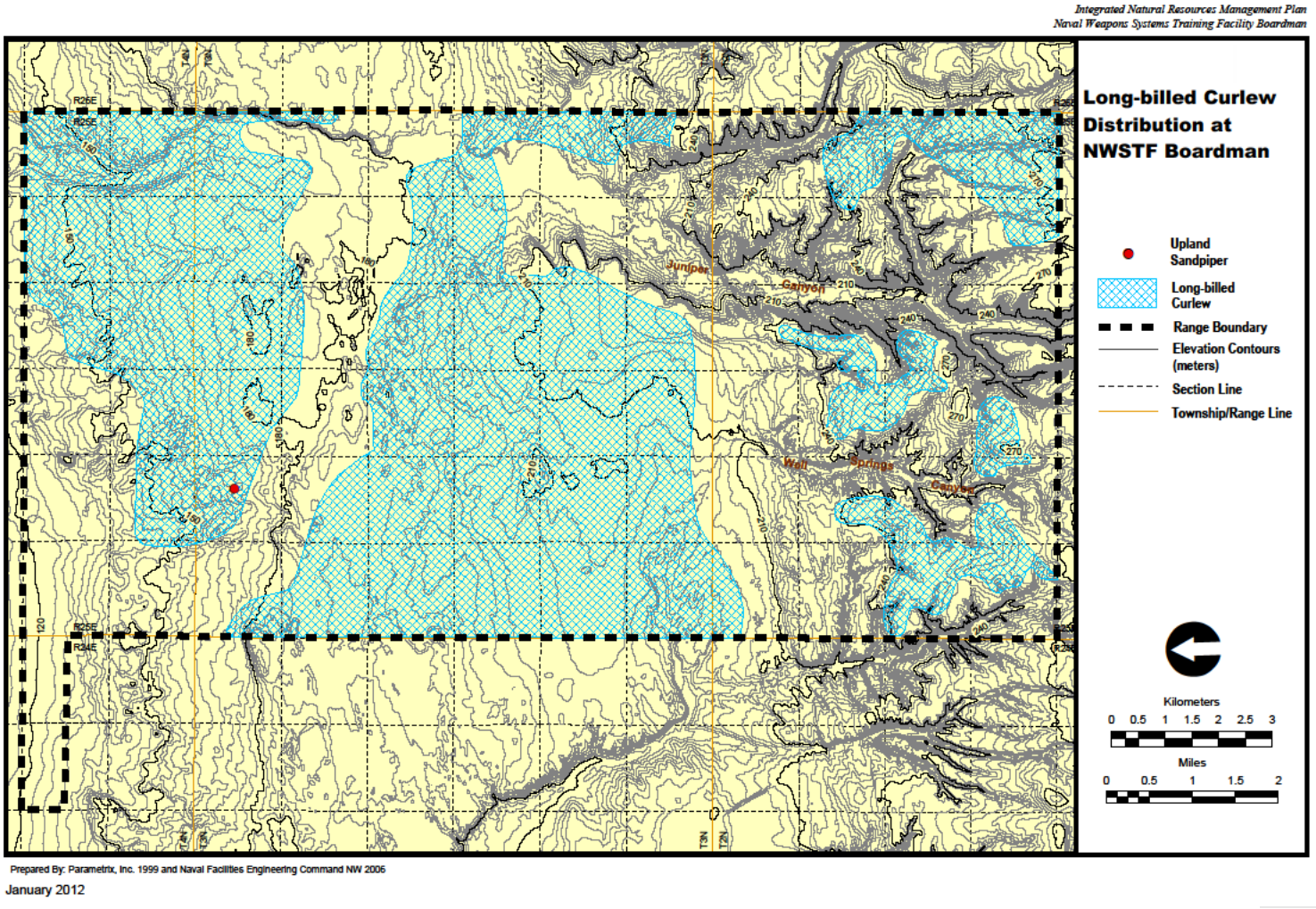
http://www.fws.gov/mountain%2Dprairie/species/birds/wbo/Western%20Burrowing%20Owlrev73003a.pdf

The California Burrowing Owl Consortium has developed Survey Protocol and Mitigation Guidelines to survey Burrowing Owl populations and to evaluate impacts from development projects. The following websites have survey protocol and mitigation guidelines for burrowing owl research that could be used for future burrowing owl studies on NWSTF Boardman:

http://www.energy.ca.gov/sitingcases/communitypower/documents/applicant/afc/AFC_VOLUME_2-appendices/Appendix%208.16-11.pdf

Conway et. al. (2010), through the DoD Legacy program, developed a standard monitoring protocol for burrowing owl populations on DoD lands. The protocol is listed in Appendix 1 of the report and the full report can be found in Appendix D of this INRMP.

Figure 2-23. Long-billed Curlew Distribution at NWSTF Boardman



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Long-eared Owl - The long-eared owl is the second most common owl on the facility with a high of 19 pairs nesting in the juniper trees of Juniper Canyon in 1997 (Holmes and Geupel 1998). Nearly all the nestings occur in old magpie nests with annual nesting success ranging from 63-100 percent (Holmes and Geupel 1998). G. Green examined the diet of long-eared owls in Juniper Canyon and found that from 1994-1997, these owls fed largely on pocket mice, deer mice, kangaroo rats, and harvest mice. In 1980, however, these same owls fed almost exclusively on pocket mice (G. Green, unpubl. data, see Appendix D for full details), suggesting dramatic changes have occurred in the Juniper Canyon small mammal community over the past two decades.

Short-eared Owl - Holmes and Geupel (1998) observed paired short-eared owls in the ungrazed bunchgrass habitat during all three years of study. A successful nest was found in 1997. A grassland ground-nester, these owls probably require the dense bunchgrass vegetation of the ungrazed RNAs for successful nesting. Sightings have also occurred in low shrub, annual grass, and bitterbrush habitats, but the importance of these habitats to short-eared owls is unknown.

Barn Owl - A barn owl nest, active every year since its discovery in 1994, occurs in an earthen bank in Juniper Canyon. It is presumed that the nest was successful during all years of study, but this was verified only in 1997. G. Green studied the diet of this pair from 1994-97 and learned that pocket mice, deer mice, harvest mice, Ord's kangaroo rats, and pocket gophers were the most important prey items (see Appendix D for full details).

Upland Gamebirds - Four species of upland gamebirds have been found on the facility: ring-necked pheasant, gray partridge, chukar, and California quail. Chukars and California quail are relatively rare, and there is no evidence of them breeding on the facility (Holmes and Geupel 1998). Gray partridge, however, have been found breeding in all three shrub communities, while the pheasant is a common breeder in the sagebrush.

Black-billed Magpie - The black-billed magpie is the most common corvid breeding at NWSTF Boardman. Holmes and Geupel (1998) located 44 and 45 nests annually in 1996 and 1997, respectively, most in juniper and sagebrush with a few in bitterbrush. Only about a third of the nests were successful over the two-year period with predation by ravens the chief cause of nesting failure.

Common Raven - Three nesting pairs of common ravens were found by Holmes and Geupel (1998), two in junipers and one on the abandoned observation Tower A. Ravens are major nest predators of other birds on the facility, especially magpies and loggerhead shrikes; although, as Holmes and Geupel (1998) have pointed out, ravens originating off facility may be primarily responsible for this predation. Raven flocks of up to 200 birds are regularly observed in the central and southern portions of the facility beginning about June.

Common Crow - Common crows do not nest at NWSTF Boardman (because of the lack of the deciduous trees they use for nesting) but do nest and roost in large numbers north of the facility near Boardman. Many of these crows have been observed foraging over the bitterbrush and annual grass habitats of the northern third of the facility, where they are believed to be a major predator of curlew eggs (Holmes and Geupel 1998). It is further believed that the local crow population has dramatically increased in the Boardman area with the development of Columbia River riparian areas and general increase in residential or ornamental deciduous trees associated

with increased human housing developments. They may increase even further with expansion of commercial cottonwood plantations adjacent to the facility. The long-term impact of increased crow populations on curlews should be monitored.

Shrub-steppe Passerines - NWSTF Boardman supports a number of birds characteristically associated with shrub-steppe habitats. Three species alone, western meadowlark, grasshopper sparrow, and horned lark, account for about 85 percent of the entire spring/summer bird population on the facility (Holmes and Geupel 1998). Western meadowlarks were found to be common in all habitats studied by Holmes and Geupel (1998), while grasshopper sparrows and horned larks were common only in the annual grass, bunchgrass, and ungrazed sagebrush habitats. Passerines found nesting in the junipers include the western kingbird (high of 16 in 1997), Bullock's oriole (high of four in 1996), and mourning dove (high of three in 1997). Mourning doves are common breeders in the taller bitterbrush and sagebrush communities, as well as the junipers.

Other shrub-steppe passerines include the lark sparrow, Brewer's blackbird, and white-crowned sparrow, largely found in bitterbrush and all sagebrush habitats. The sage sparrow, Brewer's sparrow, sage thrasher, and loggerhead shrike, mostly restricted to upland and ungrazed sagebrush. Black-throated sparrows, including singing males, were largely seen in the bitterbrush only, although the only confirmed nesting occurred in sagebrush on the south end of the facility in 1994. A sensitive species survey for sagebrush preferring species was conducted in 2009 by Oregon State University and The Nature Conservancy after the 2008 wildfire that burned much of the remaining sagebrush habitat (The Nature Conservancy 2009). Nineteen nesting territories were recorded for loggerhead shrikes and 8 nesting territories were recorded for sage sparrow mostly in and around the remaining unburned patches of sagebrush habitat of Juniper Canyon and along the western edge of the installation (see Figure 2-24 and Appendix D for full report). Locations of loggerhead shrike nest sites found 1995 to 1997 are also shown in Figure 2-24.

Species of Possible Occurrence

Species of possible occurrence are those that are rare, secretive, and or otherwise difficult to detect, but possibly could occur on the facility based on presence of suitable habitat and proximity of known distributional range. There are no amphibians in this group.

Snakes - Shrub-steppe snakes that occur in other portions of Morrow County or adjacent Umatilla County but have not been recorded on NWSTF Boardman are the striped whipsnake and night snake. Although both may be absent because of a general lack of rocky areas on the facility, like the rattlesnake, they may just be rare and not yet identified by a trained observer. This may especially be the case with the night snake as this species is easily confused with gopher snakes and is generally only active at night.

Birds - The only birds included in this group are the bald eagle, great horned owl, and snowy owl. Bald eagles and snowy owls possibly occur on the facility during some winters, but their presence is as yet unverified. Great horned owls nest north of the facility and possibly hunt the facility at night. Suitable habitat also occurs in the junipers and at the Proudfoot barn. A number of water-associated species—such as waterfowl, herons, and shorebirds—may incidentally use the ponds but are not likely to remain for long.

Merriam's Shrew - Merriam's shrew has not been recorded to date from the facility. Quade (1994) suggested that it might occur here given the species' range and habitat requirements (Armstrong and Jones 1971), but Johnson and Clanton (1954) suggested that they do not inhabit areas of extreme aridity. They have apparently not been found below 1,200 feet elevation in eastern Washington (Johnson and Cassidy 1997). The presence of this species in Oregon is based on a

single specimen collected in Wasco County in 1896 (Bailey 1936, Olterman and Verts 1972), and another in Deschutes County in 1972 (Gashwiler 1976). Nevertheless, this species is apparently naturally rare and difficult to catch (Johnson and Clanton 1954, Olterman and Verts 1972),although several have been collected in association with sagebrush in eastern Washington (Johnson and Clanton 1954). Johnson and Clanton alone collected 46 Merriam's shrews in the Columbia Basin of Washington, mostly in association with sagebrush voles. More recently, this shrew has been captured during small mammal trapping efforts (Rickard et al. 1974) or found in owl diets (Fitzner et al. 1980) on the Hanford Site in south-central Washington.

Norway Rat - Norway rats are usually found in close association with humans, feeding on garbage, stored grains, and livestock feed (Verts and Carraway 1998). They are commonly trapped among the buildings at the nearby Umatilla Army Chemical Depot (G. Green, pers. obs.). There are no records of Norway rats occurring on the facility, although poisoned baits placed at the sheep sheds and other buildings, a likely place to find rats, may be preventing their establishment or at least reducing the likelihood of detection.

Little Brown Myotis and Other Bats - The little brown myotis is a species that McClelland and Bedell (1987) listed as occurring on the facility, yet no verification was provided. It is possible that little brown myotis and other bats may roost in the older buildings and juniper trees on facility, but their presence is probably sporadic due to the lack of open water. It is more likely that bats pass through the range during migration periods. Little brown myotis and big brown bats have been collected north of the facility near Boardman (Maser and Cross 1981).

Mountain Lion and Bobcat - Both these large cats were most certainly regular inhabitants of the shrub-steppe of northern Morrow County prior to the arrival of European settlers. While today it is unlikely that either species regularly inhabits the facility, it is possible that individuals dispersing from other areas might occasionally be found using the facility as a temporary refuge. Bobcats are known to inhabit the Willow Creek area 12 miles to the west, and a stray mountain lion was observed on the Umatilla National Wildlife Refuge five miles to the northeast in the early 1980s.

Reestablishment of Extirpated Native Species

It has been over a 100 years since agricultural activities (farming and grazing) began impacting wildlife on the site of the present NWSTF Boardman. Because of a paucity of written records for this time and location, determining what species of wildlife have been extirpated from the facility is, in most cases, pure deduction, or based on unreliable local stories. Nevertheless, information is available on a few key species that we can be reasonably certain occurred in north Morrow County. These species are addressed below.

Sharp-tailed Grouse - Gabrielson and Jewett (1940) stated that by 1940, they still occasionally saw small flocks of Columbian sharp-tailed grouse along the north-central boundary of Oregon, including Morrow County. Apparently once extremely abundant throughout their range (Bendire 1892), especially in the Palouse of Washington (Larrison and Sonnenberg 1968), this grouse was extirpated in Oregon by 1969 (Evanich 1983). Reestablishment attempts in north-central Oregon in 1960s failed, but a 1991 reestablishment in northeastern Oregon was successful as of 1998 (V. Coggins, pers. comm. 1998). The dramatic decline of sharp-tailed grouse populations in the Columbia Basin has been directly blamed on rampant overhunting in the late 1800s (Larrison and Sonnenberg 1968) and habitat loss to cultivation in the early 1900s (Buss and Dziedzic 1955).

The potential for reintroducing sharp-tailed grouse on the facility is unlikely. Based on discussions with Mike Schroeder of the Washington Department of Fish and Wildlife and John Crawford of Oregon State University, the facility probably does not provide enough of the necessary habitat

requisites to hold an attraction for year-round use (e.g., year-round water, sufficient seed-bearing forbs for chicks). Recent lessons in translocation of sharp-tailed grouse in the Pacific Northwest have shown that transplanted birds often move many miles from their translocation site regardless of the habitat conditions at the initial site (V. Coggins, pers. comm. 1998). Furthermore, it is unlikely that any state wildlife agency would support translocation of sharp-tailed grouse to a marginal habitat site such as the facility when better sites are available.

Sage Grouse - The original range of the sage grouse in the Columbia Basin included the sagebrush regions of northern Morrow County. Although there are no verifiable records available for northern Morrow County, it is likely that they were once relatively common in this region, based on reports from early explorers (Cooper and Suckley 1860, Gabrielson and Jewett 1940, also see Tirhi 1995). The reason for their demise is unclear, although the forage and habitat destruction that occurred during the 1920s era of intense sheep grazing may have been a major contributor. Gabrielson and Jewett (1940) did not include Morrow County as a location where sage grouse populations were surviving by the 1930s, even though Jewett spent six years (1928 to 1934) conducting bird studies in northern Morrow County. Nevertheless, a few breeding sage grouse may have survived on lands immediately west of the facility into the 1970s, based on descriptions provided by local livestock grazers (R. Morgan, pers. comm. 1998). An anecdotal sighting of a pair of sage grouse in the southwest corner of the installation was received from one of the Navy personnel stationed on the range in 2003. Subsequent spring surveys for sage grouse were conducted in the southwest corner of the range from 2004-2008 and have not been able to validate the 2003 sighting. To date, no confirmed sightings of sage grouse have been observed on NWSTF Boardman (J. Phillips, pers. comm. 2008).

The potential for reestablishment of sage grouse on the facility was dismissed by McClelland and Bedell (1987) due to a lack of suitable habitat. However, that assessment may have been premature, especially with range improvements in the RNAs and planned development of permanent water sites on the range. While subsequent analysis may show that major habitat requisites for sage grouse are lacking, the potential for reestablishment may be worth further examination.

Based on typical grouse densities found elsewhere in Oregon (Gregg 1991), the 47,432-acre facility might support between 200 and 600 grouse and six or more strutting grounds or leks (Braun et al. 1977). However, the ability of the facility to support these numbers of birds is directly dependent on the availability of the bird's life requisites for each the breeding, nesting, brooding, and wintering life stages.

3 ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY

3.1 Supporting Sustainability of the Military Mission and the Natural Environment

The fundamental component of natural resources management is personnel and funding. OPNAVINST 5090.1E requires each installation to have a designated and qualified Natural Resources Manager. NWSTF Boardman NRM is a permanent, funded position, administratively situated at NAS Whidbey Island. Other environmental professionals within the Navy Region Northwest, as well as the NAVFAC Northwest, can assist in the management of natural resources on NWSTF Boardman. The NRM integrates environmental protection, conservation, enhancement/restoration, and outdoor recreation within the constraints of Boardman's military mission. At the same time, the NRM identifies risks to the environment that may result from military activities and reports potential risks to the Command.

This document is designed to support the military mission by meeting natural resource compliance requirements and by maintaining training lands for realistic training scenarios that can sustain impacts from those training activities. The document incorporates natural resources goals and objectives to provide mission support that should be integrated with military mission planning. Successful implementation of this INRMP requires close coordination between the installation natural resources manager and the military operators that use and maintain the facility. This document has been reviewed by the military operators and planners that manage NWSTF Boardman. All natural resource future projects and actions will be coordinated with installation operational range sustainment planners and range operators.

3.2 Compliance with Federal Requirements

3.2.1 Threatened and Endangered Species Consultation

Federal agencies are required by the Endangered Species Act (ESA) to manage federally listed threatened and endangered (T&E) species and their habitat in a manner that promotes conservation of T&E species and is consistent with plans for recovery of such species. Section 7 of the ESA requires all federal agencies to enter into consultation with the USFWS whenever proposed actions "may affect" listed T&E species of plants and animals. Although there are no federally-listed threatened or endangered species currently at NWSTF Boardman, proposed projects, operations, or other actions are routinely scrutinized for potential impacts to *all* species through a formal review process (described below in Section 3.2.3). Should a species found on NWSTF Boardman become listed in the future, Section 7 consultations will be initiated if warranted; otherwise, written documentation that there are no effects to T&E species will be generated by the NRM and kept with the project files. The NRM will use this INRMP as a tool to identify, at an early stage, the potential impacts of planned Navy actions on endangered, threatened, candidate, and sensitive species and to provide a basis for altering the action to prevent or minimize those impacts. It is a goal that INRMPs are developed and implemented to provide benefits to federally listed species and to obviate the need to formally list species. It is beneficial to stakeholders to address management and conservation issues for species before they become federally listed.

The FY 2004 National Defense Authorization Act (NDAA) modified the critical habitat provision in the ESA to allow an approved INRMP to be used by the Department of the Interior in lieu of a critical habitat designation. The INRMPs can be more effective than the critical habitat designation because

INRMPs provide a more holistic approach to species conservation and provide greater flexibility for installations to manage their lands while maintaining coordination with the USFWS and all interested stakeholders.

Impacts to the military mission: If a listed species is identified or critical habitat is designated under the ESA and consultation is necessary, an outcome of that regulatory process could require changes to particular activities or mitigation that could result in delays and additional costs. Because of this, it is imperative that the Command initiate early environmental/natural resources review of proposed actions in order to assess risks, develop alternatives, and correctly identify mitigation costs both in terms of time and dollars.

3.2.2 State Threatened, Endangered, and Sensitive Species Coordination

The Sikes Act requires that the Navy partner with state fish and wildlife agencies to manage resources on each installation. At NWSTF Boardman, the NRM will inform the appropriate ODFW manager about Navy actions that may affect fish and wildlife on the installation. This informational mechanism is more informal than the federal process, but yields the same results: identification of potential impacts of planned Navy actions on fish and wildlife, including state listed species, and provides an opportunity for an information exchange with state fish and wildlife experts that can provide a basis for altering the action to prevent or minimize those impacts.

3.2.3 Planning for National Environmental Policy Act (NEPA) Compliance

The National Environmental Policy Act (NEPA) of 1969 (42 USC § 4321 et seq.) requires federal agencies to evaluate the impacts of their proposed actions on the quality of the human environment. To be an effective decision-making tool, the Navy integrates the process with other Navy-Marine Corps project planning at the earliest possible time. This ensures that planning and decision-making reflect environmental values, avoid delays, and potential conflicts.

NEPA and Navy policy require early review and coordination for environmental considerations. This is achieved at NWSTF Boardman by NAS Whidbey Island's environmental review process, which requires all new projects, programs, and operations, or changes to existing projects, programs, and operations, be reviewed by the NRM for potential impacts to the environment, including potential impacts to natural resources. The NRM reviews planned 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 early review process also allows the NRM an opportunity to feed information into the appropriate NEPA documents that will be generated based on the proposed action and the alternatives and identify natural resource environmental compliance requirements.

The Natural Resources Program is not exempt from the review process, nor from the requirements of NEPA. Agricultural leases, research projects, and vegetation management, just to name a few possible natural resource actions, must all be reviewed for environmental risks and impacts, the same as if the proposed action is a building project or a new training operation.

Per Navy and DoD policy, INRMPs are planning documents subject to NEPA review and coordination. An environmental assessment (EA) is determined to be the appropriate level of NEPA documentation for the INRMP and the natural resources management actions proposed within it. The final approved EA of 2020 and the Finding of No Significant Impact (FONSI) are presented in Appendix F along with coordinating correspondence.

3.2.4 Sikes Act/Sikes Act Improvement Act

The Sikes Act of 1960 initially authorized each DoD installation to develop a plan to manage and maintain wildlife, fish, and game conservation and rehabilitation. In 1997, Congress passed amendments to the original Sikes Act requiring the DoD to prepare and implement an INRMP for each installation in the United States with "significant natural resources."

The SAIA requires DoD facilities to manage their natural resources so as to provide multiple uses and public access to the extent that it is consistent with the military mission. The SAIA also requires that all INRMPs and natural resources management actions are developed to ensure "no net loss" to the military mission and training activities. The Act provides a mechanism whereby the DoD, the Department of Interior, and the state cooperate to manage fish and wildlife on military installations.

A tripartite cooperative agreement, under the Sikes Act, for the management of natural resources and implementation of the integrated natural resources management plan on NWSTF Boardman was developed and signed with the USFWS and ODFW in 1998. Currently, no hunting occurs on the installation and no Sikes Act fishing and hunting permit fees are collected.

3.2.5 Bald and Golden Eagle Protection Act (PL 76-567), as Amended 16 USC § 668 et. seq.

The Bald Eagle Protection Act was enacted in 1940; in 1962, Congress extended the Bald Eagle Protection Act to cover golden eagles. This Act prohibits the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. "Take" is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle. 16 USC § 668c. "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." 50 CFR § 22.3.

3.2.6 Migratory Bird Treaty Act (MBTA), USC § 703 et. seq.

The MBTA is a federal statute that implements U.S. treaties with several countries for conserving and protecting migratory birds. The number of bird species covered by the MBTA is listed at 50 CFR § 10.13. Further, the regulatory definition of "migratory bird" is broad and includes any mutation or hybrid of a listed species, as well as any part, egg, or nest of such bird (50 CFR § 10.12). Migratory birds are not necessarily federally listed endangered or threatened birds under the ESA. The MBTA, which is enforced by the USFWS, states that it is unlawful by any means or manner, to pursue, hunt, take, capture [or] kill any migratory bird, except as permitted by regulation. 16 USC § 703(a). "Take" is defined under the implementing regulations as "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect". 50 CFR § 10.12. In July 2006, the DoD and the USFWS signed and entered into a Memorandum of Understanding (MOU) to promote the conservation of migratory birds in accordance with EO 13186 (see below). This MOU describes specific actions that should be taken by the DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; ensure DoD operations–other than military readiness activities–are consistent with the MBTA. The final rule, Migratory Bird Permits: Take of Migratory Birds by the Armed Forces, was published as 50 CFR Part 21, in the February 21, 2007 Federal Register, pages 8931-8950 and applies to military readiness activities that occur on the installation.

3.2.7 Federal Water Pollution Control Act (aka: Clean Water Act (CWA)), PL 92-500, 33 USC §§ 1251-1388

The primary objective of the Clean Water Act (CWA) is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). The CWA regulates the discharge of pollutants into the navigable waters of the United States through several programs, including the National Pollutant Discharge and Elimination System (NPDES) permit program, encouraging States to address nonpoint source pollution and pretreatment standards for discharges to wastewater treatment plants. Section 404 of the CWA establishes the Federal regulatory program that governs dredge and fill activities. In addition, section 404 is used as the primary means of protecting wetlands. Pursuant to section 301 of the Act, discharges of dredged or fill material into waters of the U.S., including adjacent wetlands, are illegal unless permitted or exempted from the permit requirement, pursuant to regulation issued under Section 404.

No waters of the U.S. have been identified on NWSTF Boardman. During winters with heavier rain or snowfall, there can be areas of small temporary ponding that develop in central Juniper Canyon. However, these extremely ephemeral water areas have no ordinary high water mark, do not connect to navigable waters, nor contain wetlands adapted vegetation, so they would not be considered water of the U.S.

3.2.8 Tribal Treaty Rights and Tribal Coordination

The Boardman Bombing Range lies within the lands ceded to the United States by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and the Yakama Nation in the 1855 Treaties between the Tribes and the United States (12 Stat. 945). Article 1 of the Treaties reserves for the CTUIR and Yakama certain rights within the ceded lands. It states:

"Provided, also, That the exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians, and at all other usual and accustomed stations in common with citizens of the United States, and of erecting suitable buildings for curing the same; the privilege of hunting, gathering roots and berries and pasturing their stock on unclaimed lands in common with citizens, is also secured to them."

The Navy manages the Boardman Bombing range subject to the rights the CTUIR and Yakama reserved in the Treaties of 1855, as well as those established by statutes, regulations, executive orders, court decisions, and other authorities. SECNAVINST 11010.14B (Jan 18 2019) provides that the Navy will "[c]onsult with Indian tribes and NHOs as provided by law on all issues impacting Indian lands, properties of traditional religious and cultural importance to Indian tribes or NHOs, cultural items subject to reference (d), rights protected under treaties, and issues of concern to Indian tribes and NHOs." Pursuant to this consultation policy, the CTUIR and Yakama were contacted regarding the development of the INRMP in 2012. Consultation will continue with the CTUIR and Yakama regarding the potential impacts of management activities on treaty reserved resources, historic and cultural properties, as well as other issues of concern. The Navy has an ongoing responsibility to consult with the CTUIR and Yakama on a government to government basis in recognition of tribal rights and tribal sovereignty.

This INRMP and management strategy, as well as proposed yearly funded natural resources management actions or projects, will be reviewed annually by the Sikes Act management partners and INRMP signatories. It is the Navy's intent to consult with and solicit input from the CTUIR and Yakama concerning these reviews each year prior to them being held.

3.3 Executive Orders (EO)

In addition to the laws discussed above, there are a number of other laws and regulations that must be considered in natural resources management.

3.3.1 EO 11990 – Protection of Wetlands (May 24, 1977, 42 Fed. Reg. 26,961)
This EO requires federal agencies to avoid the destruction or modification of wetlands when there is a practicable alternative. Wetlands are defined in this EO as "…those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does (sic) or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and production. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds."

3.3.2 EO 11644 – Use of Off-Road Vehicles on Public Lands (Feb. 8, 1972, 37 Fed. Reg. 2,877)
This EO requires federal agencies to establish policies and provide for procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. The EO clarifies agency authority to define zones of use by off-road vehicles on public lands by exempting fire, military, emergency, law enforcement, or combat/combat support vehicles.

3.3.3 EO 11987 – Exotic Species (May 24, 1977, 42 Fed. Reg. 26,949)
To the extent permitted by law, federal agencies will restrict the introduction of exotic species into the natural ecosystems on lands and waters that they own, lease, or hold for purposes of administration, and they will encourage the states, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States.

3.3.4 EO 13112 – Invasive Species (Feb. 3, 1999, 64 Fed. Reg. 6,183)
To the extent permitted by law, federal agencies will prevent the introduction of invasive species, will detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner, will monitor such populations accurately and reliably, will provide for restoration of native species and habitat conditions in ecosystems that have been invaded, will conduct research on invasive species, and will promote public education on invasive species and means to address them.

3.3.5 EO 13186 – Protection of Migratory Birds (Jan. 10, 2001, 66 Fed. Reg. 3,853)
This EO requires federal executive agencies to implement a memorandum of understanding (MOU) with the USFWS to avoid or minimize the negative impacts of agency actions on migratory birds and to take steps to protect migratory birds and their habitats. The DoD and USFWS have developed and signed (July 2006) a MOU to promote the conservation of migratory birds.

3.4 Public Access and Outreach

Persons authorized to access NWSTF Boardman are military and civilian employees of the DoD and authorized contractors and personnel from research organizations conducting military training or training support activities. Currently, no hunting or hunting program occurs on the installation because of range safety issues. The hunting program issues are further described in Chapter 4.0.

Limited public access and outreach is provided in the Wells Springs public access area on the south boundary of the installation and includes several cultural and natural resources information displays. Public outreach regarding natural resources is typically coordinated through efforts with the NAS Whidbey Island Public Affairs Office.

3.5 Encroachment Issues and Potential Encroachment Partnering

NWSTF Boardman exists as a bombing range for military aircraft. Large tracts of agricultural property are found to the north, east, and south of the installation. On the west side lies large open lands (23,000 acres) that the owners (Threemile Canyon Farms) agreed to have managed by TNC as habitat for the Washington ground squirrel, birds, and plants and to allow public access along the Columbia River. NWSTF Boardman's natural resources management program attempts to coordinate with TNC management of the conservation area to maximize conservation benefits. The farm's remaining 19,000 acres will remain fallow, accommodating Portland General Electric Company's coal-fired electric plant and beef feedlots.

Agricultural development immediately adjacent to NWSTF Boardman's boundaries can be consistent with military operations because of the low density nature of crop circles and the lack of noise receptors. However, in recent years, incompatible development has occurred adjacent to NWSTF Boardman, such as wind turbine developments. Other incompatible development requests, such as major roads across the range, tall power transmission corridors, basin-wide wind turbine installation, and water recharge and crop circle agriculture on the range, have been discussed. These type of developments could directly and indirectly impact military training. For example, air space around the installation may be constrained or developments may negatively affect species that inhabit the NWSTF Boardman to become listed as threatened or endangered.

Navy personnel will continue to partner and work with the local community to prevent incompatible development proposals on and around NWSTF Boardman to maintain a viable military training asset for current and future missions. The Encroachment Partnering program can be used to acquire restrictive use easements off-range to mitigate developments that could impact military mission uses of the range. Encroachment Partnering is granted by OPNAVINST 11010.40, pursuant to 10 USC § 2684a, to acquire easements to resolve encroachment issues or acquire habitat conservation easements to conserve sensitive species or habitat off of military training ranges. The objective of encroachment partnering is to "eliminate or relieve current or anticipated environmental restrictions that would or might otherwise restrict, impede, or otherwise interfere, whether directly or indirectly, with current or anticipated military training, testing, or operations on the installation" (10 U.S.C. 2684a(a)(2)(B)). Within the 5-year scope of this INRMP, there are no currently identified or planned acquisitions of off-site conservation easements that focus on natural resources benefits. The main purpose of this INRMP is to manage natural resources on Navy owned lands at NWSTF Boardman. Natural resources personnel will continue to work with Navy encroachment planners to identify natural resource based encroachment issues and potential off-site conservation easements that could benefit management of regional species and habitat.

3.6 State Comprehensive Wildlife Conservation Strategy (SCWCS)

In 2016, USFWS approved ODFW's state Comprehensive Wildlife Conservation Strategy (SCWCS), which addresses the full range of wildlife conservation needs and their habitats. In 2016, ODFW submitted and USFWS approved the 10-year revision to the SCWCS (https://www.dfw.state.or.us/conservationstrategy/). As a stakeholder in the management of natural resources on the installation, ODFW works closely with the Navy on various wildlife conservation issues, ranging from on-site habitat protection to invasive species control, and also cooperates with the installation on developing and conducting wildlife and habitat research and surveys.

Table 3-1. Conservation Actions Identified in the 2005 Comprehensive Wildlife Conservation Strategy.

State Conservation Actions
Work with community leaders and agency partners to ensure planned, efficient growth, and to preserve fish and wildlife habitats, farmland, forestland and rangeland, open spaces, and recreation areas.
Use, expand, and improve financial incentive programs and other voluntary conservation tools to support conservation actions taken by landowners and land managers.
Develop new voluntary conservation tools to meet identified needs.
Promote collaboration across jurisdictional and land ownership boundaries.
Work creatively within the existing regulatory framework, seeking new opportunities to foster win-win solutions.
Inform Oregonians of conservation issues and the actions everyone can take that will contribute to Oregon's collective success.
Columbia Plateau Conservation Actions
Water conservation.
Soil erosion prevention.
Habitat fragmentation prevention/restoring connectivity.
Invasive species control.
Shrub-steppe restoration and management.
Restore and maintain sagebrush habitat.
Restore and maintain grasslands.
Boardman Area Conservation Actions
Control wildfires to protect native habitats from risk of conversion to cheatgrass.
Maintain and/or initiate shrub-steppe restoration and management.
Promote early detection and suppression of invasive weeds.
Habitat Conservation Actions
Evaluate carefully the impacts that may occur from prescribed fires.
Emphasize prevention, risk assessment, early detection, and quick control of invasive species.
Manage grazing to prevent soil erosion and detrimental changes to wildlife habitat.
Conserve habitats to prevent conversion to agriculture or urban/suburban sprawl.
Maintain high priority shrub-steppe habitat patches and improve connectivity when possible.
Species Conservation Actions
Washington ground squirrel: maintain habitat; restore connectivity between habitat patches.
Brewer's sparrow: maintain sagebrush habitat; restore connectivity between habitat patches.
Ferruginous hawk: provide diverse vegetation to support prey; maintain known and potential nest site trees (junipers); minimize human disturbance during nesting season.
Grasshopper sparrow: maintain grasslands; increase plant diversity; control invasive plants; no mowing until > July 15.
Loggerhead shrike: maintain seral sagebrush habitat.
Long-billed curlew: maintain and restore short grass habitat; minimize human disturbance around nests during nesting season.
Sage sparrow: maintain ground cover.
Swainson's hawk: protect nest trees; maintain ground cover for prey resources.
Western burrowing owl: maintain ground cover; establish 200' protective buffer around nests; protect badger populations.
Northern sagebrush lizard: maintain habitat patches; restore habitat connectivity.
Laurence's milk-vetch: maintain priority sites; control invasive plants.
Tygh Valley milk-vetch: mow around rather than spray; protect from grazing.

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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 OPNAV M-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 BSO 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 DD Form 448 Military Interdepartmental Purchase Request), cooperative ecosystem study unit agreements, contracts, and in-house and self-help processes, and voluntary services.

4.2 Threatened and Endangered Species Management

The Endangered Species Act (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 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, 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 listed threatened and endangered species at NWSTF Boardman for which consultation with USFWS is required. As a result, no projects at NWSTF Boardman 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.

Critical Habitat
Currently, there is no Critical Habitat Designation for threatened and endangered species on NWSTF Boardman. 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.

Section 4(a)(3)(B)(i) of the ESA states "the Secretary [of the Interior or the Secretary of Commerce] shall 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 670a of [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.

The USFWS uses three criteria (USFWS 2015b) to determine if an INRMP provides adequate special management or protection to obviate the need for critical habitat designation:

(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 Regional Office 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.

4.3 Wetlands Management

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

In order to comply with the "No Net Loss of Wetlands Policy" of the Navy, commands with land management responsibilities shall ensure the following:

- That the Navy 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. Within this policy, use of Navy lands and lands of other entities are permissible for mitigation purposes for Navy projects when consistent with EPA and COE guidelines or permit provisions. Requests by non-Navy entities to mitigate the effects of non-Navy projects on Navy property should be reviewed on a case-by-case basis for their effect on Navy mission, the environment, and appropriateness of economic compensation to the Navy for the long-term use of the site, all such projects need to be approved by the chain of command;
- That any action significantly affecting wetlands is addressed by the environmental review and public notification process (NEPA);
- That boundaries of legally defined wetlands, on all Navy lands, are identified and mapped with sufficient accuracy to protect them from potential unplanned impacts, and that the maps are 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 should be required for all projects;
- That adequate expertise is available to installation commanding officers (COs) for the protection, management, identification, and mapping of wetlands;
- That implementation of wetlands creation or enhancement projects and wetlands banking, where compatible with the installation mission, is encouraged. Natural resource managers should identify potential wetland mitigation sites.

Wetland management strategies vary depending primarily on the wetland’s classification, which is determined by the value of a particular wetland. A wetland’s value is determined by the quality of the functions it provides, including its biomass production, habitat, erosion control, and storm water storage. Some of the factors used to measure the quality of these functions are the wetland’s size, its location in the watershed, the amount of development in the watershed, vegetative structure and composition, rate of water flow through the wetland, the size of natural buffers, and surrounding land

uses. The program/project review process identifies possible wetland area, evaluates any potential impacts to those wetlands and ensures that program/project managers are aware of the laws and regulations regarding the protection of wetlands.

To date no jurisdictional wetland areas have been identified on NWSTF Boardman. During heavy precipitation years, several very ephemeral small shallow ponds can develop in central Juniper Canyon, but the areas contain no ordinary high water marks and develop no wetland adapted vegetation so they would not be classified as jurisdictional wetlands. These ephemeral ponded areas are used by breeding spadefoot toads, so they are significant ephemeral water features.

4.4 Habitat Management

See Section 2.6.4. for a description of the habitat types on NWSTF Boardman.

Habitat Enhancement and Restoration
Habitat restoration and enhancement will focus on controlling noxious weeds and preventing mechanical habitat degradation. Natural habitat recovery of burned areas will be assessed by repeated monitoring of established vegetation plots and additional pedestrian surveys. Areas that are not recovering naturally back to the desired pre-fire habitat types will be assessed for restoration success and priority ranked for potential restoration measures.

Habitat Management – Water/Wetland/Riparian/Ephemeral Aquatic Areas
There are no streams or wetlands on NWSTF Boardman. The only area that has ever exhibited wetland vegetation at NWSTF Boardman is Toad Pond, previously described in Section 2.6.2. Because the lack of a stable natural hydrology, Toad Pond would not be classified as a jurisdictional wetland, but, as noted above, did support intermittent surface water when the grazing water system was functioning, providing wetland adapted vegetation. The last time the system had water was in 2006. As of 2011, the pond has been dry for 5 years and wetland vegetation is no longer present.

The pond was established as a spadefoot toad breeding location, but other wildlife species used the pond as a source of water. Ephemeral ponded areas in Juniper Canyon can develop during heavy precipitation years and are vulnerable areas used by breeding spadefoot toads. Because of their ephemeral nature and shifting location based on soil depressions present during the heavy rain years, these areas are difficult to manage. When these shallow ponded areas are present, they will be avoided as much as possible so as not to negatively impact spadefoot toad breeding cycles.

Figure 4-1. Dry cattail stems in Toad Pond (September 2006).

Habitat Management – Developed Areas
The following items will improve wildlife habitat.

- **Where feasible, reduce the mowed areas**. Reducing mowed areas will allow native vegetation to grow, enhance wildlife habitat, and may also result in a maintenance cost savings for the Navy.
- **Use native vegetation for landscaping around buildings**. Native vegetation is well-suited to the conditions of the Columbia Plateau region, requires less maintenance to keep healthy, and provides better wildlife habitat than exotic, non-native plants and trees.
- **Reduce pesticide/herbicide/fertilizer use.** Reducing the use of chemicals will help protect surface and groundwater quality at the installation.

Habitat Management – Sand Dune
A large sand dune is a noticeable feature of the north border of NWSTF Boardman. There is a possibility for the dune to move onto an adjacent, privately-owned agricultural property. Although no management prescriptions are warranted at this time, it would be useful to monitor the movement of the dune over a long period of time. This can be done by periodic aerial surveys, but a less expensive method is to install permanent markers around the perimeter to track movement. The markers should be accurately surveyed using GPS equipment so that locations of the markers may be mapped. The markers should consist of (or have close by) pipes or poles calibrated with markings to measure rate of deposition of sand (or loss of sand depending on the movement). This

information can be useful to the Navy if movement of the dune off-installation becomes a future issue. Because this dune complex is a regionally sensitive habitat area, no off-road vehicle activity is allowed on the dune or in nearby habitat areas. This site is attractive to trespassers entering Navy property with off-road vehicles. The Navy personnel stationed at the range will work to prevent unauthorized access and off-road vehicle activity on the dune.

Habitat Management – Juniper Trees
Western juniper stands have been expanding in Oregon and other western states since the late 1800s (OSU 1993). This expansion has been attributed to grazing and the reduction of wildfires (OSU 1993). Juniper, if left unchecked, can shade out understory grasses and forbs and also reduce rainfall to the ground, further impacting the understory plants and resulting in bare soils around the trees. During large rainfall events, the bare soils allow for increased runoff, causing erosion and sediment loading of streams (OSU 1993). The interruption of the water cycle can result in lowered water tables and a reduction in stream flows during the drier periods of the year.

A review of aerial photos of the juniper areas and a brief field inspection in 2006 shows that the juniper tree numbers are relatively stable; that is, some trees died during the recent wildfires but there is evidence of new tree growth too. No more than approximately 200 trees have been identified on NWSTF Boardman, so the problems mentioned in the above paragraph have not been experienced or are not of sufficient impact to warrant special management. A new survey was conducted in 2018 and once the report is finalized, it will be added to the INRMP. Preliminary results indicate that the population is stable and regeneration is occurring. Juniper trees provide habitat and shade to various birds and other wildlife. The juniper trees should be protected from wildfires or other impacts. The removal of trees is not recommended as dead and live trees provide valuable wildlife habitat.

Habitat Management – Native Bunchgrass
Native bunchgrass communities are composed of bluebunch wheatgrass (P*seudoroegneria spicata* spp. *spicata* (*Agropyron spicatum*)), needle and threadgrass (*Hesperostipa* (*Stipa*) *comata*), and Sandberg's bluegrass (*Poa secunda*). These habitats are well suited for rangeland use. The bluebunch wheatgrass is preferred feed for elk, deer, and antelope throughout the year. The needle and threadgrass species are effective grass in preventing wind erosion on sandy soils. They are also one of the first grasses to naturally establish in disturbed sandy sites. Sandberg's bluegrass is probably the most common bluegrass species in the West and is an important species for small animals and birds in the spring and fall. It is not considered an important forage species for large wildlife species.

Habitat restoration and enhancement will focus on controlling cheatgrass and other nonnative weeds which competitively displace native bunchgrass over thousands of acres of NWSTF Boardman. Prevention of mechanical degradation and wildfire is particularly important as these disturbances predispose establishment of cheatgrass and other nonnatives, negatively impacting re-establishment of native bunchgrass. Natural habitat recovery of the burned areas will be monitored by repeated monitoring of established vegetation plots and additional pedestrian surveys. Areas that are not recovering naturally back to the desired pre-fire habitat types will be assessed for restoration success and priority ranked for potential restoration measures.

Habitat Management – Sagebrush
Sagebrush habitats of NWSTF Boardman are shrubland communities dominated by big sagebrush (*Artemisia tridentata*). These habitats are important for a variety of birds and wildlife. The birds in these shrublands not only add to the West's diversity of wildlife, they are important to the sagebrush ecosystem itself, providing crucial services such as dispersing seeds and

preying on insects and rodents (Paige and Ritter 1999). Other wildlife species, including pronghorn and sagebrush lizard, also depend on healthy sagebrush habitat. Pronghorn, mule deer, and elk may rely heavily on sagebrush during the winter. Taller sagebrush provides cover for deer fawns and nesting sites for many shrub-nesting birds. The sage thrasher, Brewer's sparrow, and sage sparrow nest most frequently in or beneath sagebrush (Paige and Ritter 1999).

Habitat restoration and enhancement will focus on controlling wildland fire, mechanical degradation and nonnative weeds that can remove or inhibit sagebrush growth. Conservation of big sage brush areas is heavily dependent on decreasing fire frequency and fire size on NWSTF Boardman as wildland fire is typically lethal to big sagebrush. Natural habitat recovery of the burned areas will be monitored by repeated monitoring of established vegetation plots. New survey methodology should be incorporated to monitor long-term ecological condition of sagebrush-steppe. Areas that are not recovering naturally back to the pre-fire habitat types should be assessed for restoration success and priority ranked for potential restoration measures.

The following table (Table 4-1) is adapted from Paige and Ritter (1999) and lists potential management actions that can reduce impacts and protect sagebrush habitats foster wildlife use of the areas.

Habitat Management – Biological Soil Crusts

Biological soil crusts can be highly susceptible to disturbance, both fire and mechanical. The follow discussion on biological soil crust impacts and management is adapted from Belnap et. al. (2001).

Biological soil crusts provide little fuel to carry a fire through interspaces, thereby acting as "refugia" to slow the spread of fire and decrease its intensity (Rosentreter 1986). Unburned islands of vascular vegetation and biological soil crust provide propagules for reestablishment in burned areas. Johansen et al. (1993) observed that the crust's structural matrix was left intact following low-intensity fire, indicating that a lightly burned crust still functions to maintain stability against erosive forces for both vascular plants and biological soil crusts during the recovery period. Biological crusts are generally killed by hot ground fires, resulting in loss of biomass and visible cover (Johansen et al. 1993). Frequent fires prevent recovery of lichens and mosses, leaving only a few species of cyanobacteria (Whisenant 1990; Eldridge and Bradstock 1994). Damage to, and recovery of, biological crusts depend on the pre-fire composition, structure of the vascular plant community, as well as fuel distribution, fire intensity, and fire frequency. Many semi-arid areas are now commonly invaded by annual weeds, and unnaturally frequent, large fires that preclude crustal species' recolonization or succession. Disturbance can directly and indirectly affect many aspects of the structure and function of biological crust communities, including cover, species composition, and carbon and nitrogen fixation. The impact of a given disturbance depends on its severity, frequency, timing, and type, as well as the climatic conditions during and after it.

While most mechanical (compressional) disturbances (such as from vehicles and trampling by people or animals) result in similar types of impacts, severity can vary widely depending on disturbance source. For instance, vehicles and trampling exert compressional and shear forces; however, these forces are much greater for vehicles than trampling. In addition, vehicles often turn soils over and bury crustal organisms, while trampling tends to only compress the surface. Intensifying physical impacts (such as high-intensity, short-duration grazing) is deleterious to

Table 4-1. Sagebrush habitat management actions.

Activity	Wildlife Goal	Action
Military Activities	Reduce impact on wildlife habitat.	Protect springs from vehicle use and training exercises. Encourage use of established sites, including keeping vehicles on established trails and roads. Provide maps of springs and ephemeral ponds to installation users. Limit the number of roads; reclaim excess roadbeds with native vegetation.
Insecticides	Reduce wildlife mortality and protect native habitat.	Include protections for birds and other wildlife in integrated pest management programs. Use natural pathogens instead of broad-spectrum insecticides. Avoid broadcast spraying; use limited ground applications rather than aerial spraying.
Recreation	Reduce impact on wildlife habitat.	Protect springs from recreational use. Encourage use of established sites, including keeping vehicles on established trails and roads.
Prescribed Fire and Wildfire	Allow reestablishment of native grasses and forbs in heavily managed circumstances.	Burns should be of small scale and patchy distribution with strict time frames and situation in order to benefit native vegetation. Any controlled burns must be conducted under specific and controlled conditions followed by intensive reseeding. Prescribed fire is not recommended as a method for re-establishment of native bunchgrasses in cheatgrass areas due to robust and highly invasive character of cheatgrass. Prescribed burns should not be conducted in big sagebrush. Burn in spring, or fall to address native grasses' adaptations to late season fires and to discourage cheatgrass. Reseed burns with native bunchgrass and forb species. Do not conduct prescribed fires in early spring in areas where birds are nesting to comply with the MBTA.
	Prevent large-scale wildfires and high wildland fire frequency that will result in cheatgrass invasion or will destroy high-value sagebrush sites.	Use fire breaks around high quality sagebrush habitat areas. No disking is allowed, fire breaks will be created only through mowing native vegetation or retardant or herbicide application (green-stripping). Increase suppression capability to decrease wildland fire size and frequency.

biological soil crust cover and its species richness (Johansen 1993). Disturbance that removes or kills crustal organisms results in greater impact and slower recovery than disturbance that leaves crushed crust material in place.

Recovery rates are dependent on many factors, including disturbance type, severity, and extent; vascular plant community structure; adjoining substrate condition; inoculation material availability; and climate during and after disturbance. In general, crusts are highly susceptible to hot fires; thus, recovery will depend on the size and intensity of fires. As noted previously, most compression disturbances have similar types of impacts. However, severity of mechanical disturbance can vary widely with disturbance type. Thus, on similar soils, vehicle tracks generally have longer recovery times than disturbances that do not churn the soil or make continuous tracks (Wilshire 1983; Belnap 1996). Because recolonization of disturbed areas occurs mostly from adjacent, less-disturbed areas, the size and shape of disturbance can affect recovery rates.

While total protection from disturbance is often the easiest way to maintain or improve biological soil crusts, this is not often possible or desirable. There are many factors to consider in the management of soil communities, including disturbance type, intensity, timing, frequency, duration, or extent. Proactive management is needed to prevent unnaturally large and/or frequent fires in areas where fuel build-up or annual grass invasions have occurred. Such management actions may include altering grazing regimes to prevent annual plant invasions, preventing fuel build-up, fire prevention, increase of initial suppression capability, and restricting off-road vehicle use. Once a site has burned, evaluation is needed to determine whether recovery will occur naturally or if revegetation is needed. Many burned sites, particularly those in the Great Basin, Intermountain regions, and the Columbia Plateau, require revegetation to stop exotic plant invasion, and most techniques require some soil surface disturbance. This may not appear consistent with recovery of biological crusts. However, failure to treat sites can result in irreversible dominance by annual species (such as cheatgrass), which prevents the return of well-developed biological soil crusts (Kaltenecker 1997, Kaltenecker et al. 1999a).

Biological soil crust management on NWSTF Boardman will focus on preventing fire and mechanical impacts and then restoring degraded habitats. Habitat restoration and enhancement will focus on controlling noxious weed and preventing mechanical habitat degradation. Natural habitat recovery of the burned or mechanically disturbed areas will be monitored by repeated monitoring of established vegetation plots and additional pedestrian surveys. Areas that are not recovering naturally back to the desired pre-disturbance habitat types will be assessed for restoration success and priority ranked for potential restoration measures. Disturbed areas will be reseeded (either by broadcast seeding or using a no-till rangeland seed drill) or monitored for natural plant revegetation. Minimizing invasion by cheatgrass and other exotics or noxious plants is a primary goal of native plant restoration. Chemical or biological control of cheatgrass and noxious weeds may be necessary to allow for native plant establishment. Revegetation treatments will be repeated as needed to establish native vegetation on the entire burned areas. Once an area's soil becomes stable and vegetation has been re-established after disturbance, the condition of the biological soil crust will be re-evaluated. If the soil crusts in the area are heavily damaged or have been destroyed with no nearby habitat for recolonization, then the site will be evaluated for soil crust restoration by spreading or introducing cyanobacteria or moss by application of those soil components to inoculate the soil. This has been shown to be effective in accelerating the redevelopment of biological soil crusts.

4.5 Fish and Wildlife Management

4.5.1 Hunting Program

Military Reservation and Facilities: Hunting, Fishing and Trapping Act of 1958 (Public Law 85-337, 10 U.S.C. § 2671). This Act requires that all hunting, fishing, and trapping activities on military installations be conducted in accordance with the state fish and game laws in which the installation is located. Appropriate state licenses must be obtained for these activities on the installation.

Historically, limited small scale hunting for deer and birds occurred by military personnel stationed at NWSTF Boardman and for military and DoD civilian personnel stationed at NAS Whidbey Island and their guests. Since the late 1990s, this has been an informal and intermittent activity that was lightly controlled.

The Navy issued new access regulations for NWSTF Boardman in August 2009 (NASWHIDBEYINST 8020.8), to meet current safety requirements for an active military bombing range. Because of the potential for unexploded ordnance throughout the range, access to NWSTF Boardman has been restricted to military training and direct training support activities. The suitability of any hunting program or other non-training access has been evaluated against these new safety requirements. From that evaluation, it was determined that access for hunting on NWSTF Boardman is not consistent with and cannot meet safety and access requirements as outlined in NASWHISBEYINST 8020.8. Therefore, in November 2010, access for hunting on NWSTF Boardman was formally closed and no hunting is authorized on NWSTF Boardman.

If access requirements and unexploded ordnance safety issues change in the future, the suitability of a hunting program on NWSTF Boardman may be re-evaluated. Should hunting become a suitable use for the range at in the future, a formal hunting program could be established. Any formal hunting program development would be coordinated with the USFWS, ODFW, and Tribes with treaty rights to coordinate procedures, participation, program requirements, and to outline and codify requirements for access.

4.5.2 Migratory Birds

This management plan is envisioned with a large-scale habitat/ecosystem management concept. Therefore, most management prescriptions and conservation actions are habitat based. This plan is designed to be in compliance with the requirements of the DoD and the USFWS MOU to promote the conservation of migratory birds in accordance with EO 13186. Habitat management prescriptions and species survey actions are designed to advance migratory bird conservation, species understanding, and avoid or minimize the take of migratory birds.

Long-billed Curlew and Burrowing Owl

Long-billed curlews and burrowing owls are significant regional migratory bird populations that nest on NWSTF Boardman and have been the subject of many research activities (see Section 2.6.5 and Appendix D).

Similar to Washington ground squirrels, management strategy for these regionally significant bird populations focuses around a combination of population monitoring, habitat assessment, and habitat enhancement and restoration. Curlew and burrowing owl surveys will be conducted at necessary repeated time intervals in order to determine the activity status of historical nesting locations. Using standard transect survey monitoring protocol, surveys will provide information confirming species presence, geographic extent of nesting sites, estimates of abundance in occupied habitat, and can be compared to previous survey work for the species. This will help to

identify current occupied habitats. Habitat restoration and enhancement should focus on controlling noxious weeds and preventing mechanical and wildland fire disturbance of habitats. Natural habitat recovery of previous and future burned areas will be assessed by repeated monitoring of established vegetation plots and additional pedestrian surveys. Areas that are not recovering naturally back to the pre-fire habitat types will be assessed for restoration success and priority ranked for restoration measures. Direct affect to individuals and nesting locations from operations will be accomplished by reviewing training and operational projects for potential impacts to known curlew and burrowing owl nesting locations, surveying project areas before activities, and incorporating suitable avoidance measures to reduce direct affects.

4.5.3 Partners in Flight

In 1990, the National Fish and Wildlife Foundation initiated the Neotropical Migratory Bird Conservation Program, known as "Partners in Flight - Aves de Las Americas" (PIF). The initiative stresses the importance of international conservation partnerships to focus limited financial and human resources to provide for the long-term health of avifauna throughout the Western Hemisphere. The purpose of the program is to bring together the diverse array of groups and individuals involved in the conservation and management of birds and their habitats. The initial focus was on neo-tropical migrants, but has now spread to include most birds requiring terrestrial habitats. In the U.S., more than 300 partners from federal and state agencies, conservation groups, foundations, academia, and forest products companies have contributed expertise and resources to make PIF successful in its conservation efforts. The PIF strategy for effective *c*onservation relies on setting realistic biological priorities, using an appropriate geographic scale, and applying an ecosystem management approach.

In 1991, the Navy signed a Memorandum of Agreement with other DoD and federal agencies to promote and support our partnership role in the protection and conservation of birds and their habitats by protecting vital DoD lands and ecosystems, enhancing biodiversity, and maintaining healthy and productive natural systems consistent with the military mission". Implementation of this strategy should allow DoD natural resources managers to determine best management practices based on regional or physiographic delineations rather than on a species basis. This ecosystem management approach provides a framework to consider the biological diversity on military lands in the context of the surrounding landscape, will improve long-term planning and efficiency, and promotes better integration of mission and resource requirements.

The primary goals and objectives of the DoD PIF program, as they are to be implemented at NWSTF Boardman, are to:

- Apply information collected from this partnership program to support DoD mission requirements;
- Take proactive management actions to prevent bird species from reaching threatened or endangered status;
- Facilitate cooperative partnership efforts consistent with the military mission;
- Determine the status of migratory and resident bird populations on DoD lands and the causes of population fluctuations;
- Reduce bird aircraft strike hazard risks through implementation of mobile radar;
- Maintain and restore priority habitats on DoD lands for migratory and resident bird populations;
- Reduce or eliminate pesticide use in sensitive habitats, especially in and around wetlands and riparian areas;
- Reduce the spread and impact to birds and their habitats of invasive and nuisance species on military lands, including feral and free-roaming cats.

For further information on the DoD PIF program go to http://www.DoDpif.org.

4.5.4 Bird Aircraft Strike Hazard (BASH)

There is no BASH plan for aircraft at this time because there are no fixed wing aircraft runways or helicopter pads at the installation. Helicopters could land and take off in many areas of the installation, if needed. However, helicopter landings and take-offs are rare at the installation. No specific BASH concentrated risk areas have been identified at this time and no habitat alteration, harassment, or depredation specific to BASH functions takes place at this time on NWSTF Boardman. Any BASH incidents are reported back to the aircraft's home station and that information is monitored by NAS Whidbey Island BASH personnel for any impending BASH risks that may need to be addressed. BASH risk is considered with the planning of all natural resource management actions and those prescriptions are designed to not increase BASH risk.

4.6 Land Management

4.6.1 Invasive Plant Species

The term "invasive species" is defined by EO 13112 to mean "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." The EO goes on to define an alien species as any species not native to a particular ecosystem, including the seeds, eggs, spores, or other biological material capable of propagating that species. Exotic invasive plants and animals have the potential to cause vast ecological and economical damage, and sometimes pose human health impacts in areas they infest. EO 13112 requires that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law:

- Identify such actions;
- Subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and
- Not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

To implement the above recommendations, known noxious weeds locations will be annually surveyed and controlled in a cooperative effort between the Navy and the Nature Conservancy (mostly within RNAs). Invasive plant species occurrences will be prioritized to target limited control efforts where they will do the most good. Targeted control should be based on the below general criteria (Dave Pranger, pers. comm. 1998):

- All "class A" species: rush skeletonweed, yellow starthistle, spikeweed, perennial pepperweed, Scotch thistle;
- medium-density and high density areas (the southern and eastern boundaries) of diffuse knapweed in the main target;
- High-density areas of diffuse knapweed outside of the main target;
- Low-density and very low-density areas of diffuse knapweed in the main target;
- Medium-density areas of diffuse knapweed outside of the main target;
- Low-density areas of diffuse knapweed outside of the main target;
- Other species: medusahead rye, cereal rye, Russian thistle;
- Very low-density areas of diffuse knapweed outside of the main target.

All control actions need to be in compliance with the requirements of the installation Integrated Pest Management Plan and applied herbicides have to be on the plan's approved list for use and applied by a federally licensed applicator. All installation training and facility operation actions shall be reviewed by the NRM for potential noxious weed issues. Existing installation-wide mapping of noxious weeds is outdated and in need of updating because of recent fires, habitat changes, and spreading invasive plant populations. A new installation-wide assessment needs to be performed to help with targeting future control priorities (see description in Appendix E).

4.6.2 Fire Management

There are three possible ways that NWSTF Boardman can experience uncontrolled fires: 1) fires originating on the installation from operational activities; 2) fires originating from lightning strikes; and 3) fires originating off-base from any source and migrating into the perimeter of the installation.

The primary natural resource objectives at NWSTF Boardman are to maintain resiliency of the Colorado Basin shrub-steppe ecosystem and reduce areas of invasive cheatgrass. Conservation of big sage brush is heavily dependent on decreasing wildland fire frequency and size on NWSTF Boardman as wildland fire is typically lethal to big sagebrush. Historic fire return intervals were 50 to 70 years for this part of the Columbia River plateau, but the interval has decreased to an estimated 5 to 10 years due to introduction of cheatgrass and invasive weeds (such as knapweeds). These invasive grasses have increased the fuel loading in these historic habitats with highly flammable fuels. Current fire suppression strategies are limited and compromise the Colorado Basin native shrub-steppe ecosystem. Reducing the current frequency and size of uncontrolled fires is most important to maintaining the remaining big sagebrush and native bunch grass shrub-steppe ecosystem on NWSTF Boardman.

Wildland fires at the current frequency and size are also detrimental to soil structure, biological soil crusts, and the associated wildlife community. Because sagebrush is highly susceptible to fire damage, wildland fire will continue to decrease or eliminate this vegetation to favor invasive non-native species. Repeated burnings of desirable perennial bunchgrasses has also contributed to invasive cheatgrass and other non-native species spreading over the installation landscape. Large areas of big sagebrush and native vegetation are necessary to retain the Washington ground squirrel and other dependent or associated wildlife species, and the current fire regime is causing degradation and elimination of this habitat.

The current Boardman fire strategy is to use the existing road system as the staging lines from which fires will be fought. As a result, large acreages, in one case over 30,000 acres, are burned. Permanent firebreaks can cause soil stability problems and cause noxious weed establishment. As the 2008 wildfire illustrated, disked firebreaks are not an effective means of stopping wildfires on

the Boardman range as seen in the photo below. Typical wind driven fires in the area can easily jump a dirt road with an adjacent double width disked firebreak (40 foot width), without burning the remnant vegetation in the break, and continue burning across the range unimpeded.

The present suppression strategy is to control fires at roads with wet lines, back burns, and mechanical breaks (if needed), instead of cross-country travel with tank trucks or tractors to construct new disked firebreaks. Cross-country travel with vehicles specifically damages biological soil crusts, Washington ground squirrels, and cultural sites. Trespass from neighboring entities has caused natural resource damage from cross-country travel. Additional suppression coordination with neighboring landowners would be beneficial to prevent trespass and improve prevention and suppression efforts. The current placement of firebreaks is a remnant of past operations and protection strategies that may no longer be prudent given the limited success of the fire breaks and change in operation tempo. A complete integrated review of fire break placement, and coordination of fire management strategy integrated with the natural resource objectives of this management plan, would meet mission objectives.

Fire Breaks

Firebreaks should serve the purpose of protecting infrastructure, and be focused around high use areas (targets, etc.). It is important that firebreaks are established and maintained only in stable soil locations situated around existing roads for easy access of equipment. In addition, only existing disturbed areas should be utilized with the objective of initiating fire suppression actions. Firebreaks need to be maintained several times a year to prevent noxious weed establishment and seed propagation. Alternative fire break technologies should be explored such as “green stripping” with selective herbicide application or planting fire resistant vegetation (such as forage Kochia) as opposed to mechanical disking or blading. Green stripping has been used successfully adjacent to existing roads by herbicide application to reduce annual and invasive species fuel loads without disturbing the soil or by planting fire resistant vegetation. Green stripping reduces soil erosion potential, avoids establishment of noxious weeds, and maintains some form of wildlife habitat value with the fire breaks. Any unneeded old fire breaks should be revegetated. Old disked areas should be treated to control invasive or ruderal species, seeded with suitable perennial native grass species, and monitored with continued maintenance until desired vegetation is established.

Range Operating Controls

In accordance with the Pacific Northwest Training Range Complex Manual (NASWHIDBEYINST 3770.1D), the use of tracer rounds at the strafe pit is authorized between 1 October and 31 May or at other times upon written approval of the NAS Whidbey Island Operations Officer (i.e., should unit scheduling provide its own wildfire suppression personnel and equipment onsite during strafe operations, consideration will be made to permit tracer rounds use outside the normal “low fire danger” season). This broad authorization for seasonal use can sometimes allow the use of pyrotechnic ammunition during high fire conditions. Since fire conditions are dependent on weather

patterns, high fire danger conditions can occur during the general October-May tracer round use period. If sufficient fire suppression resources are not available onsite during a training event, the Navy staff stationed at NWSTF Boardman should monitor weather and fuel conditions for high fire risk and be prepared to halt training operations if the risk from errant rounds, munitions, or pyrotechnics is high for producing a wildland fire. Future fire management and range planning should use a case-by-case strategy for identifying high fire risk when scheduling training activities. A fire risk severity ranking system is identified in Appendix E that could be fitted for use in determining when certain training activities would be unwise due to fire conditions.

Post Fire Requirements

To meet the INRMP goals and the military mission, re-establishment of native vegetation on a burned site must be conducted as quickly as possible. Since vegetation re-establishment is a function of available seed and water, the process may be delayed under dry or cold climatic conditions. After a wildfire of any origin, all burned areas will be mapped for extent and surveyed for habitat damage. Assessment will determine whether revegetation treatment should be accomplished. Depending on assessment, habitat type, and the likelihood of natural revegetation of desirable species from the native soil seed bank, the area will be reseeded (either by broadcast seeding or using a no-till rangeland seed drill) or monitored for natural plant revegetation. Minimizing invasion by cheatgrass and other exotics or noxious plants is a primary goal of post-fire restoration. Chemical or biological control of cheatgrass and noxious weeds may be necessary to provide native plant establishment. Revegetation treatments will be repeated as needed to establish native vegetation on the entire burned areas. Post-fire revegetation plans are specific to site conditions. Revegetation will be addressed specifically to site based on results of the post-wildfire assessment.

Re-establishment of the biological soil crusts on soils impacted by wildfire or suppression actions is an important part of the revegetation process. Soil stabilization is critical for successful crust establishment that requires stable soils for development. If specific areas of blowing soils are causing restoration, nuisance or safety concerns, localized stabilization fixes will be explored. Placement of small scale and localized mechanical soil stabilizing features after a wildfire (such as drift fencing) could provide localized benefits in problem soil movement areas, while limiting the effect of retarding native revegetation. The NRM should be engaged in developing any soil stabilizing activities. The NRM should also develop alternatives and/or locations for suitable work that is consistent with the goals and objectives of this plan. Restoring stable native vegetation is the most effective solution to reducing blowing sand issues on NWSTF Boardman. Once soil becomes stable with reestablishment of vegetation, re-assessment of the biological soil crust will be conducted. If the soil crusts in the area are heavily damaged or have been destroyed, the soil will be inoculated by introduction of cyanobacteria and/or moss to accelerate redevelopment of biological soil crusts.

Prescribed fire

Incorporation of prescribed burning into vegetation management is not considered practical or ecologically beneficial due to the unnaturally high fire interval on Boardman that predisposes establishment and dominance by cheatgrass and other non-natives. Prescribed fire is typically not recommended for controlling cheatgrass as it may increase cheatgrass populations and timing can be difficult (Menalled *et al* 2017) (Mealor et al 2013). Prescribed fire will decrease cheatgrass for a short time frame of one to two years and should be used only as a seed bed preparation technique where cheatgrass dominates the understory (Rasmussen 1992). As a result, prescribed burning is not supported as an appropriate method of managing for the Columbia Basin big sagebrush and bunch grass ecosystem compromised by cheatgrass (Chambers *et al* 2014) (Gordon *et al* 2014) (McIver *et al* 2014) (Bansal *et al* 2016). Additionally, current staffing levels and equipment are not adequate to plan or conduct prescribed burns. The high fuel loads resulting from invasive growth

of cheatgrass introduces additional control issues relative to existing suppression abilities on the installation.

Fire Management Strategy

A Comprehensive Wildfire Response Plan for NWSTF Boardman is recommended in order to guide 1) preventive actions, such as locations, size, and maintenance plans for permanent fire access and available airspace for aerial application of water/retardant, and 2) reactive actions, such as initial attack strategy, locations for temporary fire lines, use of wet lines, and access to water sources. The Navy Region Northwest Federal Fire Department is responsible for leading the development of the fire management strategy for NWSTF Boardman.

The NWSTF Boardman Fire Management Plan (2019) has identified that after preventative measures, quick initial suppression of ignitions is the most effective way to reduce extensive and frequent wildland fires. Major obstacles to achieve this stated goal are 1) inadequate organizational resources to identify ignitions on or off the installation 2) inadequate resources to initiate and respond to an ignition (outside of munitions events); 3) insufficient suppression equipment and 4) lack of water access. The Navy currently has not provided for an increase in staff or additional funding for necessary fire-fighting equipment to meet the stated goal of reducing fire size and frequency. Consequently, fire management relies on a limited level of suppression response and containment that can be sufficient for small and easily containable fires. Otherwise, fire suppression requires mutual assistance from outside agencies. Mutual assistance is available or occurs on an intermittent basis. As a result, ignitions from lightning and off-site origins have resulted in large fires at higher than natural frequencies at NWSTF Boardman.

Incorporating INRMP objectives into the fire management strategy would produce a comprehensive and effective integrated strategy to meet mission goals.

Natural Resource goals and objectives for fire management are as follows:

General habitat management

Goal: Identify and protect natural resources and monitor species and communities that are i n dicators of ecosystem integrity and integrate into fire suppression strategy.

Objective 1: Protect native big sagebrush juniper trees and pinyon juniper habitats from frequent wildland fire and damage.

Objective 2: Protect native grasslands from frequent wildland fire and damage

Objective 3: Reduce size of wildland fires by implementing improved initial attack.

Objective 4. Stabilize soils after wildfire.

Objective 5. Reintroduce biological crust soil organisms.

- Identify rehabilitative actions to be taken after wildfires to recover areas burned or disturbed during fire suppression activities.

Rare and listed species management

Goal: Mitigate negative effects to the Washington ground squirrel and habitat from wildland fire.

Objective 1: Suppress wildland fires.

- Suppress wildland fires, regardless of origin, on NWSTF Boardman and surrounding areas if requested.
- Develop suppression strategy to contain wildfire to small areas to prevent loss of sagebrush habitat.
- Provide an adequate level of prevention and rapid response in fire suppression for military-related (and other) wildland fires.
- Do not use tracked vehicles and avoid cross country vehicle travel except as approved by the installation NRM.

Objective 2: Restore areas damaged by fire

- Identify rehabilitative actions to be taken after wildfires to recover areas burned or disturbed during fire suppression activities.
- Restore fire-damaged areas using native species and broadcast seeding.
- Collect and plant small amounts of native seed not commercially available.
- Monitor the restoration success.
- Stabilize soils.

Fire Management

Goal: Prevent and suppress wildland fires to maintain ecosystem biodiversity and resilience.

Objective 1**:** Maintain trained and equipped wildland fire crews and staff appropriately during the fire season and while military training activities are occurring.

Objective 2: Increase patrol and fire suppression resources and capability for response during periods of lightning and dry fuels.

Objective 3: Improve mutual aid support agreements with other federal and state, and coordination with local entities for the suppression of wildland fires at NWSTF Boardman and fires that originate from off-installation.

Objective 3: Develop strategy and capability for initial attack to contain wildfires to small areas.

Objective 4: Provide sufficient fire suppression response that can be efficiently deployed during training exercises and as needed during periods of high wildland fire risk (lightning, high temperatures and winds).

Objective 5: Ensure mutual aid responders are aware of resource protections. Provide resource guidance and instructional maps.

Objective 6: Provide natural/cultural resources management-related recommendations relative to fire management and suppression activities to NWSTF Boardman Range personnel.

Objective 7: Manage range and training activities to prevent wildland fires.

Objective 8: Provide environmental awareness materials to stress the importance of fire prevention to all users of NWSTF Boardman.

Objective 9. Avoid disturbance of soil surfaces and do not use tracked vehicles or cross-country routes, except as coordinated with the NRM.

Objective 10. Conduct an integrated review of fire break placement and management with the installation NRM to achieve mission objectives:

- Focus placement around infrastructure, existing roads, in disturbed areas, and for effective initiation of suppression actions.
- Construct firebreaks only in locations with stable soils.
- Maintain fire breaks several times a year to prevent noxious weed establishment and seed propagation.
- Explore alternative fire break technologies such as "green stripping" as opposed to mechanical disking or blading.
- Avoid and preserve the remnant Oregon Trail wagon tracks; focus disturbance actions on the roadside away from the wagon tracks.

4.6.3 Agricultural Outleasing

Grazing and Crop Circles

Almost all of NWSTF Boardman was previously outleased as grazing lease areas until 2001, and three half-crop circles were outleased on the northcentral boundary of the installation until 2002. The grazing leases provided an average total of 3,590 Animal Unit Months [AUMs] of grazing capacity and the crop circles provided 240 acres of irrigated ground for row crop tillage as a way of stabilizing the main active sand dune. Historically, the total AUMs available for the lessees as stipulated in the contracts constituted about 55 percent of the potential AUM production for the lease areas (McClelland and Bedell 1987). Both sheep and cattle were historically used on the range and alfalfa was grown in the crop circles.

Since NWSTF Boardman is an active ordnance training range, all agricultural outleases must comply with the requirements of DoD Publication 6055.09-STD and NAVSEA Publication OP-5. Both publications limit access to active training ranges to necessary operational functions and set requirements for leasing ranges with potential unexploded ordnance. The requirements and reviews are extensive and the cost of meeting those requirements when weighed against the potential income and benefit generated from an agricultural outlease program would be cost prohibitive. Because of those issues, no current agricultural outlease program operates on the range nor is one anticipated during the duration of this management plan.

4.6.4 Research Natural Areas

The Research Natural Areas (RNAs) of NWSTF Boardman (see Figure 2-2) are part of a federal system of RNAs established for research and educational purposes. The Navy established the Boardman RNAs on September 1, 1978, to preserve high-quality examples of Columbia River Basin grassland and steppe vegetation communities and associated wildlife.

Federal RNAs provide a unique system of publicly owned and protected examples of relatively undisturbed ecosystems where scientists can conduct research with minimal interference and reasonable assurance that investments in long-term studies will not be lost to logging, land development, or similar activities. The main purposes of RNAs are to provide:

1. Baseline areas against which effects of human activities can be measured;
2. Sites for study of natural processes in undisturbed ecosystems; and
3. Gene pool preserves of organisms, especially rare and endangered types.

In return, a scientist wishing to use a RNA is obligated to:

1. Obtain permission from the appropriate administering agency before using the area;
2. Abide by the administering agency's regulations governing use; and
3. Inform the administering agency on progress of the research.

The management plan for the NWSTF Boardman RNAs follows much of the documentation from the original 1978 establishment report (see Appendix E for full report). The Commanding Officer, NAS Whidbey Island is the administrator of the RNAs on NWSTF Boardman. The non-commissioned Officer in Charge (NCOIC) at NWSTF Boardman and his assigned staff is responsible for coordinating access for the RNAs around scheduled military use of the facility. Access will not be granted during periods of military use that cover the areas of the subject RNAs. The principle contact for approval and coordination of research on the RNAs is the NRM, NAS Whidbey Island, Environmental Division, Public Works Department, NAS Whidbey Island, 1115 W. Lexington Street, Bldg. 103, Oak Harbor, WA 98278. Final approval of all research proposals will be by the Commanding Officer, NAS Whidbey Island. Per Cooperative Management Agreement between The Nature Conservancy (TNC) and the Navy, signed in 1988 (see Appendix E for full agreement), the Navy will review all proposed management activities, provide fire suppression, and control visitation to the RNAs. All RNAs are fenced to identify the boundaries and to control access. Access to the RNAs is subject to the following requirements:

- Approval of proposed research must be obtained from the Navy prior to using the area;
- B cooperative agreement between the Navy and the researcher must be entered into prior to use of the area;
- Proposed research must be essentially non-destructive;
- Collection of plant and animal specimens will be restricted to a minimum and such collections must be deposited in a public holding institution;
- Researcher must obtain approval from the NCOIC at NWSTF Boardman for access to the area prior to each use;
- Periodic reports on the progress of the research and copies of published research results must be provided to the Navy;
- Specific research must be compatible with the preservation of the ecosystem and the maintenance of its processes;
- Non-indigenous and invasive plant and animal species will not be introduced into the areas;
- Permanent structure will not be constructed within the areas, but minimal temporary research facilities may be approved by the Navy;
- No interference with normal cycles and fluctuations of wildlife populations will be allowed;

- Predator control will not be allowed within the areas without specific approval of the Navy;
- No camping is allowed on the area or the Navy facility; and
- No services or support will be provided by the Navy without prior request and approval.

The 1988 Cooperative Management Agreement coordinates management of the RNAs on NWSTF Boardman between TNC and the Navy. Key provisions in the agreement are that TNC will establish permanent plots and monitor vegetation trends within the RNAs, control noxious weeds within the RNA boundaries, and maintain the fences around the RNAs. TNC has reviewed and was included in the development of this INRMP. By letter (attached in Appendix E), TNC has committed to follow and advance the goals and objectives of this INRMP in their management of the RNAs under the existing cooperative management agreement. TNC and the Navy have proposed moving RNA-A due to the military activities and establishing a new RNA location. Local Navy staff will work with TNC on a proposal to move RNA-A from the main target and to identify the specific boundaries of a new location that is more representative of the unique habitat types the RNAs are designed to protect. An area located in the more sandy soil types in the northwest portion of the NWSTF or immediately west of the current RNA location would protect exceptional examples of several critically imperiled plant community types.

4.6.5 Grounds Maintenance and Landscaping

Grounds maintenance and landscaping includes considerations for weed control and urban forestry. It is Navy policy that environmentally and economically beneficial landscaping practices be used. These practices are outlined in a Memorandum on Environmentally
Beneficial Landscaping for Heads of Executive Departments and Agencies issued by the President (Presidential Memorandum), dated 26 April 1994. The Presidential Memorandum directs federal agencies to use landscaping techniques that enhance the local environment and minimize the adverse effects that landscaping can have on the environment. The Presidential Memorandum stresses the use of regionally native plants and practices that conserve water and prevent pollution. Integrated measures include reducing use of fertilizers, pesticides, and water use for both economic and environmental benefits. With regard to the control of noxious weeds, Navy installations will cooperate with state programs for controlling noxious plants.

4.6.6 Integrated Pest Management

Integrated Pest Management Plans (IPMP) are reviewed and revised as needed on a yearly basis according to DoD Instruction 4150.7 and OPNAVINST 6250.4C. Changes in pest management strategy, pest control methods, pesticides used, pesticide safety, and pest survey techniques are discussed in the IPMP. The IPMP is prepared by the Pest Management Coordinator and reviewed by the Public Works Officer, Environmental Office, and Medical Officer. Approval of the IPMP is conducted through joint review by the NAVFAC Area Pest Management Consultant and Officer-in Charge, Naval Disease Vector Ecology and Control Center.

Poisonous plants and noxious weeds shall be controlled or eradicated in accordance with approved practices and applicable laws when they interfere with safe and efficient land use, endanger the health and welfare of personnel, or constitute a source of weed infestation to adjacent property. The pest control measures and approved pesticides are identified in and shall be implemented within the IPMP guidelines.

Grasshopper Control

NWSTF Boardman can experience high population levels of grasshoppers that exceed the U.S. Department of Agriculture's economic threshold levels. Outbreaks are difficult to predict because they are dependent on climatic variables such as temperature, moisture, and previous wildfire occurrence. The last major outbreak on the range occurred during 2004-2005. Complaints from adjacent landowners can arise with requests that the Navy control grasshopper numbers on the range. Most adjacent landowners, however, conduct control operations on their own adjacent fields when these high levels occur in the area. Like all insect populations, the populations decrease to typical levels when conditions are not optimal.

Larval and adult grasshoppers are an important food source for grassland birds on NWSTF Boardman and are readily consumed by loggerhead shrikes, long-billed curlews, burrowing owls, and many other bird species as an important protein source during the spring and summer. The loss of this food source over large areas could hamper reproductive success for those bird species during optimal forage years.

Because of the importance of the grasshopper food source to those geographically-limited large breeding bird populations, that adjoining landowners can protect their crops by controlling grasshoppers on their own land, and the knowledge that the grasshopper populations will revert to typical population levels on their own, no large scale grasshopper control should occur on NWSTF Boardman.

4.6.7 Off-road Vehicle Use

Recreational use of off-road vehicles (ORV), such as all-terrain vehicles, dirt bikes, non-motorized mountain bikes, is not authorized on NWSTF Boardman as use of the range is restricted to military training and their support activities. DoD policy (OPNAVINST 5090.1E, DoDDIR 4700.4) requires that any ORV use areas must be reviewed, monitored, and officially designated through chain-of-command approval. There are no designated ORV use areas on NWSTF Boardman. The recreational use of ORVs by civilians or military personnel on the range is not considered consistent with the installation's training mission and conflicts with military land use requirements, wise land management practices, environmental values, and training sustainment activities. Recreational ORV use increases impacts to habitats, destabilizes the soil, promotes invasive plant species introductions, and is a potential source of wildfire ignition, reducing military training capabilities and increasing natural resources training sustainment costs. The restrictions on off-road vehicles do not apply to official use by an employee, agent, or designated representative of the federal government or one of its contractors in performance of their assigned duties (EO 11644). That is, the use of military or contractor provided ORVs for road and perimeter patrols, fencing repairs, ordnance clearance, and invasive weed spraying or military training support activities are not subject to the ORV use restriction. The personnel stationed at NWSTF Boardman provide security for the range and will work to prevent any trespassing on the range including preventing unauthorized ORV access and use.

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5 IMPLEMENTATION

This chapter of the INRMP addresses how the plan will be carried out as a means of supporting the military mission through effective land stewardship. All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under Federal law. Nothing in this INRMP is intended to be nor must be construed to be a violation of the Anti-Deficiency Act (31 U.S.C. § 1341 *et seq*.).

A list of NWSTF Boardman proposed projects is shown in Section 5.5.1 of this INRMP.

5.1 Project Requirements and Funding

Project and management action implementation is the most important part of this management document. It is through implementation that conservation benefits are realized. A major function of implementation is funding.

All INRMP projects must be entered into the Environmental Program Requirements (EPR) web and receive approval up the chain of command prior to funding. The Navy prioritizes funding based on the Environmental Readiness Level (ERL) of a project. ERL levels go from 1 to 4 with 4 being the highest priority funding requirement.

All in-house Navy and external funding sources will be explored and utilized to implement this management plan, as appropriate. Major funding sources for project implementation are management actions using Navy in-house labor, utilizing Navy Operations and Maintenance environmental funding, legacy funding, forestry revenue funding, agricultural outlease revenue funding, or fish and wildlife fees. Non-Navy funding/labor resources or volunteer assets will also be used when available.

5.2 Coordination and Planning for Construction and Facility Maintenance

Planning actions are reviewed for natural resource implications. Common facility maintenance actions are assessed during the proposal review. This ensures that the installation is in compliance with environmental laws and regulations, provides feedback for length of time to receive permits, and reconciles natural resources issues that may have been overlooked. In-water maintenance projects may require a permit from the U.S. Army Corps of Engineers.

When maintenance is not reviewed upfront, then maintenance actions are reviewed as a project. Required permits and consultations are identified during this project review and actions are documented in this manner.

Major construction projects (MILCONs) are reviewed during the project development. At this time, NEPA planning and processing is occurring to identify environmental elements that may affect the scope, schedule, and budget. Early communication between action proponents and NRMs is vital in order to ensure a thorough review of the project alternatives and to enable NAVFAC Northwest planners to secure funding for NEPA actions.

5.3 Project Review Procedure

The installation environmental staff reviews new operations, proposed construction, maintenance projects, and programs to be conducted on the installations. The environmental review coordinator

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

a) A program or project manager submits the scope of the new operation, maintenance activity, or construction project to the NASWI Whidbey Island Environmental Office, which oversees NWSTF Boardman environmental management, for review. The initial submittal generally includes the project information, including maps, diagrams, and drawings that outline the project and show the location.

b) The environmental review coordinator will receive the package and
   - Send it to the correct Environmental Division staff members (sometimes including the NRM) for their review and comments.
   - The environmental review coordinator will coordinate the comments and return them to the program manager. The review comments will include:
   - The identification of any environmental requirements (e.g., wetland buffers);
   - Suggestions for Best Management Practices (BMPs) to minimize or eliminate any potential environmental degradation;
   - The identification of all environmental permits, consultations, and other documents required to carry out the project (e.g., Clean Water Act permits, ESA Section 7 requirements, NEPA documentation);
   - The designation of the environmental staff person who will write the applications for and obtain the permits or carry out the environmental consultation process with outside regulatory agencies;
   - An estimation of any costs necessary to obtain environmental permits or other documents; and
   - A schedule for obtaining all permits and documentation.

5.5.1 Project Implementation

The NAVFAC NW Environmental Business Line Director approves the proposed budget and execution plan, which is implemented by the Conservation branch in coordination with the installation NRM. Table 5-1 shows the projects that were executed between FY 2010 through FY 2019. Table 5-2 shows the projects programmed by CNIC and the Commander, Pacific Fleet from FY 2020 through FY 2025.

Table 5-1 Projects Implemented from FY 2010 through FY 2019, with executed amounts ($)

PROJECT TITLE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
EPR #61137NR035 EO 13751 NW NWSTF Boardman - Soil and Water Weed Control		23,411	24,275	24,491	48,649	62,416	38,224			
MBTA NW EPR #61137R0002 NWSTF Boardman - Burrowing Owl Survey and Monitoring			24,133		49,958		24,469		68,373	
EPR #61137NR03B CNIC In-house – Sikes NW NWSTF Boardman INRMP			10,099	11,457	11,990	12,177	13,074	13,463		
EPR #6113712001 SIKES NW NWSTF Boardman - Large Mammal Surveys			15,823		32,424				18,758	
EPR #61137R0001 SIKES NW NWSTF Boardman - Recover Monumented Vegetation Plots and Resurvey Vegetation using Established Protocol			20,000		41,927		23,313			
EPR #61137NR01A 3 SAR NW NWSTF Boardman - Washington Ground Squirrel Surveys and Monitoring				39,418		47,696		38,917	65,573	
EPR #61137NR003 3 CO NW NWSTF Boardman - Post Wildfire Habitat Restoration and Enhancement for Species at Risk					259,154		75,000	81,232		
EPR #61137NR005 SIKES NW NWSTF Boardman - INRMP Conservation Mapping					136,232					
EPR #61137CPF01 CN PACFLT 2 CO CPF Boardman – EIS Conference Opinion Requirements				167,639	1,739,169	137,699	181,901	49,759	161,235	21,620
PACFLT 2 CO CPF Boardman – EIS Conference Opinion Requirements - Habitat Enhancement						100,000				
PACFLT 2 CO CPF Boardman – EIS Conference Opinion Requirements – Washington Ground Squirrel						100,000				
Annual Totals		23,411	94,330	203,587	2,319,503	459,988	332,668	183,371	313,939	21,620
Ten-year Total: FY 2010 – FY 2019										**3,952,417**

Table 5-2 Projects Programmed from FY 2020 through FY 2025, with programmed amounts ($)

PROJECT TITLE	FY20	FY21	FY22	FY23	FY24	FY25
EPR #61137NR03B CNIC In-house – Sikes NW NWSTF Boardman INRMP	14,245	14,530	14,820	15,117	15,419	15,727
EPR #61137NR035 EO 13751 NW NWSTF Boardman Soil and Water Weed Control	52,292	53,338	35,170	35,873	36,591	37,322
EPR #61137NR003 3 CO NW NWSTF Boardman Post Wildfire Habitat Restoration and Enhancement for Species at Risk	177,993		165,563		172,252	
EPR #6113712001 SIKES NW NWSTF Boardman Large Mammal Surveys		19,899				21,539
EPR #61137NR006 MBTA NW NWSTF Boardman Long-billed Curlew Surveys and Breeding Density Estimates		51,794				35,242
MBTA NW EPR #61137R0002 NWSTF Boardman - Burrowing Owl Survey and Monitoring		49,932				33,227
EPR #61137NR01A 3 SAR NW NWSTF Boardman Washington Ground Squirrel Surveys and Monitoring		68,222		51,358		53,433
EPR #61137NR005 SIKES NW NWSTF Boardman INRMP Conservation Mapping			86,886			
EPR #61137CPF01 CN PACFLT 2 CO CPF Boardman – EIS Conference Opinion Requirements	397,915	66,287	202,613	68,965	210,798	210,798
Annual Totals	642,625	324,002	505,052	171,313	435,060	407,288
Total						**2,485,340**

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