


# Integrated Natural Resources Management Plan Pohakuloa Training Area, Hawaii 2019-2023

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**February 2020 - FINAL**

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

# 2019 – 2023

**Prepared for**

**U.S. Army Garrison - Pohakuloa**
**Pohakuloa Training Area**

Prepared by

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February 2020 - Final

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

# 2019-2023

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S. Code § 670a et seq.) as amended.

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# Acronyms/Symbols

| | |
|---|---|
| ac | acre |
| ACUB | Army Compatible Use Buffer |
| APHIS | Animal and Plant Health Inspection Service |
| AR | Army Regulation |
| ASP | Ammunition Storage Point |
| ASR | Areas of Species Recovery |
| BAAF | Bradshaw Army Airfield |
| BASH | Bird Aircraft Strike Hazard |
| BAX | Battle Area Complex |
| C | Celsius |
| CAB | Combat Aviation Brigade |
| CALFEX | Combined Arms Live-Fire Exercise |
| CAS | Close Air Support |
| CATEX | Categorical Exclusion |
| CEMML | Center for Environmental Management of Military Lands |
| CESU | Cooperative Ecosystem Studies Units |
| CLF | Convoy Live Fire |
| CR | Cultural Resources |
| CS | Combat Support |
| CSS | Combat Service Support |
| CX | Categorical Exclusion |
| DA | Department of Army |
| DLNR | Department of Land and Natural Resources, Hawaii |
| DoD | Department of Defense |
| DoDI | Department of Defense Instruction |
| DoFAW | Division of Forestry and Wildlife, DLNR, Hawaii |
| DPTM | Directorate of Plans, Training, and Mobilization |
| DPTMS | Directorate of Plans, Training, Mobilization, and Security |
| DPW | Directorate of Public Works |
| E | Endangered |
| EA | Environmental Assessment |
| ECS | Environmental Cost Standardization |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| EMS | Environmental Management System |
| EO | Executive Order |
| ESA | Endangered Species Act |
| ESTCP | Environmental Security Technology Certification Program |
| F | Fahrenheit |

| | |
|---|---|
| FAARP | Forward Arming and Refueling Point |
| FBI | Federal Bureau of Investigation |
| FDRS | Fire Danger Rating System |
| FEIS | Final Environmental Impact Statement |
| FOB | Forward Operating Base |
| ft | Foot |
| FTX | Field Training Exercise |
| GIS | Geographic Information System |
| GPS | Global Positioning System |
| ha | Hectare |
| HAVO | Hawaii Volcanoes National Park |
| HBMP | Hawaii Biodiversity and Mapping Program |
| HDOT | Hawaii Department of Highways |
| HE | High Explosive |
| HLZ | Helicopter Landing Zone |
| HQDA | Headquarters, Department of Army |
| IBCT | Infantry Brigade Combat Team |
| ICRMP | Integrated Cultural Resources Management Plan |
| ID(L) | Infantry Division, Light |
| IMCOM | Installation Management Command |
| IMCOM-PAC | Installation Management Command-Pacific |
| INRMP | Integrated Natural Resources Management Plan |
| IPA | Intergovernmental Personnel Act |
| IPBA | Infantry Platoon Battle Area |
| IPBC | Infantry Platoon Battle Course |
| IPMP | Integrated Pest Management Plan |
| IPP | Invasive Plants Program |
| ITAM | Integrated Training Area Management |
| IWFMP | Integrated Wildland Fire Management Plan |
| IWS | Installation-wide Surveys |
| KMC | Kilauea Military Camp |
| km | Kilometer |
| KMA | Keamuku Maneuver Area |
| LOHI | Listening Observatory for Hawaii Ecosystems |
| LRAM | Land Rehabilitation and Maintenance |
| LSV | Logistic Support Vehicles |
| LZ | Landing Zone |
| m | Meter |
| MBTA | Migratory Bird Treaty Act |
| METL | Mission Essential Task List |
| mi | Mile |

| | |
|---|---|
| MOA | Memorandum of Agreement |
| MOU | Memorandum of Understanding |
| MOUT | Military Operations on Urban Terrain |
| MP | Military Police |
| MPRC | Multi-Purpose Range Complex |
| MWR | Morale, Welfare, and Recreation |
| NCGRP | National Center for Genetic Resources Preservation |
| NEPA | National Environmental Policy Act |
| NHO | Native Hawaiian Organizations |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| nMRA | Military non-Readiness Activities |
| NRCS | Natural Resources Conservation Service |
| NR | Natural Resources |
| NRO | Natural Resources Office |
| NSF | National Science Foundation |
| NVCS | National Vegetation Classification System |
| PA | Programmatic Agreement |
| POA | Public Affairs Officer |
| POM | Program Objective Memorandum |
| PTA | Pohakuloa Training Area |
| RA | Restricted Airspace |
| RC | Range Control |
| RCUH | Research Corporation of the University of Hawaii |
| REC | Record of Decision |
| REPI | Readiness and Environmental Protection Initiative |
| RFMSS | Range Facilities Management Support System |
| RG | Range |
| RIMPAC | Rim of the Pacific |
| ROD | Record of Decision |
| RTLA | Range and Training Land Assessment |
| RTLP | Range and Training Land Program |
| RTLPDP | Range and Training Land Program Development Plan |
| SA | Small Arms |
| SAIA | Sikes Act Improvement Act |
| SBCT | Stryker Brigade Combat Team |
| SDZ | Surface Danger Zone |
| SERDP | Strategic Environmental Research and Development Program |
| SHPO | State Historic Preservation Officer |
| SOP | Standard Operating Procedures |
| SR | State Road |

| | |
|---|---|
| SRA | Sustainable Range Awareness |
| SRP | Sustainable Range Program |
| STEP | Status Tool for Environmental Program |
| T | Threatened |
| TA | Training Area |
| TER-S | Threatened, Endangered and At-Risk Species |
| TP | Target Practice |
| TRADOC | Training Doctrine |
| TRI | Training Range Integration |
| TSS | Training Support System |
| UAS | Unmanned Aircraft Systems |
| UAV | Unmanned Aircraft Vehicles |
| USACE | U.S. Army Corps of Engineers |
| USAEC | U.S. Army Environmental Command |
| USAG-HI | U.S. Army Garrison-Hawaii |
| USAG-P | U.S. Army Garrison-Pohakuloa Training Area |
| USARHAW | U.S. Army Hawaii |
| USARPAC | U.S. Army Pacific Command |
| USDA | U.S. Department of Agriculture |
| USDOT | U.S. Department of Transportation |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| USMC | U.S. Marine Corps |
| UXO | Unexploded Ordnance |
| VFR | Visual Flight Rules |
| VMM | Marine Medium Tiltrotor |
| WASH | Wildlife Aircraft Strike Hazard |

# EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) guides the implementation of U.S. Army Garrison, Pohakuloa Training Area (USAG-P, PTA) Natural Resources Program. This INRMP complies with the Sikes Act Improvement Act as amended through 2003 (Public Law 108-136), which requires the preparation, implementation, update, and review of an INRMP for each military installation in the U.S. with significant natural resources. The Natural Resources Office (NRO) coordinates efforts with the U.S. Fish & Wildlife Service (USFWS) and the Hawaii Department of Land and Natural Resources (HI DLNR) to develop program goals and projects. The Army coordinated with the State to ensure the PTA INRMP was included in Hawaii's Statewide Wildlife Action Plan updated in 2015.

This INRMP provides for the conservation and rehabilitation of natural resources and the sustainable multipurpose use of PTA resources subject to safety requirements and military security. It provides for "no net loss" in the capability of installation lands to support the military mission and other activities as considered appropriate to the military. At the same time, this document provides for wildlife and land resources, wildlife enhancement and modification, establishment of natural resource management objectives and time frames, sustained use by the public of natural resources to the extent that such use is not inconsistent with other needs, public access where appropriate, and the enforcement of natural resource laws and regulations.

This INRMP is designed to support the military mission, manage PTA's natural resources, and to ensure compliance with related environmental laws and regulations. The plan ensures the maintenance of quality training land, thereby supporting PTA in accomplishing its critical military missions.

Some of the guiding principles present in this INRMP are:

- Identify and describe an ecosystem management-based vision for the installation's current and desired future condition that supports and sustains the training mission.
- Meet the Army's responsibilities as required by the Sikes Act, Department of Defense Instruction 4715.03 (*Environmental Conservation Program*), Endangered Species Act, Army Regulation 200-1 (*Environmental Protection and Enhancement*), and all other applicable federal and state laws and Departments of Defense and Army regulations and guidance.
- Shift the temporal and spatial management direction to a long-term view.
- Base management on flexible and adaptive decision-making to accommodate new information and understandings.
- Identify collective and stewardship responsibilities for resources with a broader community.
- Minimize pest-related habitat damage and health risks to natural resources and people.
- Provide sustainable natural resources-related outdoor recreation opportunities within security constraints.
- Increase awareness of natural resources issues, programs, and responsibilities among PTA employees, tenants, and visitors.

This document identifies the natural resources management and conservation requirements necessary for sustaining viable ecosystems, the military mission and compliance with relevant environmental laws (i.e., ESA). All requirements set forth in this INRMP requiring the expenditure of Hawaii funds are expressly subject to the availability of appropriations and requirements of the Anti-Deficiency Act (31 USC Section 1341). No obligation undertaken by Hawaii under the terms of this INRMP will require or be interested to require a commitment to expend funds not obligated for a particular purpose. If funding does not meet the level needed for full implementation, projects and efforts will be prioritized based on importance for mission sustainability and statutory compliance.

# 1 OVERVIEW

## 1.1 Purpose

The purpose of this document is to review and update the *U.S. Army Garrison, Pohakuloa (USAG-P, PTA), Integrated Natural Resources Management Plan (INRMP)*. This INRMP reflects changes to the Natural Resources Management Program associated with the biological opinions issued by the U.S. Fish and Wildlife Service (USFWS). The intent is to integrate land use needs, the military's mission, and the management and conservation of natural resources at PTA. An INRMP establishes an approach and actions to accomplish the integration of natural resources conservation and military preparedness, and to meet the natural resource planning and responsibilities of the Sikes Act Improvement Act (SAIA) of 1997 (16 USC §670a et seq.); National Environmental Policy Act (NEPA); Endangered Species Act (ESA); Migratory Bird Treaty Act (MBTA); Department of Defense Instruction (DoDI) 4715.03; and Army Regulations (AR) 200-1, 200-2, and 350-19.

Department of Defense (DoD) lands support military mission-related activities. Future availability of military lands is dependent on the proper integration of land use and natural resources management. This plan helps ensure no net loss of resources that would affect the capability to support the Army's mission today and in the future as required by the SAIA. This INRMP integrates all natural resources efforts, programs, and plans to conserve and rehabilitate natural resources, consistent with military preparedness; provides recreational opportunities that contributes to the quality of life for Soldiers, their families, and the public; and is based on scientifically sound conservation procedures, methods, and techniques in the context of an ecosystem management approach. This plan serves to identify funding support required for the successful management of natural resources on military lands.

Major changes to an INRMP require a revision be conducted, while minor changes are incorporated as an update to the existing document. This version is an update based on the reorganization of the Natural Resources Office (NRO), their resulting Program Plan (USAG-P 2016), and the 2013 Biological Opinion (USFWS 2013). The NRO Program Plan supersedes and replaces the PTA Implementation Plan (2010) required by the 2003 Biological Opinion (USFWS 2003). The INRMP mirrors the Program Plan structure and identifies the program goals and objectives, methods of implementation, and demonstrates how regulatory requirements are being met for the conservation and preservation of natural resources.

## 1.2 Scope

This updated INRMP reviews, documents, and builds on progress made during the previous plans (USAG-HI 2002, 2010) and outlines Natural Resources Program directions and integrates projects identified in the PTA NRO Program Plan. Changes in this INRMP are not expected to result in consequences materially different from those in the previous INRMP. Until the final approval of this INRMP, the Natural Resources Program will be continued in accordance with the PTA INRMP (2010-2014) and the supporting endangered species management plans noted below. A joint review this INRMP in no less than five years will be conducted to determine whether the plan needs an update or revision to continue to address Sikes' Act purposes and requirements as outlined in *U.S. Fish and Wildlife Service Guidelines for Coordination on Integrated Resource Management Plans*, June 2015.

This document is intended to be used as technical guidance for those responsible for land use planning and decision-making, and incorporates information and responsibilities outlined in the biological opinions and other actions with the USFWS: (1) *Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army Installations, Island of Hawaii* (USFWS 2003); (2) Reinitiation

of Formal section 7 Consultation for *Additional Species and New Training Actions at PTA, Hawaii* (USFWS 2008); (3) *Informal Consultation and Formal Consultation with a Biological Opinion for Construction, Maintenance, and Operation of an Infantry Platoon Battle Area and Installation-Wide Impacts of Military Training on Hawaiian Geese* (*Branta sandvicensis*) *at PTA, Hawaii* (USFWS 2013); (4) concurrence between the Army and the USFWS on *Aviation Landing Zones and Urban Close Air Support* (USFWS 2013); and (5) the NRO Program Plan (USAG-P 2016). An INRMP provides the basis and criteria for protecting and enhancing natural resources with an ecosystem perspective, consistent with the military mission. Provisions of the INRMP apply to each directorate, command, tenant units, and others who either directly or indirectly use installation natural resources. Implementation of this INRMP is subject to the availability of annual funding, availability of qualified personnel, and mission requirements.

The INRMP includes input from stakeholders including federal, state and local agency representatives, conservation organizations, and interested individuals. As required under the SAIA, this INRMP reflects contributions from the USFWS and the Hawaii Department of Land and Natural Resources (DLNR). The Army coordinated with the State to ensure the PTA INRMP was included in Hawaii's Statewide Wildlife Action Plan update in 2015. The Army works closely with the USFWS via e-mail and by phone to develop and update projects including the Hawaiian goose and rare plant genetic projects.

This INRMP addresses all PTA properties. However, leased properties that are occasional use properties and have not been used in the last five years are not included (e.g., Puu Pa).

## 1.3 Document Approach

The structure of this INRMP is roughly based on the "Integrated Natural Resources Management Plan (INRMP) Template" issued by the Office of the Under Secretary of Defense (14 August 2006) and distributed by the Office of the Assistant Chief of Staff for Installation Management (18 September 2006). The document is composed of six parts:

**Chapter 1: Overview** details the purpose, scope, approach and management, plan strategy and goals, responsibilities, authority, stewardship, review process, plan integration and unresolved issues.

**Chapter 2: Current Conditions** provides a description of the installation, regional land use, installation history, and operations and activities; as well as a description of the physical environment and ecosystems, and the biotic environment.

**Chapter 3: Environmental Management Strategy and Mission Sustainability** describes supporting mission and the natural environment, natural resources consultation requirements, NEPA compliance, partnerships and collaborative resource planning, public access and outreach, encroachment partnering, and state comprehensive wildlife plans.

**Chapter 4: Program Elements** departs from the INRMP template and follows the schema of the NRO Program Plan. All of the program elements associated with the template are addressed.

**Chapter 5: Implementation** discusses preparing management plans that drive objectives, projects, achieving no net loss of training lands, use of cooperative agreements, and funding.

**Appendices** capture all additional information not appropriate for the body of the INRMP. The appendices include Appendix 1. Funding Classification, List of Projects, and Project Timeline and

Appendix 2. Species Lists. Additional support material such as the previous INRMP, annual/biennial program reports, copies of the biological opinions and more are included on an accompanying CD.

A number of handbooks and guides, including "A Handbook for the DoD Natural Resources Manager, Resources for INRMP Implementation," were consulted to aid in addressing the various sections.

This INRMP also includes guiding documents applicable to the management of natural resources at PTA:

- USFWS recommended non-discretionary conservation measures and reasonable and prudent measures in the following biological opinions:
  - December 2003, *Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army Installations, Island of Hawaii*.
  - December 2008, *Reinitiation of Formal Section 7 Consultation for Additional Species and new Training Actions at PTA, Hawaii*.
  - January 2013, *Informal Consultation and Formal Consultation with a Biological Opinion for Construction, Maintenance, and Operation of an Infantry Platoon Battle Area and Installation-Wide Impacts of Military Training on Hawaiian Geese* (*Branta sandvicensis*) *at PTA, Hawaii* and the Army's execution of these measures through the PTA Program Plan.
- *Memorandum of Understanding (MOU) Regarding Implementation of the Saddle Road Palila Critical Habitat Impact Mitigation* that called for fencing of Kipuka Alala as part of a multi-agency mitigation effort to offset the loss of Palila (*Loxioides bailleui*).
- Conservation measures outlined in the *FEIS for the Construction and Operation of an Infantry Platoon Battle Course at PTA Hawaii*. March 2013.
- *Integrated Wildland Fire Management Plan* (IWFMP) (CEMML and Installation Fire and Safety Office, U.S. Army Hawaii 2013 draft).
- Various permits that include a state permit to access established off-site locations for maintenance and propagule collection, federal permits for listed plant recovery, MBTA scientific permits, and Forest Service permits.
- *Integrated Pest Management Plan* (IPMP, 2008) for the implementation of a pest management program that promotes nonchemical controls for managing pests and management recommendations for a variety of pests on U.S. Army Garrison, Hawaii lands.
- *Installation Master Plan* provides guidance for land use and grounds maintenance management.

### 1.3.1 Ecosystem Management

An ecosystem management approach considers the biotic and abiotic components that comprise and govern the behavior of an area. The boundaries of an ecosystem vary by component, so that no one parcel of land is an ecosystem to itself, but rather is a collection of ecosystems and a part of larger ecosystems. Ecosystem management is the deliberate management of an entire regional ecosystem with the intention of maintaining ecological sustainability and integrity. Because ecosystems extend beyond boundaries, ecosystem management requires working across fences and with neighbors. Neighbors become partners, and a collaborative vision for desired future condition becomes a shared goal. The goal of an ecosystem approach is to sustain or restore the health, productivity, and biological diversity of an ecosystem through natural resources management and recognizing usage and social factors (Interagency Ecosystem Management Task Force 1995).

A successful ecosystem-based management program:

- Maintains and improves native ecosystems.
- Identifies and describes an ecosystem management-based vision for the installation's current and desired future condition that supports and sustains the training mission.
- Identifies goals and objectives to move the natural resources of PTA in the direction of this vision.
- Shifts the temporal and spatial management direction from short-term and installation, or training area focus, to a long-term and mission view.
- Constructs a scientific foundation that describes components of the ecosystem as well as ecosystem structure and function.
- Provides the foundation for monitoring programs that measure progress using project specific goals and objectives.
- Shares a vision with a broader community (e.g., federal, state, native, and local governments, non-governmental organizations, and the public) that identifies collective responsibilities and stewardship.
- Supports mechanisms for communication.
- Develops greater sensitivity to the social, economic, and national security needs that are an integral part of ecosystems and their management.
- Is based on a flexible and adaptive understanding of new information. As such, management by the NRO is adjusted as knowledge about species, habitat, and/or ecosystems evolves.
- Assists in the implementation of installation plans and programs.

Much of the NRO Program execution follows an ecosystem approach. An example is the Areas of Species Recovery (ASR) that focuses on core clusters of federally listed plants, the natural resources value of the area, and habitat quality to improve the overall condition of a larger area. When these areas include weed control buffers, fire is less likely to burn through these areas and the chance for natural recruitment increases.

An ecosystem management approach supports the Army's vision of sustainable use of training and testing lands. This management strategy enables PTA to conduct military training while conserving natural resources. An ecosystem-based approach promotes and sustains native species and habitat diversity and prevents the breakdown of ecosystem integrity, which, in turn, maximizes support to the military's training and infrastructure. Compliance with applicable laws and regulations provides oversight and guidance and ensures stewardship of public lands. The Army Strategy for the Environment (2004) recognizes the interdependence between mission, community, and environment, and applies an ecosystem approach to managing natural resources.

A sustainable ecosystem is critical to fulfill PTA's mission to provide a quality joint/combines arms facility in support of military training capabilities. With 20 federally listed plant species, six federally listed animal species, along with numerous rare plants, animals, invertebrates, and critical habitat, the PTA Natural Resources Program recognizes the benefits of an ecosystem management approach as compared to species-by-species management. An ecosystem approach balances all components (e.g., mission, biological, physical, economic, and human elements), compliance regulations and guidance (e.g., SAIA, ESA, DoD, and Department of Army), restoration (e.g., exotic species control, erosion control), and program implementation to minimize adverse impacts. PTA's ecosystem management is intended to complement and support local and regional conservation efforts, to manage effectively new as activities and infrastructure development, and to respect cultural values.

## 1.4 Plan Strategy, Goals, and Major Objectives

### 1.4.1 Strategy

The PTA INRMP's strategy is to support PTA's military and non-military activities while maintaining functional, healthy ecosystems. The programs outlined in this INRMP will be executed within the principles of ecosystem management and refined as new information and ideas become available. Management will be adaptive. The overall strategy of the PTA INRMP is to:

- Sustain the Army's mission and access to air and land resources.
- Conserve resources for present and future generations by:
    - Maintaining or restoring native ecosystems and ecological processes types across their natural range when practical and consistent with the military mission.
    - Using regional approaches to implement ecosystem management on PTA by collaboration with other DoD components as well as other federal, state, and local agencies, and adjoining property owners.
    - Providing recreational opportunities to the public when such activities are compatible with military mission activities, ecosystem sustainability, and other considerations such as security, safety, and fiscal soundness.

This strategy was developed with USFWS, the Hawaii DLNR and resources from various divisions within the Hawaii DLNR.

### 1.4.2 Goals

The overall goal of the PTA INRMP is to:

- Sustain and enhance military mission capabilities through sound ecosystem management.
- Ensure cooperation between internally and externally stakeholders.
- Integrate military operations and conservation measures.
- Implement and complete all NRO Program projects validated and funded per project descriptions.
- Comply with laws and regulations to maintain PTA's natural resources.
- Aid planners and facility managers.
- Identify actions required to implement goals and objectives.

## 1.5 Responsibilities

The secretary of a military department, in this case, Army, prepares each INRMP in cooperation with the Secretary of the Interior, acting through the Director of the USFWS and the head of each appropriate state fish and wildlife agency for the state in which the military installation concerned is located. The resulting plan for the military installation reflects an agreement of the parties concerning conservation, protection, and management of fish and wildlife resources.

Mutual agreement with the USFWS and appropriate state fish and wildlife agencies is the goal of the plan for those elements that are subject to the otherwise applicable legal authority of the USFWS and a state's fish and wildlife agencies to conserve, protect, and manage fish and wildlife resources. Elements of the SAIA are not intended to either enlarge or diminish the existing responsibilities and authorities of the USFWS or a state's fish and wildlife agencies concerning natural resources management on military lands. At the same time, the USFWS or a state's fish and wildlife agency cannot change elements in an INRMP outside the scope of its authority.

The INRMP, written by or under the guidance of the installation natural resources managers, is developed in concert with and with significant input from internal installation stakeholders (i.e., any branch, section, department, or activity that would carry out work that would execute, affect, or be affected by the INRMP).

### 1.5.1 Installation and Department of Army Stakeholders

#### *U.S. Army Garrison-Pohakuloa*

PTA supports all active Army forces. The Garrison Commander is directly responsible for the operation and maintenance of Army lands and therefore is responsible for preparing, updating, and implementing INRMPs under the SAIA. U.S. Army Garrison-Hawaii (USAG-HI) provides facilities, services, and logistic functions to enhance combat readiness.

#### *Directorate of Public Works*

The Director of Public Works (DPW) is responsible for the operation and maintenance of Army lands and thus is responsible for preparing, updating, and implementing the INRMP.

- **Environmental Division, Conservation and Restoration Branch, Natural Resources Office, PTA**

  The on-site biologist oversees daily operations of the office and coordinates natural resources use, management, and implementation of this plan. The biologist maintains close coordination and cooperation through the Natural Resources Section at Schofield Barracks with other affected organizations and agencies, particularly the USFWS and DLNR. The PTA biologist and the Cultural Resources Program managers work closely together to ensure each program is cognizant of the other's needs.

#### *Directorate of Emergency Services*

The Provost Marshal's Office provides general range security and directly controls access for hunting at PTA. It also supports and is responsible for the enforcement of laws related to natural resources uses (e.g., the enforcement of the external agency laws and regulations). The Directorate of Emergency Services Detachment manages law enforcement.

- **Department of the Army Police**
  The Department of the Army Police (DA Police) provides general range security and directly controls access onto the installation. The DA Police is not responsible for the enforcement of laws of an external agency or their regulations (e.g., state hunting regulations). However, the Game Warden is a police patrol officer assigned to the Game Program. His authority and responsibilities are established in Department of Defense Directive 5525.17 (*Conservation Law Enforcement Program*, 17 October 2013) and the SAIA. As such, he provides protection of property and natural and cultural resources under DoD control.

- **Fire and Emergency Services**
  The Fire and Emergency Services is responsible for implementing the Wildland Fire Management Plan, developing procedures to reduce the threat of wildland fires, responding to fires that impact the PTA area of responsibility, and mitigating the adverse effects of fires. This requires coordination with Range Division Hawaii and NRO.

#### *25th Infantry Division*

The 25th Infantry Division is the principal land user at PTA. The installation is geographically remote and serves all branches of the U.S. Armed Forces. The installation is the largest live-fire range and training complex in the Pacific Basin. It is mainly used as a tactical training area and for military Mission Essential Task List (METL) training. This INRMP supports the training land needs of the 25th Infantry Division and other military units.

### *HQ USARHAW, Training System Support*

HQ USARHAW, Training System Support (TSS) manages the ranges on PTA, which is under the direction of the Garrison Commander. TSS is responsible for managing range complexes, coordinating military training, and releasing training areas for land rehabilitation and recreational use.

- **Range Division Hawaii**
  Range Division Hawaii, G3/HQ USARHAW is located at Schofield Barracks and is responsible for implementing ITAM at PTA. The Range Officer and ITAM Program represent the training community and work with the Environmental Division to address sustainability issues in the training areas.

### *U.S. Army Pacific Command*

U.S. Army Pacific Command (USARPAC) oversees most Army forces in the Asia-Pacific region, with the exception of Korea. USARPAC, located at Fort Shafter, Hawaii, assists USAG-HI and USAG-P with the development and implementation of conservation programs. This INRMP supports the training land needs of USARPAC.

### *Installation Management Command–Pacific*

USAG-HI's higher headquarters is the Installation Management Command-Pacific (IMCOM-PAC) at Fort Shafter, Hawaii. IMCOM-Pacific assists with the development and implementation of conservation programs. IMCOM-PAC reports to IMCOM Headquarters. IMCOM Headquarters provides environmental funding for the implementation for this INRMP.

### *U.S. Army Corps of Engineers, Honolulu Engineer District*

U.S. Army Corps of Engineers (USACE), Honolulu Engineer District has responsibility for providing engineering support for USAG-HI. This support includes administering major construction, environmental documentation, natural and cultural resources surveys, and research contracts.

### *U.S. Army Environmental Command* (USAEC)

USAEC is located at Fort Sam Houston, Texas. The mission of USAEC is to ensure continued use of Army training lands through sound environmental practices and stewardship. The USAEC team fulfills the Army's diverse mission demands and supports its installations, garrison, and commands by providing environmental expertise that supports ready and resilient Soldiers and installations. The USAEC provides oversight, centralized management, and execution of army's environmental programs and projects.

## 1.5.2 External Stakeholders

### 1.5.2.1 Federal Agencies

### *U.S. Department of Defense*

The U.S. Navy, U.S. Marine Corps, and the U.S. Air Force execute training exercises on PTA. Air-to-Ground Gunnery exercises, bombing exercises, and live-fire exercises are conducted. Navy and Marine Corps fighter and attach aircraft crews train using R-3103 airspace. The Air Force also conducts C-17 heavy drops and high-altitude bombing runs.

DoD supports a number of venues for conducting natural resources research on military lands with the intent of sustaining resources and the training environment. Sponsored projects typically include other agencies, universities, and other interested parties.

- **Strategic Environmental Research and Development Program (SERDP)**
  The SERDP is the DoD environmental science and technology program that is planned and executed in full partnership with the Department of Energy and the Environmental Protection Agency, with participation by numerous other federal and non-federal organizations. The intent

of SERDP is to address high priority environmental issues that confront the Army, Navy, Air Force, and Marines.

- **Environmental Security Technology Certification Program (ESTCP)**
  ESTCP is the DoD's environmental technology demonstration and validation program. The program's goal is to identify and demonstrate the most promising innovative and cost-effect technologies and methods to address the DoD's high priority environmental requirements.

- **Legacy Resource Management Program**
  The Legacy Resource Management Program provides financial assistance for DoD efforts to preserve natural and cultural resources on military lands while supporting military readiness. A number of Legacy projects have been completed on PTA, most of which investigated federally listed plants and wildland fire.

### *U.S. Department of Interior*

- **U.S. Fish and Wildlife Pacific Islands Ecoregion**
  USFWS is a major cooperator in the implementation of this INRMP in accordance with the SAIA. Cooperative efforts with USFWS primarily involved with: (1) Ecological Services, which is responsible for conserving imperiled species and their habitats; (2) Fire Management, which is concerned with using and managing fire safely, especially in regards to endangered species; (3) Invasive Species, which cause economic and environmental harm; and (4) other areas applicable to species management on PTA.

- **Migratory Bird Program**
  The USFWS Migratory Bird Program has a mandate to maintain and enhance migratory bird populations and habitats. Authorized by more than 25 laws, conventions, and treaties, the Migratory Bird Program works to ensure the conservation of more than 1,000 species of migratory birds.

- **National Wildlife Refuge System**
  The National Wildlife Refuge System is a network of lands and waters for conservation management and, when appropriate, restoration of fish, wildlife, and plant resources and their habitats. PTA has engaged in conversations regarding the Hawaiian goose.

- **National Park Service**
  The National Park Service is a source of information and experience on a number of topics (e.g., ungulate control, invasive plant species control, bird survey techniques) for PTA.

- **Geological Survey – Biological Resources Discipline**
  Currently, the U.S. Geological Survey (USGS) is looking at the sustainability of military training in the Keamuku Maneuver Area (KMA). The USGS will be looking at different training scenarios to determine the effects of erosional forces of wind and water. The work will determine areas most receptive to military use.

### *U.S. Department of Agriculture*

- **Agricultural Research Service – National Center for Genetic Resources Preservation**
  Formerly known as the National Seed Storage, the National Center for Genetic Resources Preservation (NCGRP) conserves genetic resources, which is important for conservation and biological diversity. The PTA Natural Resources Branch plans to continue storing federally listed and native plant materials at NCGRP as part of its conservation effort in this INRMP.

- **Animal and Plant Health Inspection Service (APHIS) – National Wildlife Research Center**
  The research arm of USDA-APHIS is dedicated to finding solutions to challenging wildlife damage management problems. A current project at PTA involves the hand broadcasting of bait to control mice in conservation areas under an experimental label. This project supports the development of a Programmatic Environmental Impact Statement for rodent and mongoose control state-wide. PTA is a cooperating agency in the NEPA process.

- **Natural Resources Conservation Service**
  The Natural Resources Conservation Service (NRCS) is available to provide technical support and information on plant and animal control and plant identification. The NRCS has provided expertise in soil conservation and erosion control.

- **U.S. Forest Service**
  The U.S. Forest Service is looking into the impact of invasive predators on pollinators and native plant reproduction in Hawaiian dryland ecosystem. The absence of and/or reduction of native pollinators may be a reason some plants are experiencing a lack of reproduction and reduced population abundance. The findings will guide future land management decisions involving invasive predators at PTA.

### *U.S. Department of Transportation*

- **Federal Highway Administration**
  The Federal Highway Administration was involved with USAG-HI in the realignment of Saddle Road. The realignment of Saddle Road has had significant implications for natural resources management at PTA. Kipuka Alala was fenced as a multi-agency mitigation to offset loss of Palila critical habitat associated with road construction. This was a second fence unit (1,662 ha/4,107 ac) completed in 2001. The first fence (432 ha/1,068 ac) was completed in 1999 to protect federally listed plants and their habitats from feral ungulates. PTA continues to work with agencies in the restoration of Kipuka Alala. PTA has been working with Big Island Invasive Species Committee, who has been working the Federal Highway Administration and the Hawaii Department of Transportation (HDOT) in the Saddle Road/Daniel K. Inouye Highway corridor running through PTA for the control of tree tobacco (*Nicotiana glauca*) to prevent the species from establishing in KMA. Not only is the species a non-native, but it is a new host for the federally listed, endangered Blackburn sphinx moth (*Manduca blackburni*). PTA is working to keep both the plant and the moth off the installation.

### *National Science Foundation* (NSF)

The NSF is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…" NSF supports science and engineering education, and funding is integrated with education. As such, installation programs can benefit from educationally-based projects supported by NSF. Examples are provided below.

- **Living Stock Collections**
  The Living Stock Collection program supports operation of and improvements in outstanding collections of living organisms used in basic biological research. Proposals come from U.S. colleges, universities, and non-profit organizations.

- **Phylogeny of the genus *Schiedea***
  This is an intended future collaboration with NSF where PTA will provide samples of *Schiedea hawaiiensis* (island Schiedea) for genetic testing.

### 1.5.2.2 State of Hawaii Agencies

#### *Department of Land and Natural Resources* (DLNR)

The Hawaii DLNR is a major cooperator in the implementation of this INRMP in accordance with the SAIA. Cooperative efforts with DLNR typically fall under the responsibilities of the Division of Forestry and Wildlife (DoFAW) (hunting management and game populations, wildfire prevention and suppression, and wildlife research) and the Division of Conservation Resource Enforcement (natural resources law enforcement). DLNR and PTA's NRO staff works together on endangered species and critical habitat issues as well as in various working groups.

#### *Department of Agriculture*

The Hawaii Department of Agriculture certifies pesticide applicators, inspects storage facilities for pests, and provides as needed assistance to the installation.

### 1.5.2.3 Other Interested Parties

#### *Cooperative Ecosystem Studies Units*

The Cooperative Ecosystem Studies Unit is a cooperative of research units established to provide research, technical assistance, and education to resources and environmental managers. The Rocky Mountain and the Hawaii-Pacific Islands Cooperative Ecosystem Studies Units work with DoD and PTA. Cooperative agreements are executed via the U.S. Army Corps of Engineers and paid for by DoD.

#### *North Kona Dryland Forest Working Group*

The North Kona Dryland Forest Working Group is a cooperative association of individuals, non-governmental organizations, private businesses, and public agencies interested in dryland forest conservation.

#### *Hawaii Conservation Alliance*

The Hawaii Conservation Alliance is a cooperative partnership of government, education, and non-profit organizations with a strong commitment to the environmental conservation of the Hawaiian Islands through land management, scholarly research, and financial incentives.

#### *Hawaii Biodiversity and Mapping Program*

The Hawaii Biodiversity and Mapping Program (HBMP) played a fundamental support role for DoD lands in Hawaii. The HBMP hosted Hawaii's central database on plant and animal species. The HBMP archives data and provides statewide species information to NRO staff.

#### *Hunting Groups*

PTA is a popular hunting area on the Island of Hawaii; as such, many individual hunters and groups of hunters express interest in the management of natural resources at PTA, especially management decisions affecting hunting. Three such organizations are the Wildlife Conservation Association of Hawaii, Pig Hunters of Hawaii, and Hawaii Island Archery. Past PTA Commanders have been personally involved in these forums and have emphasized the benefit of NRO staff participation.

#### *Hawaiian Hoary Bat Research Cooperative*

The Hawaiian Bat Research Cooperative is a partnership composed of government agencies, non-profit organizations, and private landowners. The cooperative was formed to prioritize and fund Hawaiian hoary bat research. The cooperative awarded a three-year contract to the USGS Biological Resources Division, Pacific Islands Ecosystems Research Center to begin the initial phases of research. PTA NRO staff attend cooperative meetings, but is not an official member.

#### *Hawaii Seed Bank Partnership*

The Hawaii Seed Bank Partnership is a group of cooperating partners dedicated to the use of seed banking to store and preserve genetic diversity of native plants for the purpose of conservation and restoration.

PTA is investigating the feasibility of engaging the partnership to store threatened and endangered plant seed long-term and off-installation.

### *Mauna Kea Watershed Alliance and Three Mountain Alliance*

These two organizations cover most of the Island of Hawaii; Mauna Kea Watershed Alliance to the north and including all of the Mauna Kea slopes and Three Mountain Alliance to the south covering Kilauea, Mauna Loa, and Hualalai. Both organizations manage the watersheds areas, native habitats, and species, historical, and cultural as well as implementing management actions for the control of threats such as feral ungulates, fire, and invasive species.

### *Nene Recovery Action Group*

The Nene (Hawaiian goose) Recovery Action Group is an organization comprised of federal and state resources agencies. The group was created to enhance communication between agencies with responsibilities for Hawaiian goose management. A subset of the group meets regularly on the Island of Hawaii.

### *Pohakuloa Training Area Advisory Committee*

The PTA Advisory Committee is an advisory team selected by the PTA Commander. The Commander invites prominent local community members to serve. The committee advises the Commander on various land and community issues and strategies. Meetings are held six or more times a year depending on the Commander's schedule and need.

### *University of Hawaii*

The University of Hawaii provides support and interacts with NRO staff through the Research Corporation of the University of Hawaii (RCUH). RCUH provides research expertise in the areas of native species management and invasive species control as well as other areas. Expertise/service is provided via cooperative agreements that are executed via the U.S. Army Corps of Engineers and paid for by DoD.

### *Colorado State University*

Colorado State University provides natural resource specialists through the Center for Environmental Management of Military Lands, Colorado State University and the Cooperative Ecosystem Studies Units to PTA. These specialists comprise most of the work force who execute the programs and projects described in this INRMP. Expertise/service is provided via cooperative agreements that are executed via the U.S. Army Corps of Engineers and paid for by DoD.

## 1.6 Authority

This INRMP is required by the Sikes Act Improvement Act (SAIA) (16 U.S.C. §§ 670a et seq.), DoDI 4715.03 (*Environmental Conservation Program*), AR 200-1 (*Environmental Protection and Enhancement*). This INRMP provides guidance for PTA's compliance and implementation of other federal and state laws, most notably laws associated with environmental documentation, endangered species, and wildlife management.

The SAIA, as amended (16 U.S.C. §§ 670a-670o), requires the secretary of each military department to prepare and implement an INRMP 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 the preparation of such a plan inappropriate.

Additional authority and official DoD policy are provided by the Office of the Under Secretary of Defense memoranda, *Implementation of SAIA*, 25 May 2006, 10 Oct 2002, and 1 Nov 2004, *Implementation of SAIA: Supplemental Guidance Concerning Leased Lands*, 17 May 2005, DoDI Instruction 4715.03 (*Environmental Conservation Program*) (https://www.denix.osd.mil/denix/Public/Library/NCR/inrmp.html?fm-natres), AR 200-1 (*Environmental*

*Enhancement and Protection*, 28 August 2007), and AR 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*, 28 February 1995).

## 1.7 Stewardship and Compliance

An INRMP is an installation's natural resources strategy that identifies compliance requirements and how these requirements have been and will be met. An INRMP establishes stewardship initiatives that demonstrate the Army's commitment not only to sustain training lands, but to sustain the environment. The DoD is required to comply with all federal laws and executive orders (EO). For the purposes of this INRMP, this includes the ESA, SAIA, MBTA, NEPA, Invasive Species EO and others. Compliance with these laws and EOs is a priority.

Stewardship is the responsibility to manage and conserve natural resources for the future. Stewardship is a large component of the military environmental and training ethic. Military lands are actively managed for multiple training and testing missions. The military implements programs/efforts to reduce impacts on such lands and to ensure environmental and mission sustainability.

This INRMP contains projects that are compliance and mission driven, and others that are driven by ecosystem management and good land stewardship. Projects driven by compliance with federal laws and mission sustainability are first order priority for funding. Other projects and programs that enhance an installation's natural resources, promote proactive conservation actions, and support investments that demonstrate environmental leadership and proactive environmental stewardship are prioritized by their importance to support mission goals and to prevent future noncompliance with federal laws and Army regulations. Alternative funding can be sought and used to support stewardship projects. Stewardship projects that are not compliance/mission driven can be accomplished when funding is available or alternative sources for completion are identified. Alternative sources of funding include the Legacy program, SERDP, DoD Forestry Reserve Account, and the Agricultural Outleasing Program.

## 1.8 Review and Revision Process

Section 101(b)(2) of the SAIA [16 U.S.C. 670a(b)(2)] states that each INRMP "must be reviewed as to operation and effect by the parties thereto on a regular basis, but not less often that every five years." The review determines if the plan needs minor changes or revision to continue adequately address the purposes and requirements of the SAIA (USFWS 2015).

### 1.8.1 Review for Operation and Effectiveness

Reviews for the operation and effectiveness of an INRMP must be performed no less frequently than every five years by the Commander responsible for the INRMP, the Regional Director of the USFWS, and the Director(s) of the state fish and wildlife agency(ies), in this case, the Hawaii DLNR. If during the review the INRMP is found to be operational and effective; that is, the existing INRMP is being implemented to meet the requirements of the SAIA and contributes to the conservation and rehabilitation of natural resources on a military installation, a new INRMP is not required. This review may determine that updates to the INRMP are needed. Updates are modifications to the INRMP to address minor changes in mission or natural resources management activities that are not significant and are not expected to result in biophysical consequences materially different from those anticipated in the existing INRMP.

### 1.8.2 Annual Review

Annual reviews verify:

- All "must fund" projects and activities have been budgeted for, and implementation is on schedule.
- All required trained natural resources positions are filled or are in the process of being filled.

- Projects and activities for the upcoming year have been identified and included in the INRMP. An updated project list does not necessitate INRMP revision.
- All required coordination has occurred.
- All significant changes to the installation's mission requirements or its natural resources have been identified.
- The INRMP goals and objectives are still valid.
- No net loss of training capability has occurred due to implementation of the INRMP in accordance with the SAIA.

### 1.8.3 Public Review

Per the SAIA, NEPA and public review are only required for documents with updates major revisions or the initial INRMP. This INRMP update does not require NEPA analysis; therefore, the INRMP was not available for public review prior to final Army and External Stakeholder approval. The updated INRMP was made available on the Sustainability and Environmental Management webpage (https://www.garrison.hawaii.army.mil/sustainability/naturalresources.aspx).

## 1.9 Integration with Other Plans

Integrating the components of natural resources management can be a complex challenge. One of the objectives of ecosystem management at PTA is to develop a process to identify requirements objectively for all species and users of the environment. In addition, natural and cultural resources projects can only be classified as military use (valid expenditures of military funds) if there is a direct link back to military mission. An INRMP is prepared in coordination with the installation's Master Plan, Range Development and Training Plan, Biological Opinion(s), Implementation Plan, Integrated Cultural Resources Management Plan, Integrated Pest Management Plan, Installation Restoration Plan that address contaminants covered by Comprehensive Environmental Response, Compensation, and Liability Act and related provisions, and other appropriate plans and offices. The intent is to develop a plan that complements and is compatible with other installation programs' goals and objectives. The INRMP is not meant to function as a comprehensive compilation of detailed information on all these related topics. Rather, an INRMP should briefly summarize the key interrelationships with these plans, reference where the plans may be obtained, and describe where more detailed information can be found.

### 1.9.1 Range Related Programs

- **Sustainable Range Program**—Improves the way the Army designs, manages, and uses ranges to ensure that curreent and future doctrinal requirements are met (AR 350-19).
- **Integrated Training Area Management Work Plan**—Outlines program goals and objectives as well as the goals and objectives. The plan is designed to support the military mission by protecting and enhancing the training lands that the military is critically dependent upon.
- **Range and Training Land Program Development Plan**—U.S. Army Hawaii Range and Training Land Program Development Plan (RTLPDP) outlines range development requirements for USAG-HI training lands. The INRMP complements the RTLPDP by providing information that minimizes impacts to natural resources when siting new range facilities.
- **U.S. Army Hawaii Range Complex Master Plan**—A living document and is a sub-component of the RTLP. It depicts installation ranges and training land assets, provide general siting of future range complex project requirements, and address installation requirements and constraints that may impact ranges or training lands.
- **Wildland Fire Management Plan**—The Range Officer, G3/TSS, Range Division Hawaii, has the overall responsibility for enforcing the provisions of the plan and other applicable training directives and regulations, including restrictions on or the cessation of training activities based on

the day's fire danger rating. The PTA Wildland Fire Program Coordinator is responsible for coordinating and maintaining the firefighting infrastructure, such as firebreaks and fuel breaks, and maintaining the fire cache. The impetus for an Integrated Wildland Fire Management Plan is the numerous federally listed plants present on the installation.

### 1.9.2 Environmental Impact Statements and Assessments

- **Construction and Operation of an Infantry Platoon Battle Course (IPBC)** at Pohakuloa Training Area (PTA), Final Environmental Impact Statement, Hawaii (USAEC 2013).
- **Construction of an Urban Close Air Support Range and an Aviation Bulls-eye Range** at Pohakuloa Training Area, Hawaii (U.S. Marine Corps 2013).
- **Aviation Land Zones, 25th Combat Aviation Brigade and Army National Guard**, Hawaii (Department of Army and Hawaii Army National Guard 2013).
- **Basing of MV-22 and H-1 Aircraft in Support of III Marine Expeditionary Force Elements** in Hawaii, Final Environmental Impact Statement (Department of Navy 2012).
- **Development and Use of Military Training Facilities** on Pohakuloa Training Area (Jones 2009).
- **Construction of Large-Scale Fence Units**, Programmatic Environmental Assessment (25th ID & USAG-HI 2006a).
- **Implementation of the Integrated Wildland Fire Management Plan**, Programmatic Environmental Assessment (25th ID & USAG-HI 2006b).
- **Permanent Stationing of the 2/25th Stryker Brigade Combat Team**, Final Environmental Impact Statement (USAEC 2008).
- **Transformation of 2nd Brigade, 25th Infantry Division (Light) to a Stryker Brigade Combat Team in Hawaii**, Final Environmental Impact Statement (Tetra Tec 2004).
- **Construction of Command and Control Building and Base Camp Access Road** (U.S. Army 2003).
- **Final Environmental Impact Statement for** Saddle Road (State Route 200) Mamalahoa Highway (State Route 190) to Milepost 6 (*Regarding Implementation of the Saddle Road Palila Critical Habitat Impact Mitigation*, 1998).
- **Final 4(f) Evaluation of Saddle Road (State Route 200) Mamalahoa Highway (State Route 190) to Milepost 41**, County of Hawaii, State of Hawaii, Final Supplemental Environmental Impact Statement (County of Hawaii and State of Hawaii 2010).
- **Increased Archery Hunter Access Policy** (Army consultation with USFWS 1999).
- **Rock Crusher Operations** at Schofield Barracks and Pohakuloa Training Area, Hawaiim (Letter dated 23 January 1998).
- **Kipuka Alala and Silene hawaiiensis Exclosures** (concurrence by USFWS 1998).
- FY95 ECIP Photovoltaic/Hybrid System (concurrence by USFWS 1997).
- **Range 8**, section 7 consultation, biological opinion (USFWS 1997).
- **Deep Well Construction** (USFWS 1996).
- **Photovoltaic Project** (concurrence by USFWS 1995).
- **Ecosystem Management Program** (concurrence by USFWS 1995).
- **Relocated Baseline/Administration Area, Multi-Purpose Range Complex** (concurrence by USFWS 1990).
- **Multi-Purpose Range Complex, Pohakuloa Training Area, Hawaii** (U.S. Army 1986).

### 1.9.3 Biological Opinions

- ***Informal Consultation and Formal Consultation with a Biological Opinion for the Construction, Maintenance, and Operation of an Infantry Platoon Battle Area and***

**Installation-wide Impacts of Military Training on Hawaiian Geese (Branta sandvicensis)** at Pohakuloa Training Area, Hawaii (USFWS 2013).

- **Additional Species and New Training Actions at Pohakuloa Training Area**, Hawaii, Biological Opinion of the USFWS for Reinitiation of Formal Section Consultation (USFWS 2008a).
- **High Altitude Flight Training for Helicopter Pilots** (USFWS 2008).
- **Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light)**, Biological Opinion of the U.S. Fish and Wildlife Service (USFWS 2003).
- **Palila and Palila Critical Habitat and three Federally Listed Plant Species**, Biological Opinion of the U.S. Fish and Wildlife Service (USFWS 1983).
- **Division Field Training Exercise (FTX '82)**, Biological Opinion of the U.S. Fish and Wildlife Service (USFWS 1982).
- **Public Hunting in Kipuka Alala** (concurrence by USFWS 2001).
- **Kipuka Alala Terrestrial Arthropod Survey**, Pohakuloa Training Area (concurrence by USFWS 1999).

### 1.9.4 Informal Consultations

There have been numerous informal consultations between the USFWS and PTA. An informal consultation helps determine if a formal consultation is necessary. An informal consultation can determine and identify the affected species/critical habitat, the potential direct and indirect effects of the action on the species/critical habitat, and may delay a decision as additional information is collected. Informal consultations are a chance to explore opportunities that benefit the species/critical habitat, allow for creative alternatives, and tend to be less expensive. An informal consultation ends with an effects determination ("no effect", "may affect"). If a "may affect, likely to adversely affect" determination is made, a section 7 consultation is required, but not with a "may affect, not likely to adversely affect". An example of a "may affect, not likely to adversely affect" would be seasonal restrictions placed on an area with a listed ground nesting bird, thereby avoiding a take. In this case the Army would ask the USFWS for concurrence.

### 1.9.5 Ongoing Issues

Some natural resources issues are at a point where the path to resolution is unknown or uncertain. An example is the conflict between the requirement to protect a non-native migratory bird (Barn owl, *Tyto alba*) covered by the MBTA and federally listed species, such as the ground-nesting Hawaiian petrel. Reasons for this unsure status include the lack of scientific information, conflicting agendas, costs, or other roadblocks. Difficulties will not prevent USAG-HI and IMCOM-PAC from continuing to work on resolutions. Recognition of and a willingness to deal with such conflicts are part of the process.

#### *Migratory Birds Treaty Act*

An MOU between the DoD and the USFWS promotes the conservation of migratory birds and was developed pursuant to EO 13186 - *Responsibilities of Federal Agencies to Protect Migratory Birds*, to address both direct and indirect take of migratory birds. The MOU identifies specific activities where cooperation between USFWS and DoD will contribute substantially to the conservation of migratory birds and their habitats. This MOU does not authorize the take of migratory birds for military non-readiness activities (nMRA), and incumbent upon the Army to ensure that impacts of nMRAs on migratory birds are avoided, minimized, or mitigated to the greatest extent possible. Military activities need to be assessed to determine if there is a significant direct or indirect adverse effects on migratory birds (e.g., disruption during nesting vs. removal of resources). The NEPA process may be an appropriate mechanism for the assessment of potential impacts and to determine if an action is an MRA or an nMRA. If so, then the Army needs to confer with USFWS to develop and implement appropriate conservation measures to minimize or mitigate significant adverse effects.

### *Naio Thrip*

The naio thrip (*Klambothrips myopori*) is a sucking insect that has devastated *Myoporum sandwicense* stands on PTA. First noticed on the island of Hawaii in 2009, the pest is thought to have been transported via infested landscaping plants and locally spread by wind.

### *Perched Aquifer*

Also of interest was the discovery of a perched aquifer underlining and adjacent to PTA in 2015. Not only is this a potential source of drinking water, but could possibly be developed as a geothermal resource.

### *Kawaihae Harbor Upgrades*

The Army owns and operates the landing ramp and an easement authorized by the Governor's EO 1759, which allows the military operation and transfer troops, vehicles, explosives, and other goods at Kawaihae Harbor. Logistic Support Vehicles are off-loaded and taken to PTA. Off-loading generally occurs by dropping down a ramp from the shipping vessel after it beaches in the shallow landing area. The Army is replacing two dolphins (structures that jut out of the water and are used for tying down vessels or providing a structure where vessels could abut and dock) and a boat ramp. Future National Marine Fisheries Service (NMFS) consultations are expected to address potential impacts to turtles and marine mammals related to ongoing operations and maintenance activities.

### *Lighting systems*

The Army is considering lighting levels in the Saddle Region with future development and the potential to affect neighboring observatories (Atmospheric NOAA and Astronomical Mauna Kea) and nocturnal wildlife such as seabirds and bats. Best management practices as identified in the DoD Uniform Facilities Criteria for lighting systems will be reviewed to determine ability to reduce lighting impacts.

### *Nicotiana glauca*

*Nicotiana glauca* is a highly invasive species that can invade natural areas as well as disturbed sites at PTA. The plant has become an alternate host plant for larvae of the endangered Blackburn's sphinx moth (*Manduca blackburni*) on Hawaii Island. NRO staff are working to control *N. glauca* while minimizing potential impacts to the moth. To date, the Blackburn's sphinx moth has not yet been documented at PTA. Effective control of *N. glauca* is necessary to avoid impacts to listed species habitat and to keep fire and fuel breaks in compliance with the 2003 Biological Opinion. PTA NRO staff use mechanical and chemical control methods to reduce and eliminate *N. glauca*. Per guidance by US FWS, trees over 1m tall are surveyed for moth larvae prior to control. If larvae are found, control/removal will be scheduled for after hatching. No larvae have been found at PTA.

# 2 CURRENT CONDITIONS AND USE

## 2.1 General Description

PTA is located in the north-central portion of the Island of Hawaii (Figure 2-1), west of the Humuula Saddle, in an area formed by the convergence of three volcanic mountains: Mauna Kea, Mauna Loa, and Hualalai. The installation's cantonment area is situated 58 km (36 mi) west of Hilo, 40 km (25 mi) south of Waimea, and 80 km (50 mi) east of Kailua-Kona. The populations of Hilo and Kailua-Kona are 43,263 and 11,975, respectively, and the populations of Waimea and Waikoloa Village are 9,212 and 6,362, respectively (U.S. Census 2010). Waimea and Waikoloa are some 15 km (6 mi) northwest of the installation boundary. PTA is 175 nautical miles from Oahu, the home station for most assigned forces.

PTA is the single largest U.S. Army holding in the state of Hawaii at 53,497 ha (132,193 ac) of ceded, leased, and fee simple lands (Table 2-1). The majority of PTA was acquired through Presidential EO 11167 (64%) and purchases (18%). About 17% of the installation is held through a 65-year lease with the State of Hawaii, which expires in 2029. The installation is in an unincorporated area. Nearly all neighboring properties are conservation lands, with the exception of the Waikii Ranch, Parker Ranch, and a private dwellings (Figure 2-2).

## 2.2 Regional Land Use

State of Hawaii lands border 68% of the PTA, and the remaining 32% of the boundary neighbors privately held properties. Also boarding the installation is the Mauna Kea Recreational Area, a county park, northeast of PTA. Hawaiian Homelands properties are to the east of the installation and share 2.9% of the border. Kamehameha Schools land adjoins PTA on its southwestern boundary (8.8%), while multiple landowners northwest of Mamalahoa Highway account for 8.9% of the boundary. The purchase of KMA has placed PTA in closer proximity to developed areas. Waikii Ranch (subdivision), bordered on three sides by the maneuver area, is approximately 26 km (10 mi) from the cantonment area and shares 8.9% of the installation's boundary. The remainder of adjoining lands to KMA belongs to the State of Hawaii, and these lands are often subleased to private landowners (e.g., Parker Ranch). Grazing and public recreation are the principal neighboring land uses (25$^{th}$ Infantry Division (L) and U.S. Army Hawaii 2002).

## 2.3 History and Pre-Military Land Use

PTA is part of landscape that includes Mauna Kea, Mauna Loa, and the saddle area (U.S. Navy 2008). The area supported traditional native activities such as bird hunting for feathers and meat, lithic quarrying, and workshop locations, as well as numerous trails used for cross-island movement between Mauna Kea and Mauna Loa. The Ahu a Umi Heiau on the slopes of Hualalai (southwest of PTA) is believed to have been built by the legendary chief "Umi a Liloa" around 1600 and derives some of its importance from its location in the interior of the island. Cave shelters are abundant due to extensive natural lava tube systems in the area; historically, they have been a source of limited water and have provided refuge from the elements (U.S. Navy 2008).

A number of accounts describe the sheep stations on the flanks of Mauna Kea. The Keamuku Sheep Station was located in what is now the KMA, in Waikoloa Ahupuaa of South Kohala District. The Humuula and Kalaleha stations were on the eastern side of the volcano in Humuula Ahupuaa of the North Hilo District. Isabella Bird (1875) in the late 1800s described of the central plateau as "destitute of water, and sustaining only a miserable scrub of *Sophora chrysophylla* (mamane), stunted *Metrosideros polymorpha* (ohia), *Styphelia tameiameiae* (pukiawe), *Vaccinium reticulatum* (ohelo ai), a few composites, and some of the hardiest ferns" (Maly and Maly 2002), and continued to describe the vast tableland (Puu Keekee, Pohakuloa region) between volcanic domes and "the loneliest, saddest dreariest expanse" (Bird 1875). The lower elevations of Mauna Kea are described with "forests that skirt his base,

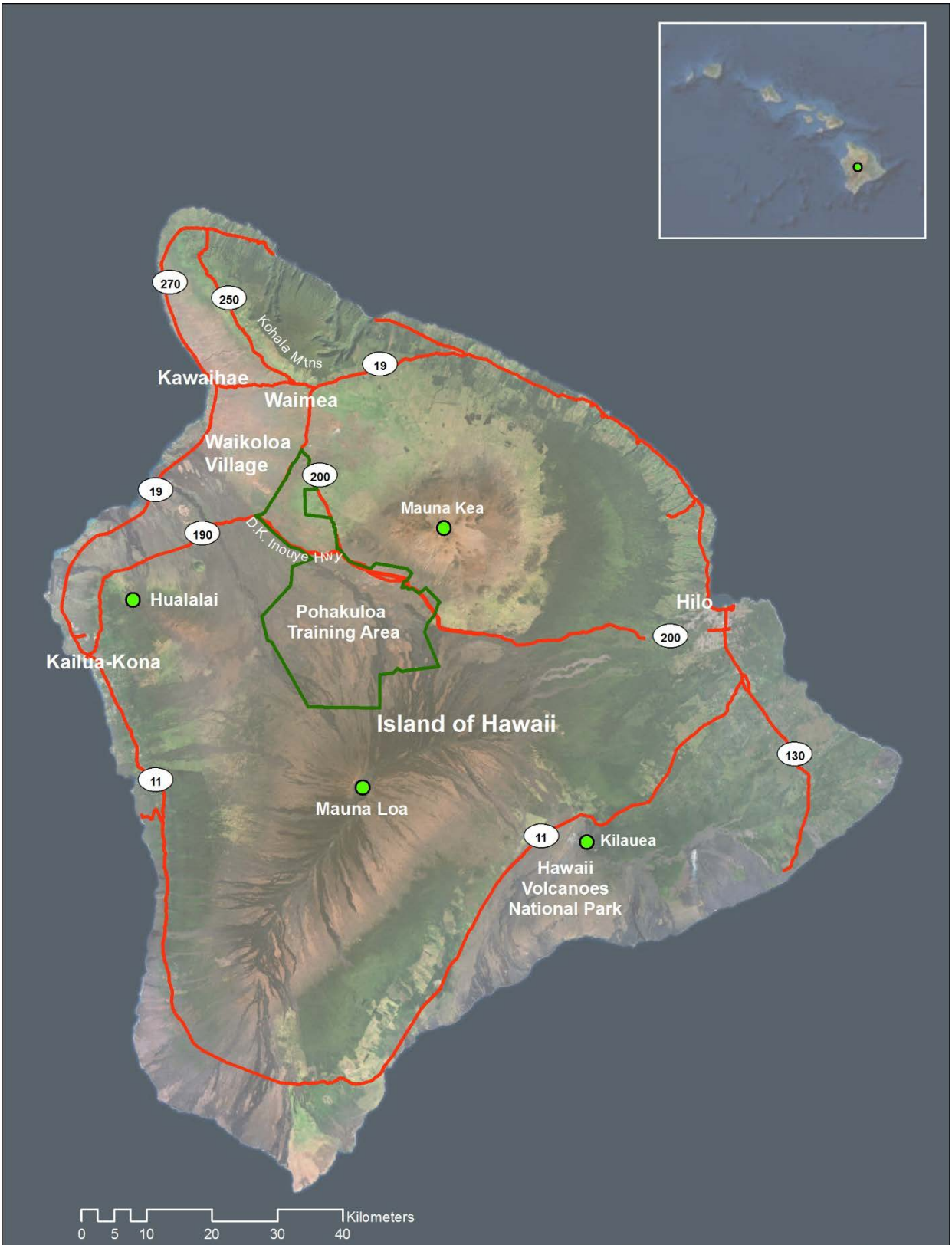


Figure 2-1. Location of Pohakuloa Training Area, Hawaii.

Table 2-1. Land Ownership on and adjacent to Pohakuloa Training Area, Hawaii (IMCOM 2013).

| Ownership | Reference | Expiration Date | Hectares (ha) | Acres (ac) |
|---|---|---|---|---|
| Ceded to the Army | Governor EO 1719 | | 307 | 758 |
| Ceded to the Army | Presidential EO 11167 | | 34,017 | 84,057 |
| State of Hawaii | Lease DA-94-626-ENG-80 | 16 August 2029 | 9,303 | 22,988 |
| Parker Ranch | Purchased | | 10,112 | 24,988 |
| Other | Purchased | | 6 | 16 |
| Other | Purchased | | 2 | 6 |
| Other | Under license | | <1 | 1 |

[and] are the resort of thousands of wild cattle… [and where] wild black swine…abound." By the 1840s, cattle, sheep, and goats were causing a significant impact to the point of eating thatched homes and consuming agricultural crops. John Parker held a lease in the area of PTA from 1876 to 1891and the Waimea Grazing and Agricultural Company from 1860-1881(USAEC 2008). The latter completed a wagon road from one of its remote sheep stations near the Saddle Road (at Humuula) to Waimea to transport wool to the harbor at Kawaihae. A portion of that road is still visible. By 1891, the Humuula lease was taken over by the Hackfield's Humuula Sheep Station Company. After 1900, the Parker Ranch, managed by A. W. Carter obtained control of the Humuula Sheep Company and controlled most of the saddle (USAEC 2008). The impacted area was about a third of the current PTA footprint, with the body of the installation in a "wild" and unused state.

In 1903, the Waikii Ranch Station and Village were developed (Maly and Maly 2002). A.W. Carter developed water resources on outlying ranch lands by piping water from the Kohala Mountains to the Holoholoku, Waikii, Puu Keekee and Puu Anuanu sections of the ranch lands. Carter was a trustee of the Parker estate interests for Annie Thelma Kahiluonapuaapiilani (ATK) Parker in 1899, after her father died, leaving her half of the ranch with the other half going to Samuel Parker (cousin) (Taomia, J. M. per. com.). ATK Parker ultimately obtained the whole ranch (about 1914).

This venture led to the development of thousands of cattle paddock acres, and the Waikii Village was described as the "heartland" and "bread basket" of the ranch. From 1900 to 1957, a number of international families—Chinese, German, Hawaiian, Korean, and more—lived at Waikii and Keamuku stations. Water brought agriculture to Waikii and the planting of cornfields. Roadways and vehicles changed the way work was done. The Army built Kaumana Road for military access between the towns of Hilo and Waimea (State Route 200, Saddle Road) during World War II. In 1957, the Waikii Village Station was closed, as outlying stations were no longer beneficial to the large ranches. Sheep operations ended in 1964. Around 1960, a deep well installed at Waikii led to the development of the Waikii Ranch.

Approximately 73% of the area outside of the impact area and about 20% within the impact area have been surveyed for cultural resources (J. Taomia pers. com. 2016). Archaeological sites include lava tube shelters, walls, trails, lithic scatters, quarries, shrines, cairns, platforms, and pits (Tomonari-Tuggle 2000). For more information regarding the historic and pre-military uses of PTA reference *An Integrated Cultural Resources Management Plan (ICRMP) for the U.S. Army Garrison – Pohakuloa (USAG-P) Hawaii Island FY 2017-2021* (USAG-HI 2017).

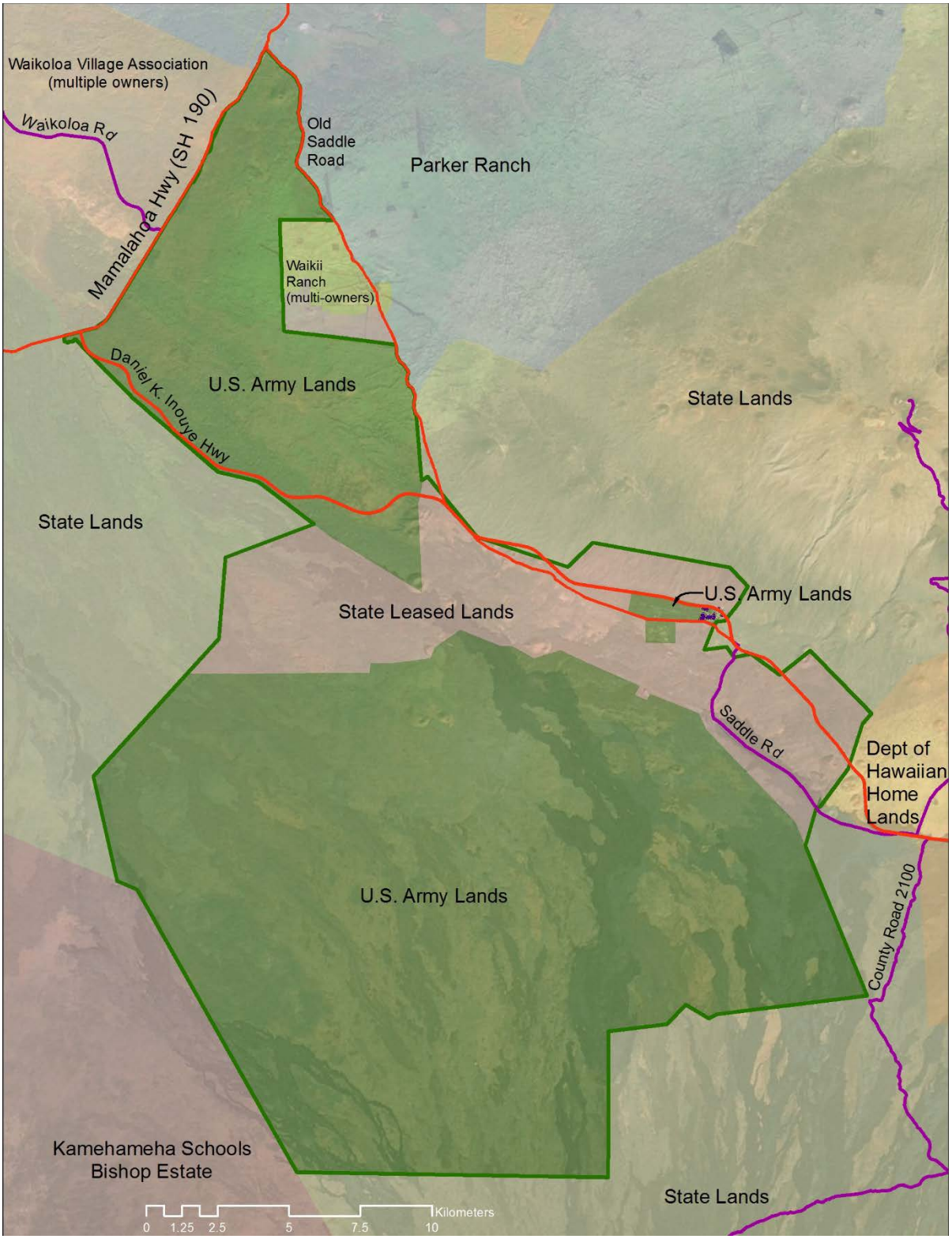


Figure 2-2. Property Ownership on and surrounding Pohakuloa Training Area, Hawaii.

## 2.4 Historic Land Use

### 2.4.1 Early History

The Civilian Conservation Corps was in the area in the 1930s, building fences around the Mauna Kea Forest Reserve (Taomia, J. M. per. com.). The U.S. military began training in the PTA area around World War II, and was not routinely use the area until 1943 (Hays 2002). The Army constructed the Kaumana Road in 1942 for military access. The cross-island road was considered imperative to the defense of the island. Road construction ultimately led to the development of the Saddle Training Area, later known as PTA (Langlas et al. 1997).

### 2.4.2 World War II

The area was used during World War II as a Marine Corps artillery live-fire training area (McElroy 2006). The Navy, as well as the Marines Corps, conducted air bombardment and strafing at the emerging installation (S. Troute, per. com. Feb 2007). Tents were the extent of billeting. After the war, the area fell under the control of the Hawaii Territorial Guard until disbanded, and the Hawaii Army National Guard from 1941 to 1947 (Hays 2002). Limited use of PTA by the U.S. military may be related to the extent of military training occurring on other parts of the island. Camp Tarawa (aka Camp Waimea) was a huge tent city on Parker Ranch land that trained Marines for Iwo Jima from 1942 to 1945. Waikoloa Maneuver Area (1943-1945) and Nansay Sites covered over 49,766 ha (123,000 ac) and served as a training camp for 50,000 men in the 2nd and 5th Marine Divisions and the V Amphibious Corps. PTA was used as a U.S. Marine Corps combat and artillery firing range as well as for troop maneuvers. Camp Tarawa closed in November 1945. Parts of Waikoloa Maneuver Area include KMA and the area referred to as the 1010 Parcel that the Army purchased from Parker Ranch in 2006.

### 2.4.3 Korean War to Vietnam

The National Guard used PTA during the Korean War in the 1950s. Temporary tent encampments sporadically occupied the training area until 1955, when the U.S. Army established a permanent installation called Pohakuloa Training Area. Year-round training area was officially established on 27 April 1955. The Governor of the Territory of Hawaii issued Executive Order 1719 (25 January 1956) setting aside 307 ha (758.26 ac) for the use of the U.S. government. Presidential EO 11167 (15 August 1964) added 34,017 ha (84,057 ac) from the State of Hawaii at no cost. Another 9,303 ha (22,988 acres) were added via a 65-year lease from the State of Hawaii (17 August 1964) that expires 16 August 2029.

The first structures were erected prior to the installation's formation in 1955. These shed roof outhouses were demolished in 1962. The Quonset huts that define the landscape of the PTA's base camp were erected from 1955 to 1961 and used by the National Guard, Army, and Marines (Langlas et al. 1997). Other waves of construction occurred from 1962 to 1969 and in the 1980s. Few of the Quonset huts built at PTA have been demolished. BAAF has been in service on the installation since the 1960s.

### 2.4.4 Post-Vietnam to First Gulf War to Present

The 25th ID and 3rd Marines were the principal users of PTA into the 1970s. Training changed to light vehicles, and tanks were no longer part of training exercises. PTA is the largest live-fire range and training complex in USAG-HI and is the main tactical training area for military METL training. The installation provides resources for active and reserve component units. PTA assets are geared toward live-fire range training, maneuver live-fire (e.g., moving and shooting at targets, including CALFEX on ranges, dismounted maneuver training outside live-fire ranges with no live-fire, mounted non-live fire maneuver, and artillery live-fire. However, Army training is changing, and training on PTA is now moving from light infantry training to include urban, close in, and complex terrain exercises. Infantry activities continue to center on movements and engagements, utilizing a variety of squad/platoon to company and larger exercises. Engineering, military intelligence, and signal units will be included.

Infantry battalion companies will change to combined arms teams, consisting of infantry, and a family of light and medium-weight vehicles.

PTA supports infantry brigades, artillery, aviation brigade, sustainment brigade, and other CS and CSS units. The 25th ID is the principal fire and maneuver user. Other users include the Hawaii Army National Guard, U.S. Marine Corps Units, and other Allied Forces.

## 2.5 Military Mission

PTA's mission is to provide a quality joint/combined arms facility that offers logistical and training support as the centerpiece of the USARPAC collective training strategy for Hawaii while maintaining an enduring partnership with the local community. It affords Soldiers the most realistic and flexible training environment in the Pacific region. Army, Navy, Marine, Air Force, and the FBI, as well as multiple international forces during RIMPAC, use PTA for their training. PTA is obligated to provide the best training for military forces so they will be ready to defend the nation in times of crisis. PTA's key tasks are to ensure responsive and effective support for units training, to set the standard for cultural and environmental stewardship, and to develop and maintain relationships with the local community, civic organizations and state and local governments.

## 2.6 Facilities Operations and Activities

### 2.6.1 Cantonment Area

The cantonment area covers approximately 229 ha (566 ac) and consists of 128 buildings (almost all Quonset huts), including three dining facilities (one is large); two small and one large motor pool; one rations warehouse and freezer; two bulk fuel facilities; and a chapel, theater, recreation club, and medical facility. Four military personnel are permanently stationed at PTA, and some 20,095 troops trained on the installation in 2006. Additional space is available for units supplying their own cots. A Facilities Improvement Plan is in place to upgrade the cantonment from 2016 to 2019.

### 2.6.2 Bradshaw Army Airfield (BAAF)

BAAF, built in 1956, provides support for rotary and fixed-wing aircraft operations. The airfield is at an elevation of 1,887 m (6,190 ft).The airfield covers approximately 211 ha (522 ac), has a 1,126 m (3,696 ft) x 27 m (90ft) runway with a 152-m (500-ft) overrun on each end marked as a displaced threshold (http://www.airnav.com/airport/PHSF). Two panels on the runway support helicopters, and the parking ramp can accommodate two C-130s. No permanent aircraft are assigned to BAAF. The facility is under the command of Air Traffic Control Services, Wheeler Army Airfield, 25th ID. Current operations are limited to visual flight rules, and approaches and departures are only from the west.

The Base Weather Station is located at BAAF and currently supports the 25th Infantry Division (Light) and its associate units at Wheeler and Schofield Barracks, the Hawaii Army National Guard Hilo, and the 45th Support Group (68th Medical Detachment). Deployments to the Big Island are usually on a quarterly rotation (http://www.globalsecurity.org/military/facility/bradshaw.htm).

The airspace in the region of PTA includes uncontrolled Class G airspace, which extends from the surface to 366 m (1,200 ft), and Class E airspace above 366 m, unless special use airspace is activated. The airspace surrounding BAAF is Class D airspace and extends from the surface to a ceiling of 2,652 m (8,700 ft). R-3103 is a restricted airspace above PTA extending from the surface to 9,144 m (30,000 ft) (U.S. Navy 2011). The use of this area is intermittent and proceeded by 12 hours advance notice. The area is controlled by BAAF when active. R-3103 is used for helicopter training, averaging 900 aircraft movements per month and can involve 10 rotary-winged aircraft at any one time. Naval aircraft use includes Navy and Marine Corps fighter and attach aircraft crew training, and could include air-to-ground missile firing, conventional ordnance delivery, and precision-guided munitions firing (USAG-HI 2011).

### 2.6.3 Population

The installation can support up to 2,300 military personnel with rations, ice, fuel and transportation. Uniformed service members and civilian employees utilize the local economy (https://www.garrison.hawaii.army.mil/pta/, 17 July 2016). Most civilian and military families live in Hilo, 35 miles east of the installation or to the west in Waimea or Waikoloa, 40 to 50 miles from PTA.

### 2.6.4 Roads

PTA has 649 km (403 mi) of roads and road surfaces (ITAM GIS Database 2017). About 172 km (107 mi) are principal routes in the cantonment and among the training areas, 113 km (70 mi) are trails within the ranges, 44 km (25 mi) of training trails are present in KMA (e.g., Contract, Loop, Papapa, Heewai Makai trails), and the rest occur off the principal routes (unimproved) and account for 323 km (201 mi) of roads/trails. Access is limited in some parts of the installation due to few roads or roads that are difficult to travel. Dust can be a problem on unimproved roads.

### 2.6.5 Commercial/Other Airports

Commercial airports at Hilo (54 km, 34 mi east) and just north of Kona at Keahole (52 km, 32 mi west) serve the Island of Hawaii, handling aircraft up to large commercial jets (Airport Resource Center 2007). A smaller airport is at Waimea-Kohala (30 km, 19 mi northwest). Upolu Point Airfield (State-owned) is occasionally leased by PTA. Upolu Point Airport is a single runway with two aircraft parking areas 5 km (3 mi) northwest of the unincorporated town of Hawi on the northern tip of the Island of Hawaii. The runway is 1,158 m (3,800 ft) long and 23 m (75 ft) wide.

### 2.6.6 Shipping Facilities

Docks at Kawaihae in South Kohala are operated by the State of Hawaii, and are suitable for transport ships. Kawaihae Harbor is undergoing expansion in accordance with the Kawaihae Harbor 2035 Plan (HDOT and USDOT 2011). The 2035 Master Plan provides the following information: The U.S. Army owns and operates a landing ramp at the coral stockpile area ("Coral Flats") through Governor's EO 1759, which allows the Army to conduct military operations and transfer goods including troops, vehicles, and explosives. Most military equipment is delivered by large sea barges. It is used by the 45$^{th}$ Army Corps Support Group (Forward) to off-load Logistics Support Vehicles (LSV) to be taken to PTA. The off-loading generally occurs by dropping down a ramp from the shipping vessel. At times, they also make use of the State piers for this purpose. The use and need varies according to the status of deployment and scheduling of training exercises. Equipment and vehicles are transported to PTA on public roads. Public notices are released when military convoys are scheduled. Additionally, EO 2142 was granted to the U.S. Army for access to the ramp area. Collectively, the two current EOs grant the U.S. Army ownership of approximately 10 acres of land at Kawaihae Harbor. Portions of Kawaihae Harbor's back areas are used for petroleum storage, bulk cement storage, and less-than container load staging.

Equipment is trucked to PTA from Kawaihae Harbor via Route 19 to Waikoloa Road then to Route 190, and ultimately to the D.K. Inouye Highway (SR 200). Personnel and equipment arriving at either Hilo Harbor or Hilo Airport are transported west to PTA along SR 200.

Near PTA, the highway runs north along the base of Mauna Kea, passing through Palila Critical Habitat. The highway crosses TA 16 and enters KMA, running along the southern boundary of KMA, generally following the edge of the 1750 Keamuku lava flow.

### 2.6.7 Kilauea Military Camp (KMC)

KMC is located on Hawaii Volcanoes National Park (HAVO) lands, and under the control of the Secretary of Interior. A special use permit (PWFA-HAVO-5300-05) was issued for DoD use of KMC in 1998, and is reviewed every 5-years. The camp is operated by Morale, Welfare, and Recreation (MWR).

The camp is about 20 ha (50 ac) and was established in 1916. The camp was originally built by a group of Hilo business men on land owned by the Bishop Estate for local National Guard members. The facility has served as a training facility, a Navy camp, an internment camp, and a prisoner-of-war camp during World War II. KMC's lease was acquired by the National Park Service in 1921 when the Territory of Hawaii turned over the land to the United States, and the Army acquired control of the area the same year. Today it serves as a vacation resort for U.S. soldiers and DoD employees.

## 2.7 Military Operations and Activities[1]

PTA is the only a major training area on the Island of Hawaii. PTA, established as a multi-functional training facility in 1955, is the largest contiguous live-fire range and maneuver training area in Hawaii, and is the primary tactical training area for units conducting military METL training. PTA encompasses approximately 53,497 ha (132,193 ac) and includes a cantonment, an airfield, maneuver training areas, live-fire training ranges, artillery firing points, and a centrally located 19,368 ha (47,859 ac) impact area.

PTA is used extensively by USPACOM and Reserve forces in the Pacific for joint and combined training exercises. PTA is the largest U.S.-owned training area in the Pacific that permits the integration of live-fire and maneuvers in joint and combined arms operations. Military operations and activities are guided by External Standard Operating Procedures that include the protection of natural and cultural resources (USAG-P 2015).

### 2.7.1 U.S. Army

PTA supports full-scale combined arms live-firing and field training military exercises at all levels from squad to brigade for units stationed in Hawaii and supports similar training up to company level for the Army Reserve Component and Hawaii Army National Guard units stationed in Hawaii. Army active component training at PTA primarily includes units from the 25th ID, 3/25th IBCT, and 25th CAB. Other units that use PTA include the 94th Army Air and Missile Defense Command, 8th Theater Sustainment Command, 45th Sustainment Brigade, 8th MP Brigade, and the 130th Engineer Brigade. PTA is also used by Hawaii's Emergency First Responders and the Hawaii Police Department.

The intent is for PTA to support:

(1) Three battalion level units on site.
(2) Two battalions training simultaneously with one battalion in support.
(3) One battalion executing collective maneuver and live-fire training at company level or higher.
(4) One battalion conducting collective maneuver and live-fire training at crew through platoon levels, and situational training exercise lanes.
(5) One to two battalions preform distributed training via link to the Mission Training Complex with a brigade headquarters providing mission command.

***Joint Training:*** Joint combined operations reflects a tailored Army task force with specific capabilities that support a larger joint task force.

[1] Sources: (1) U.S. Army Pacific and U.S. Army Garrison-Hawaii. 2013. Final Environmental Impact Statement. *Construction and Operation of an Infantry Platoon Battle Course (IPBC) at Pohakuloa Training Area (PTA), Hawaii*. U.S. Army Environmental Command, Applied Sciences & Information Systems (AS&IS), Inc., and Booz Allen Hamilton; (2) U.S. Army Garrison- Hawaii, Directorate of Public Work, Environmental Division. 2016. *Description of Army Training Actions and Locations in Hawaii. In support of U.S. Army Programmatic Agreements for Routine Military Training and Related Actions on Oahu and Hawaii Islands*; and (3) U.S. Army, Pacific, Commander. 2015. Memorandum Subject: *U.S. Army Hawaii (USARHAW) Comprehensive Approach to Training in Hawaii: A Strategy for Pohakuloa.*

***Combat Aviation Brigade:*** The 25th CAB training includes basic aviation skills and complete required annual training to maintain flight proficiency and certification for helicopter pilots and crews. This training includes specific flight maneuvers, operations with night vision equipment, instrument evaluation, and collective flight training tasks. CAB training at PTA uses designated landing zones (LZ). High altitude (up to 2,438 m/8,000 ft) landing zones on Mauna Loa are in the southern most portion of PTA. Also, training involving Unmanned Aircraft Systems (UAS)/Unmanned Aircraft Vehicles (UAV) is conducted by the 2/25th and the 3/25th ID in restricted airspace (RA).

***9th Mission Support Command and 1/196th Infantry Brigade:*** Both units conduct METL training at PTA, as well as training support to the Reserve component and the Hawaii Army National Guard throughout USARPAC area of responsibility. Training meets pre/post mobilization readiness standards and training support to the USARPAC Theater Security Cooperation Program exercises.

A number of PTA's ranges support unit collective training. The installation also contains several individual and crew-served weapon ranges that are used for individual Soldiers or units for qualifying training if those training opportunities are missed on Oahu.

The time spent at home station to reset and retrain (dwell time) is returning to levels prior to the wars in Iraq and Afghanistan. Reset and retrain is the structured progression of increasing readiness after deployment from an operational environment. Training begins with individual weapons qualification (aka "crawl"), progresses to live-fire range complexes that allow units to conduct live-fire training simultaneously as one team (aka "walk"), and culminates in the maneuver areas where units rehearse and train on the full complement of mission essential tasks as required by a unit's training doctrine (aka "run"). This progression of training is essential for units to attain safe and efficient full spectrum training proficiency and maintain readiness for deployment.

### 2.7.2 Hawaii Army National Guard

The Hawaii Army National Guard conducts METL training at PTA to support its federal and state missions. Its federal mission is to serve as an integral component of the total Army by providing fully manned, operationally ready and well-equipped units that can respond to any national contingency. Its state mission is to "provide a highly effective, professional, and organized force capable of supporting and assisting civilian authorities in response to natural disasters, human-caused crises, or the unique needs of the state and its communities" (http://Hawaii.gov/dod/hiarng).

### 2.7.3 U.S. Marine Corps

The Marine Corps is the second largest user of PTA after the 25th ID. Marine Forces Pacific is structured similarly to the Army having Marine Regiments that are similar to an Army brigade and consisting of battalions and smaller units mirroring similarly-sized Army units.

The 3rd Marine Regiment (3rd Marines) is permanently stationed in Hawaii and consists of three infantry battalions that operate on rotating deployments where one battalion is always deployed overseas and the other two are on a reset and retrain cycle getting ready for their next deployment. Training requirements and standards are similar between the Marine Corps and the Army. Marine Corps commands at Marine Corps Base Hawaii rely on PTA to fulfill a large portion of their METL training requirements. Primary Marine Corps training exercises are live-fire training on existing PTA ranges, MOUT training, and CLF training.

Battalions of the 3rd Marines train at PTA every three months. Battalion composition varies, but typically consists of artillery batteries, as many as three infantry companies, an HQ company, and possibly one combat service company and a company-sized CSS Group. In addition, battalions deploy to PTA once per year to conduct large-scale maneuvers. The entire mobilization and training takes about 30 days, with actual on-the-ground exercises occupying approximately 15 to 25 days at PTA.

PTA also supports training for Marine Corps units that are part of the Fleet Marine Forces afloat on transports in the Pacific, and includes transiting Marine Expeditionary Units from the U.S. Pacific coast to participate in training at the installation. These units conduct combined arms live-fire and maneuver and CAS training at PTA.

The Marine Corps Aircraft Group 24, located at MCBH conducts aviation training at PTA that includes assault support training and CAS training. The MCBH 1st Battalion, 12th Marines (artillery battalion) conducts regular firing at PTA. Finally, the Marine Corps conducts UAS training at Cooper Airstrip near FOB Warrior, which is also located at PTA.

To support the MV-22 and H-1 aircraft, physical improvements at PTA have focused on expanding the existing helipads at BAAF. Proposed aviation training activities at PTA may increase but would not change the installation's overall airspace management. For the planned 2018 aviation operations, there would be over 9,900 more annual operations when compared to present day; current flight operations are lower than normal due to deployments of the Army's and Marine Corps' aviation units (U.S. Navy 2012).

### 2.7.4 U.S. Navy

The Navy uses PTA to accomplish its multinational, sea control/power project fleet exercises twice yearly. PTA assets used include:

- Command and Control activities (land and sea network communications with devices strategically located at DoD installations, including PTA).
- Close Air Support Exercises/Bombing Exercises and Air-to-Ground Exercises (basic training in air-to surface missile firing, conventional ordnance delivery, gunnery, and rocket and precision guided munitions, and close air support techniques).
- Live-fire exercise (provides ground troops with live-fire training and combined arms live-fire training, including aerial gunnery and artillery firing).
- Special Warfare Operations (covert insertion and reconnaissance training for small Special Warfare units by Navy and Marine Corps, which is limited to helicopter inserts [3 to 6 helicopters] at BAAF and refueling).
- Aircraft Operations Support (operational support for maritime, Air Force, and other aircraft including an airship, and is limited to use of BAAF at PTA).
- Air-to-Surface Missile Exercises (releasing a forward-fired, guided weapon at a designated towed target).

### 2.7.5 U.S. Air Force

The Air Force trains at PTA in conjunction with other military exercises, such as RIMPAC, using B-2 Spirit stealth bomber aircraft for squadrons deployed to theater to practice air strikes. The Air Force also trains its pilots to fly under Instrument Flight Rules (routes and latitude determined by Air Traffic Control, allowing for limited visibility) and VFR (routes and altitudes are by pilot determination, cloud cover free). While operating under VFR, C-17s are currently allowed to proceed to PTA at low altitudes that permit accurate airdrop operations. The Air Force is refining its air drop corridors to include two drop corridors – a 40 nautical mile (nm) corridor into and out of PTA and one over Kahoolawe.

## 2.8 Training[2]

### 2.8.1 Live-Fire Training

Live-fire training requirements depend on individual and unit mission, weapons assigned, and ammunition available. Individual military personnel qualify with an assigned weapon and then progress through squad, platoon, and company level live-fire exercises. Each weapon system and Soldier (War Fighter) has an assigned annual or semiannual live-fire training requirement to meet. A single weapon may have several different munitions of the same caliber and different uses. Normally, military weapons are designed for a specific target type (e.g., anti-tank, anti-aircraft, and anti-personnel). Weapons are designated as small arms (up to 0.50 caliber) and heavy weapons (larger than 0.50 caliber). Weapons are classified as individual (weapon operated by one individual) or crew-served (operated by two or more individuals). Lasers are normally treated as weapons.

### 2.8.2 Maneuver Training

The extreme roughness of lava flows and administrative and environmental considerations limit the amount of maneuver land present on PTA. Maneuver training is a tactical exercise that can include the following activities: movement to contact, offensive operations, defensive operations, withdrawing under enemy pressure (retrograde), and reconnaissance and security. Maneuver training exercises are conducted at all levels (squad to brigade).

Combat effects, such as smoke and obscurants, noise, and simulated nuclear, biological, and chemical conditions are integrated into training events. At PTA, traffic in the training areas is confined to well-traveled road networks and firing position areas, and off-road driving is not authorized. Unit movement may consist of troops in tactical (contact with an enemy is likely) and non-tactical (contact with an enemy is not likely) formations moving in a predetermined direction to accomplish a mission. Individual infantry troops move in non-tactical formations using vehicles (mounted maneuvers), walking in formations on roads or trails often in a dispersed fashion overland (dismounted maneuvers), or by helicopter. Troops can move in loose tactical formations, walking in designated directions to accomplish assigned missions. Direction of movement is terrain and scenario-dependent. Due to a risk of ambush, tactical formations often do not follow roads or trails. If engagement with an enemy happens or is likely, troops seek cover from enemy fire. The only locations where off-road vehicle maneuver are permitted are in TAs 1-17 and outside the Palila Critical Habitat.

At PTA, mechanical excavation is limited to specified firing points. During maneuver, troops may sleep in the field. To avoid detection and allow for quick movement, tents are not set up during light infantry maneuvers, which is a different training scenario from bivouac. Troops normally eat prepackaged meals, and training units carry out all trash to avoid detection. Units may use blank ammunition and multiple integrated laser engagement system equipment. Field artillery and mortar fires and grenades are simulated by pyrotechnics, providing sound and visual effects, and are restricted to specific areas at PTA.

### 2.8.3 Reconnaissance Training

Typical reconnaissance training operations involve small groups, squad to platoon strength (4 to 40 soldiers). Reconnaissance training can take place on any type of terrain, but may be constrained by the extremely rugged terrain and thick vegetation at PTA. In many respects, reconnaissance training resembles dismounted maneuver training, but does not have the same type of vehicle support. No live-fire is involved and vehicles are not used. Reconnaissance training may also involve dropping a squad by helicopter into a remote location and having them find their way to a strategic rendezvous point.

[2] Source: USAG-Hawaii. 2010. Integrated Natural Resources Management Plan, Pohakuloa. Prepared by the Center for Environmental Management of Military Lands, Colorado State University, Fort Collins, Colorado.

### 2.8.4 Assembly Area Operations

Assembly area operations training supports the logistical mission of Combat Support (CS) and Combat Services support (CSS) units and includes camp areas, bivouacs, and other logistics for rest resupply, maintenance, storage, communications, command post, medical facilities, or meal preparation. Size is dependent on unit size and mission. Assembly areas are normally located on level or gently rolling areas that provide vehicle and/or aircraft access. Sites are located to accommodate the unit support element, provide communication links and concealment from the enemy, and support maneuver operations. Open fires are not allowed. The use of tent heaters (enclosed) and generators is permitted. Munitions used to defend bivouac sites typically consist of grenade and artillery simulators and blank ammunition.

### 2.8.5 Deployment Training

Deployment training principally involves moving troops and equipment from Oahu to PTA. Transportation of units consists of a combination of vehicles, sea transport vessels, and aircraft, depending on the type and location of training. Legacy Force personnel currently deploy to PTA from Hickman Air Force Base or Wheeler Army Airfield using C-17 or C-130 aircraft. Deployed equipment to PTA uses approximately 30 Logistics Support Vessel round trips from Oahu to Kawaihae Harbor annually. On arrival, troops and vehicles use established roadways to PTA.

### 2.8.6 Aviation Training

Aviation training consists of aircrew training, maneuver training, and aerial gunnery. Aircrew training pertains to normal aviation flight skills, including take-off and landings, nap-of-the-earth (low-level flight that follows the contours of the terrain to minimize visibility and evade ground fire) and low-level flights, confined and high altitude area landing/take-off, and navigation for helicopters. Air Force and Naval aviation high performance tactical and transport aircraft practice similar tactics at higher altitudes.

Aircrew training tasks include all tactical maneuvers in accordance with each aircraft's standard aircrew training manual and unit's standard operating procedures. Maneuver training pertains to the ability of aviation units to transport ground maneuver and combat support/combat service support units to support the tactical battlefield. This type of training requires up to 20 helicopters flying in tactical formations carrying ground troops and equipment to battle areas.

Aviation live-fire training follows the standard Army training methodology. Aviation live-fire training is supported by designated ranges and ground targets, along with scoring systems to determine weapon accuracy and weapon effects. Aerial gunnery is a live-fire task accomplished at fixed ranges. Aerial gunnery pertains to the ability (Army attack, cargo/troop movement helicopters, cavalry units, and Air Force/Naval tactical aircraft) to engage targets with bullets, cannon rockets, missiles, or bombs.

Army and Marine Corps aviation units each utilize PTA for major deployment exercises about two to four times annually. The average number of aircraft varies from 15 to 25 per event, but can range up to 50 to 60 per event. The number of sorties (combat training flight missions) at PTA averages 50 to 100 annually (USACE 2003). Nighttime aerial gunnery by the aviation brigade occurs semi-annually. Night flying averages 10 flights per month. High altitude flight training takes place in Palila Critical Habitat air space. The Army has measures in place to minimize impacts.

### 2.8.7 Landing/Pickup and Drop Zone Activities

At PTA, landing and pickup zones are used for moving artillery pieces, Medevac operations, troop transport, and airborne assault lifts. Troop numbers vary from platoon (40 personnel) to company (150 personnel) size units per event. These events (combined) take place approximately 20 to 30 times a year. Drop zones are used for troop and equipment parachute drops typically from C-130 and C-17 aircraft. Cargo drops take place approximately two to four times per year and personnel drops once a year (if at

all) (U.S. Army 2003). A drop zone team on the ground typically consists of two to four personnel to retrieve the cargo.

Personnel and equipment drops take place at other approved drop zones, including firing points and position areas outside of Palila Critical Habitat. Pinnacle landings are permitted on Puu Omaokoili in the Palila Critical Habitat. In addition to firing points, helicopters may land at all ranges, on Puu Ahi, Puu Keekee, Puu Kailua, Puu Menehune, forward rearming/refueling points, and other locations with permission from Range Control and the NRO. Vehicle support associated with landing zone exercises is confined to existing roads and trails.

### 2.8.8 Major Force-on-Force Training

In a major force-on-force scenario, a battalion or brigade engages an opposing force in a non live-fire maneuver over a relatively large area, typically for an extended period (10 or more days) and with the involvement combat service support forces. The elements of a force-on-force training scenario are tailored to fit available resources. A brigade commander exposes subordinate units to phases that could be encountered in actual operations, such as pre-deployment, low intensity conflict, mid-intensity conflict, and evaluation, inspection, and cleanup. In a brigade-sized operation, the battle zone develops into a linear configuration divided into three areas of operations: the forward area or security zone, the main battle area, and the brigade rear.

Specific military activities in a force-on-force exercise normally include mounted and dismounted maneuvers, blackout driving, pyrotechnics and artillery simulation devices, building hasty/limited defensive positions, emplacing obstacles, and establishing forward/rear support areas or field hospitals. Vehicles are moved on hardened and improved all-weather roads with limited use of unimproved roads and trails. Cross-country travel by wheeled vehicles is limited to TAs 1-17 (the portion of TA 1 outside of Palila Critical Habitat). Currently, there is limited off-road maneuver in KMA.

Force-on-force training is essentially a combination of maneuver training, reconnaissance training, and assembly area training. Large force-on-force training is conducted at PTA.

## 2.9 Weapons Systems, Munitions, and Vehicles

Weapon systems, munitions, and vehicles are standardized in the U.S. Armed Forces and are normally common among U.S. Allies using PTA.

## 2.10 Ranges and Training Lands

PTA has 22 live-fire and 4 non live-fire ranges, 23 training areas, a centrally located impact area, 1 airfield, and 113 surveyed field artillery and mortar firing points (Table 2-2, Figure 2-3). The 27 ranges and artillery firing points are in training areas surrounding the impact area and oriented to fire into the impact area. Range 04, a modified record-firing range, is oriented away from the impact area to the east along Redleg Trail into TA 21. The 22 live-fire training ranges are located in the northern and eastern parts of the installation. There are four airborne drop zones capable of personnel and equipment airborne operations. The impact area is surrounded to the north and east by several ranges and designated firing points for artillery. The Battle Area Complex (BAX) is northwest of the impact area and the Infantry IPBA is to the west.

KMA has increased on-road and dismounted maneuverability at PTA. Prior to purchase, the Army occasionally leased the parcel from the Richard Smart Trust (Parker Ranch). Construction is limited to roads for this brigade task force maneuver training area.

### 2.10.1 Infantry Platoon Battle Course (IPBC)

The IPBC is designed to meet the live-fire collective training needs of infantry platoons of the 25$^{th}$ ID through a variety of targets, objectives, and maneuver scenarios. In general, a platoon will react, develop

Table 2-2. Ranges at Pohakuloa Training Area, Hawaii (USAG-Pohakuloa Natural Resources Office GeoDatabase 2016, USAG-P 2015).

| Range | Purpose | Lanes | Ammunition* | Scenario |
|---|---|---|---|---|
| RG 01 | **Infantry Squad Battle Course**—training qualifications requirements for teams and squads on individual and collective tactics, techniques, procedures, and employment in tactical situations | 1 | SA | X |
| RG 01A | **Modified Record Fire and Zero Range**—training qualifications requirements for teams and squads on individual and collective tactics, techniques, procedures, and employment in tactical situations | 10 | 5.56mm | |
| RG 01B | Known Distance Range | 10 | SA | |
| RG 02 | **Combat Pistol Shotgun Range**—to meet training and qualifications for combat pistols and revolvers | 10 | 9mm, 12GA | |
| RG 03 | **M203/M320 AT Rocket Range**—to meet training and qualifications for 40mm grenade launcher | | | |
| RG 04 | **Modified Record Fire Range**—to meet training and day/night qualifications with rifles hitting stationary targets. This range is oriented away from the impact area | 5 | 5.56mm | |
| RG 05 | **Live Grenade Pits**—for throwing live-fragmentation grenades | 4 | Frag Grenades | |
| RG 05A | **Shoot and Throw Live Grenade Range**—for basic hand throwing techniques using inert/practice grenades | 1 | 5.56, Frag | |
| RG 06 | **Grenade Qualification**—train and qualify on the basic skills necessary to employ hand grenades (using practice-fused) | 1 | Practice Fuse | |
| RG 07 | **25m Zero Range**—shot-grouping and zeroing exercises with rifles and machine guns. Fires into TA 21 | 10 | 5.56mm | |
| RG 08 | **Multi-Purpose Machine Gun/Sniper Range**—zeroing, training, and qualification requirements with SAW and machine guns. Troops are trained to identify, engage, and hit stationary infantry targets | 10 | SA | |
| RG 08A | **Inert Missile Firing Point—**for engagement techniques for light anti-armor weapons (e.g., LAW/AT-4) | 1 | Inert Missiles | X |

Table 2-2. Ranges at Pohakuloa Training Area, Hawaii (USAG-Pohakuloa Natural Resources Office GeoDatabase 2016, USAG-P 2015).

| Range | Purpose | Lanes | Ammunition* | Scenario |
|---|---|---|---|---|
| RG 08B | **Grenade Machine Gun Range**—qualification firing with a grenade machine gun (e.g., MK-19), ground or vehicle mounted | 2 | TP | |
| RG 08C | **Shoot House** and **35mm Flat Range** | 20 | SA | |
| RG 08S | **Unknown Distance Sniper Range**—rifle | 2 | SA | |
| RG 09 | **Demo Range—**for employing explosives and demolition charges | 2 | Max 50 lbs | |
| RG 10 | **Infantry Platoon Battle Course**—Infantry platoons, either mounted or dismounted, on movement techniques and operations | | SA, HE, Sims | X |
| RG 12 | **Multipurpose Machine Gun Range/FAARP**—for zeroing, training, and qualification requirements with SAW and machine guns, training troops in identification, engagement, and hitting stationary targets | | | |
| RG 13 | **Artillery Direct Fire Range**—training requirements for field artillery crews | 1 | 155mm, 105mm | X |
| RG 13A | **Grenade Machine Gun Range**—training requirements for field artillery crews | 2 | 40mm | X |
| RG 14 | **High Angle Sniper Range** | 2 | SA | X |
| RG 15 | **Rotary Wing Live Fire Range**—helicopter gunnery qualifications | | Contact RC | X |
| RG 16 | **Fix Wing Live Fire Range** | | Contact RC | X |
| RG 17 | **Helicopter Gunnery/FARP—**supports training and qualification requirements | | | |
| RG 18 | **Landing and Take-off Operations/FARP**—unpaved, prepared surface, in a clear are used for training, emergency, and other special landing and takeoff operations of rotary wing aircraft | | | |
| RG 20 | **Helicopter Door Gunnery Live Fire Range** | | Contact RC | X |
| RG 20A | **Multi-Weapon Static Range** | | Contact RC | X |
| RG 21 | **Urban Close Air Support** | | | |
| RG 22 | **Aerial Scored Bullseye** | | | |
| MOUT | **Military Operations in Urban Terrain Facility** | | | |
| BAX | **Gunnery (Air/Ground) Convoy Lane** | 4 | SA, 40mm TP | X |

*Ammunitions SA=small arms, TP=target practice, RC=range control, HE=high explosives

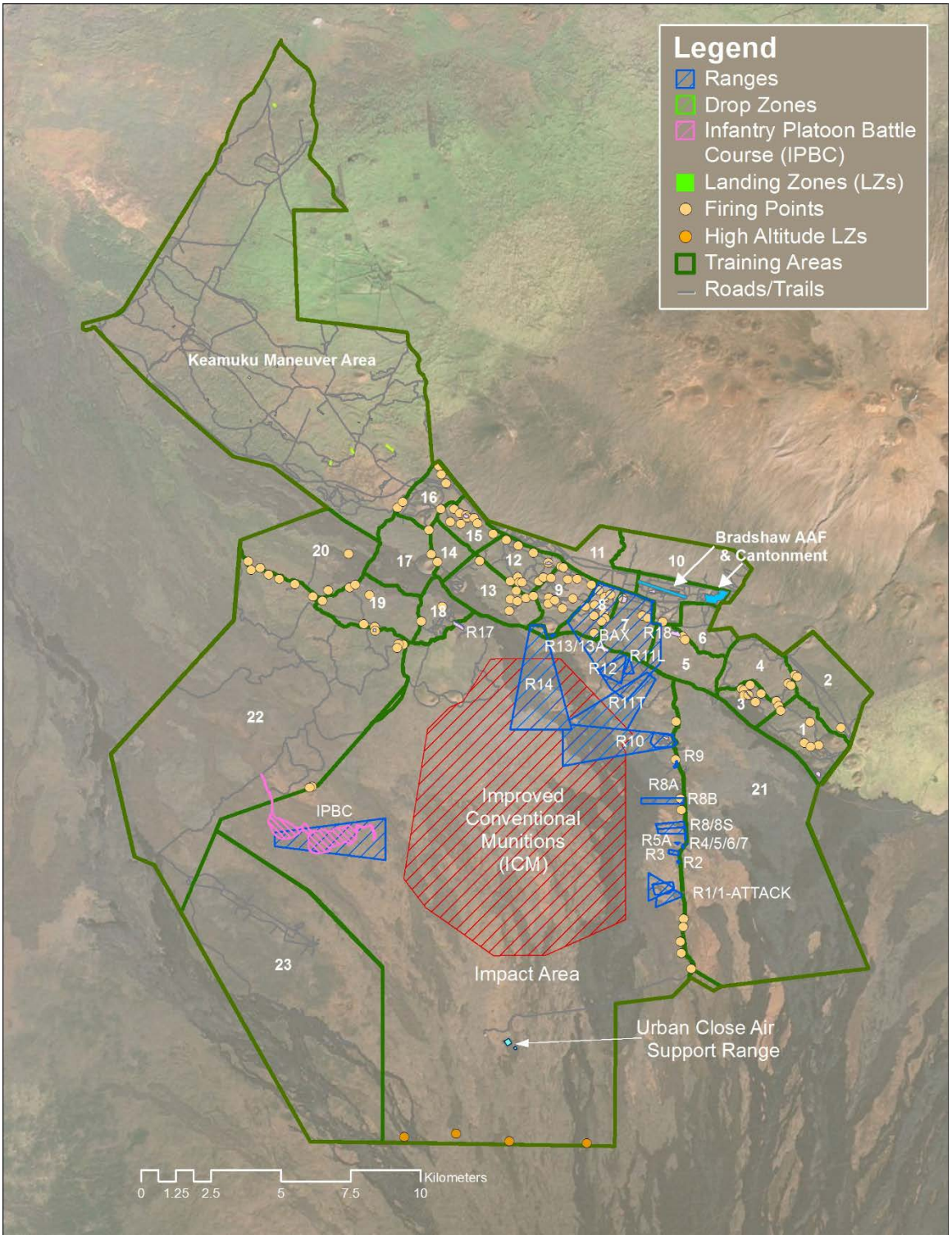


Figure 2-3. Facilities supporting training at Pohakuloa Training Area, Hawaii (USAG-Pohakuloa Natural Resources GeoDatabase).

the situation, execute a battle drill of fire and movement, and use the most effective weapons to engage the targets. A commander may choose to add other elements to the scenario at any time. The primary users is the 3/25th IBCT, with support by the 25th Combat Aviation Brigade CAB by providing air-ground integration of helicopters. This range can support training for Marine Corps or other small units training at PTA, but primarily the IPBC is designed as an essential element of infantry platoon live-fire training to meet the shortfall in collective (group) live-fire standard training capabilities for units stationed in Hawaii. The previous IPBC, located on Range 10, did not have a range capable of supporting standard collective infantry platoon live fire to enable units to accomplish their METL tasks twice a year for the Army, the Army Reserve, the Hawaii Army National Guard and other Service components.

The IPBC is part of the IPBA, which currently lacks a Military Operations on Urban Terrain Assault Course and a Live-fire Shoothouse facility for completion. IPBC is used to train and test infantry platoons and other small units on the skills necessary to conduct tactical movement techniques and detect, identify, engage, and defeat stationary and moving infantry and armor targets. Small-arms, machine guns, and other weapon systems are used as part of live-fire exercises and air-ground integration training. Units are recorded on video and target engagements scored.

### 2.10.2 Battle Area Complex (BAX)

The BAX supports tactical live-fire operations either independently of, or simultaneously with, supporting vehicles in free maneuver. CALFEX training may also be conducted at the site. The BAX provides enhanced training realism using thermal targets, night illumination devices, target kill, and visual flash simulators. The complex accommodates training with sub-caliber and/or laser training devices. Dismounted troops train and test their ability to detect, identify, engage, and defeat stationary and moving combined arms targets in both open and urban terrain environments (http://www.peostri.army.mil/SUSTAINMENT/BAX/). The principal user of the BAX is the IBCT.

### 2.10.3 Mock Airfield

A mock airfield and associated targets is present in the southeastern part of the impact area. Mobile electronic warfare systems, time sensitive targets, and identify friend or foe radar is incorporated to meet the needs of close air support and strike warfare training. The primary user is the U.S. Navy.

### 2.10.4 Urban Close Air Support Range and Aviation Bulls-Eye Range

An Urban Close Air Support Range lies to the west of the Mock Airfield. The range provides comprehensive and realistic aviation training for rotary and fixed-wing aircraft (USMC 2013). The range consists of sea/land shipping containers arranged around a 4.0 ha (10ac) site with an Aviation Bulls-eye. The concentric circles are visible from the air and the ground. Also included at the site are three observation points to observe and score rotary and fixed-wing aviator training. The U.S. Marine Corps is the primary user.

### 2.10.5 Impact Area

In the center of PTA is a 19,368 ha (47,859 ac) impact area and dudded areas. A limited access buffer zone extends along the western side of the impact area. An Improved Convention Munitions area sits close to the center of the impact area into which munitions are delivered by two or more anti-personnel, anti-materiel, and/or anti-armor submunition warheads or projectiles. Access to the impact area is restricted because of the presence of unexploded ordnance. The U.S. Air Force and Navy train tactical aviation aircraft bombing and strafing over the impact area. Aircraft are staged from remote airfields in Hawaii, other areas, and from aircraft carriers to simulate attacking ground targets. The number of aircraft varies from one to four to six. Aircraft engage ground targets with aerial cannons, rockets, missiles, and live or practice bombs.

### 2.10.6 Restricted Area 3103

Airspace above PTA is Restricted Area 3103. Flight corridors are established for R-3103 to control aircraft without interfering with ground-firing weapons systems and to prevent overflight of active firing points. This airspace is under the control of the Range Office at PTA. Restricted Area 3103 extends from surface upward to 9,144 m (30,000 ft) above mean sea level, according to an agreement with the Federal Aviation Administration, Honolulu Control Facility, which is the controlling agency of the airspace over Hawaii. The using agency is PTA, Schofield Barracks Military Reservation (USDOT 2007). R-3103 use encompasses firing small arms, field artillery projectiles, and military aircraft. The U.S. Navy uses the area for air-to-surface missile training and for high altitude, laser-guided, inert bombing of targets in the southern part of the impact area.

## 2.11 Constraints

### 2.11.1 Internal Encroachment and Training

There are effects to the ecosystem and landscape that have been influenced by actions other than military activities, including volcanic events, intentional and unintentional grazing (e.g., pigs, goats, and sheep), introduced invasive birds and plants, and fire and fire-adapted vegetation. The landscape has been converted from native scrublands and bare lava to areas dominated by invasive plants like *Cenchrus setaceus.*

The military has been present at PTA since WWII. Areas such as BAAF and the cantonment area are developed; ranges, roads, and trails established; and expansive areas contaminated by munitions in the impact area. The north portion of the installation has changed the most, but not to the same extent as other installations that have a resident population (i.e., transient, non-permanent population). Military impacts are most easily identified by invasive plants at firing points and along roads and by vehicles creating clouds of dust. Aa and pahoehoe lava limit unauthorized off-road travel. Lava flows deter troops from accessing sites away from roadways in many areas. The presence of federally listed species has resulted in training restrictions in some areas (e.g., vehicles restricted to established roads, restricted use of fire-prone munitions, restricted bivouac activities). Access to some areas for military activities are limited due to lack of NEPA review. Military roads and their use are effective conduits for the invasion of invasive plants and animals and have changed the dynamics of the plant communities by increasing wildland fire potential, creating a shift in vegetation composition and form. Impacts to natural resources have been indirect by supporting changes to the physical structure of the landscape.

Another concern is the significant number of archaeological sites. A Programmatic Agreement (PA) regarding routine military training and support activities is being completed by PTA Cultural Resources (CR) in consultation with Native Hawaiian Organizations (NHO), the State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation under Section 106 of the National Historic Preservation Act (NHPA) is addressing the cultural resources located on the installation. The PA covers the same area as the INRMP, and Natural Resources management is included in the PA as a support activity. Visits to cultural resources are coordinated with the Cultural Resources Section. Conversations with NHOs are ongoing regarding traditional cultural properties. To keep consistent, the Integrated Cultural Resources Management Plan (ICRMP) and the Cultural Resources Section guidance/lead, PTA Natural Resources will refrain from independent engagement with NHOs until the CR conversations/planning are completed.

Approximately 1,200 cultural resources are currently tracked by Cultural Resources staff in the inventory maintained at PTA. About 69% of those have not been evaluated for National Register eligibility and must be avoided until such time as evaluations are completed (AR 200-1). If an activity cannot avoid effects to cultural resources, consultation will be conducted with the SHPO and consulting parties.

The External SOPs provide information and establish procedures for training operations and using PTA (USAG-P 2018). Annex F (Conservation Management) and its appendices describe the significance of the installation in terms of natural and cultural resources and the need to seek advice for training, other than described in the SOP, from the Environmental Division staff. Restrictions exist in the Palila Critical Habitat; some Natural Resources Sensitive Areas (e.g., Kipuka Kalawamauna, Kipuka Alala, Puu Nohona o Hae and Puu Papapa); Cultural Resources-designated areas, and slopes greater than 30% for vehicle use safety (Figure 2-4).

Some general restrictions from the PTA External SOPs (Annex F) are:

- Traffic in training areas is confined to well-traveled roads and areas directly adjacent to firing points. No cross-country driving is authorized except when explicitly approved.
- Driving on cinder cones (puu) is restricted to existing roads.
- Training units must clean all vehicles in the wash rack facility at PTA prior to departing the installation.
- Open fires are prohibited.
- No smoking is allowed outside of designated areas.
- Do not move or disturb rocky outcroppings.
- Caves, lava tubes, and overhangs are off-limits.
- Stay out of small fenced areas.
- Coordinate training inside large-scale fence units in TAs 3, 13, 17-23, and 21 with the NRO.
- Do not cut vegetation.
- Dig fighting positions only in previously utilized areas and only use hand tools (shovels and picks).
- Construct built-up fighting positions using cinder rock-filled bags from local sources or other foreign materials. Do not use on-site lava rock.
- Range Control will provide locations for sandbag fill. Do not utilize fill material from puu at PTA.
- Do not disturb, remove rocks from, or walk on rocky outcroppings.
- Emergency Discovery Procedures. In the event of an inadvertent discovery of archaeological or historic remains at PTA, the following procedures should be followed:
    - Halt all activities in the area immediately. Protect the resource from further damage.
    - Notify Range Operations of the find and any damage caused.
    - Operations may continue at the location upon recommendations from the Archeologist and approval from the Garrison Commander and Deputy Garrison Commander.

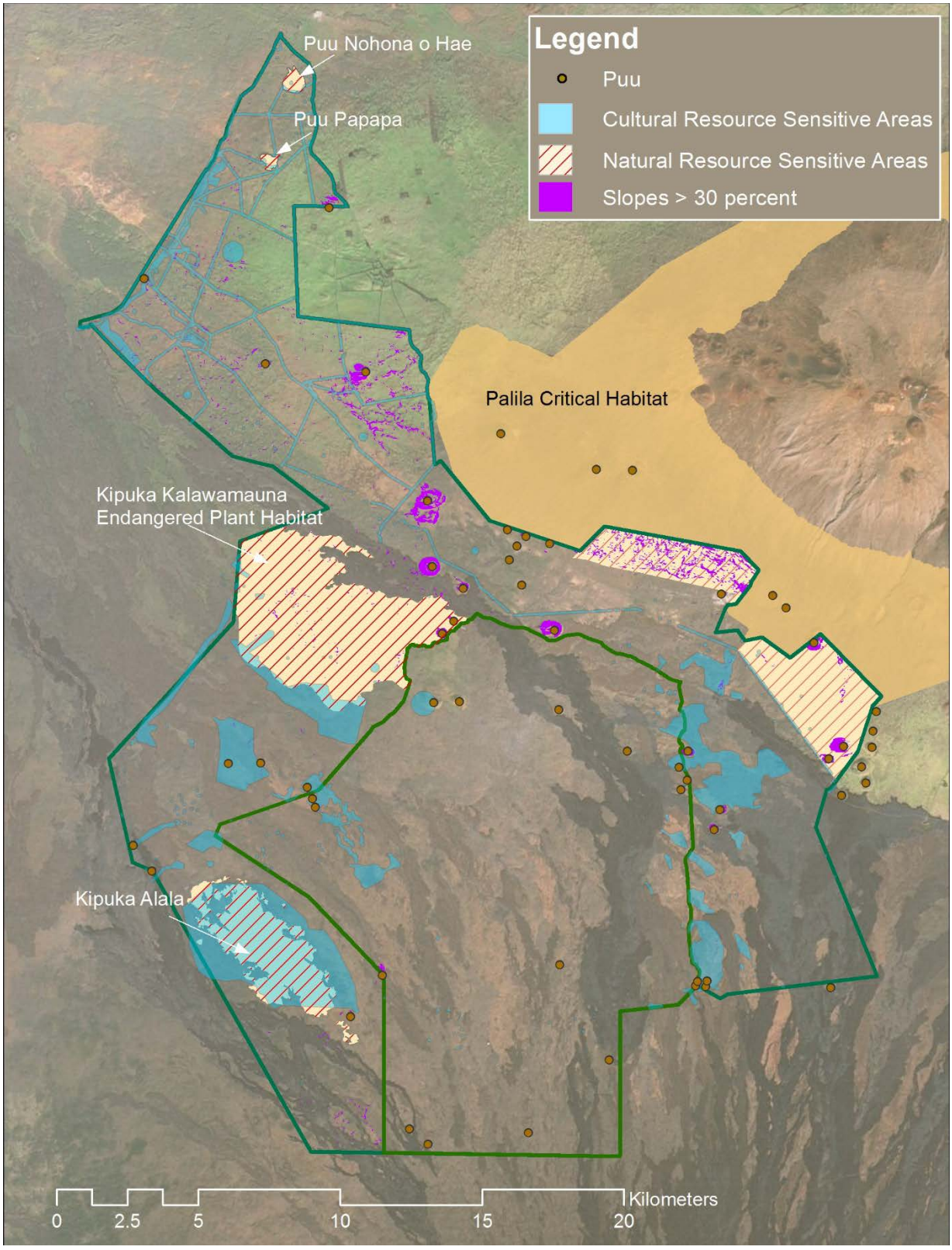


Figure 2-4. Internal Constraints to Training at Pohakuloa Training Area, Hawaii.

Restrictions are present on live-fire and maneuver ranges for the Hawaiian goose (Memorandum for Record, 27 June 2016, PTA External SOP Natural Resources Office Change Document). The installation-wide, restrictions include:

- Conduct range sweeps for Hawaiian geese prior to use.
- When Hawaiian geese are present on live-fire ranges or in vehicle maneuver areas, report the following to Range Control:
  - Date/time
  - Number of geese observed
  - Location
  - If geese appear injured or dead
  - If geese are in danger of harm (e.g., vehicle traffic, near shooting target)
- Immediately report to Range Control all harmed, harassed, injured, or dead geese.
- Immediately contact Range Control if geese are too numerous so that training is prevented or harm to geese cannot be avoided.
- Do not harm, harass, injure, or kill Hawaiian geese if they are in the line of fire, foot traffic, or vehicle traffic.
- If present, report Hawaiian geese status to Range Control when units are ready to be placed in a "Hot" status.
- Maintain the safety of geese on live-fire ranges and vehicle maneuver areas.
- Police the area for trash and food debris.

Some additional restrictions/cautions for federally listed wildlife in general include (USAG-P 2015):

- Report all bird and bat strikes to PTA Range Control including aerial strikes. Preserve remains, if possible.
- Obey 15 mph speed limit, unless a waiver is granted to minimize strikes to endangered wildlife.
- Immediately report all Hawaiian goose and Hawaiian hoary bat sightings, injury, or deaths.
- Training may proceed with Hawaiian geese on live-fire ranges. Leaders will observe training to ensure geese are not directly targeted.

Indirectly, invasive plants have impacted the military mission by altering the landscape to one that supports wildland fires. The change in landscape characteristics threatens military facilities as well as federally listed species. Native vegetation is slow to reestablish in disturbed areas, whereas some invasive species, such as *Cenchrus setaceus*, establish along and in roads. Less affected by fire than native plant species, invasive plant species quickly reestablish and extend their presence by virtue of their successful competitive ability to capture space and other resources. As such, procedures are in place to minimize the threat and extent of wildland fires that are the consequence of live-fire training and non-military activities.

There are three principal sources of wildland fire: military training live-fire exercises, accidental ignitions (e.g., cigarettes, camp stoves, etc.), and fires burning onto PTA from adjacent lands. Military training-related live fire originates from 22 ranges typically found in the northern and eastern portions of PTA or during aviation live-fire training. All live fire is directed toward a central impact area with the exception of Range 04, which is oriented to the east of Redleg Trail. Aircraft in flight fire at designated ground targets. Aerial gunnery is the engagement of targets with bullets, cannon rockets, missiles, or bombs at fixed ranges. KMA is designated mostly for dismounted maneuver and helicopter exercises. No live fire

is conducted in KMA to prevent wildland fires. Wildland fires occur in the impact area; however, vegetative cover is low and these fires tend to be limited in extent. Other accidental ignitions are limited by the External SOPs (USAG-P 2015).

Federally listed plants and animals do not preclude military access; however, the type of training, access, and munitions may be regulated by the PTA External SOPs or approval for access and use provided by the NRO (e.g., access to the Kipuka Alala Fence Unit). Training in the Palila Critical Habitat follows established rules (e.g., no live-fire, maximum number of artillery pieces, no burning or tree cutting, number of troops, etc.) and impact activities in TAs 1 (partial), 2, 4 (partial) and 11. Palila Critical Habitat restrictions that apply to TAs 2 and 10 and parts of TAs 1, 3, 4, and 11 (USAG-P 2015) include:

- All vehicles and general restrictions apply.
- Live fire is not permitted by training units.
- Maximum of 24 artillery pieces may be deployed for dry-fire exercises.
- Maximum troops are 500 for bivouac.
- Aircraft are restricted to 610 m (2,000 ft) AGL and 1,500 m (4,921 ft) from Mauna Kea State Park.
- Use only well-defined roads and trails south of Infantry Trail and Mauna Kea Road.
- No refueling operations, food preparation or vehicle maintenance.
- Maximum of seven helicopters is allowed at any given time. No cargo helicopters are permitted.
- Landing of helicopters is prohibited except at the Puu Omaokoili pinnacle landing.
- Pyrotechnics, simulators, or other munitions with ignition sources are not allowed.
- No occupation of positions or displacements during the hours of darkness.

TAs 1-5, 8-15, and 18 are considered potential sites for Hawaiian hoary bat roosting, due to the presence of *Sophora chrysophylla / Myoporum sandwicense* shrublands. The terms and conditions that impact training that were imposed by the USFWS (2003) to exempt the Army from the prohibitions of section 9 of the ESA, include:

- Restriction on construction activities in the BAX, Anti-Armor Live-Fire Tracking Range, and fuels modifications during breeding season (April through August).
- Monitor incidental take (e.g., hectares of treeland destroyed outside of the impact area) and report annually.
- Notify the USFWS when training was not conducted in accordance with the IWFMP and a wildland fire occurred.

The External SOPs (USAG-P 2015) require all bat sightings, injuries, and deaths be reported to Range Control. Many of the training restrictions are the result of Army and USFWS consultations, including the 2003, 2008, and 2013 biological opinions.

### *Training Areas 1, 2, 3, and 4*

These training areas comprise 1,775 ha (4,386 ac) and contain 40 km (25 mi) of bordering and interior roads and trails. All of TA 2 and parts of the other training areas lie in Palila Critical Habitat where specific rules governing training apply. These training areas contain 19 artillery firing points and are used for maneuver, bivouac, artillery live fire, and aviation training. Battalion-sized units use the area for two to four weeks, up to four times a year. Platoons to company-sized units average five days, 20 to 40 times per year. Five of the firing points are used for live-fire training and the other 14 in the Palila Critical Habitat are non live-fire training points. Puu Omaokoili and Puu Kaena are commonly used by troops involved in maneuver and bivouac exercises. Pinnacle landings occur on Puu Omaokoili in Palila Critical Habitat approximately 60 days per year. There are two LZs in this area. LZ Brad is located in TA 3 and

LZ Rob is located in TA 1 (USAG-HI 2001). Both LZs are located outside Palila Critical Habitat on barren, softened, lava substrate. Landing outside established LZs requires a special request, which is subject to environmental review by the NRO. Battalion-sized maneuver exercises entail about 24 helicopter landings at the LZs. Additionally, artillery and/or supplies are inserted to firing points in TA 3 about 24 times a year. In TA 3, FOB Warrior tactical base contains Cooper Airfield, a UAS airstrip, and a large helicopter landing zone (HLZ). Cooper Airfield falls within the authority of BAAF as do all UAS operating in R-3103 airspace.

Digging of individual and crew fighting positions is allowed with hand tools in previously disturbed areas. No mechanized digging is allowed in TAs 1-4.

### *Training Areas 5, 6, 7, and 8*

These training areas contain 16 artillery-firing points and comprise 1,769 ha (4,371 ac) and contain 56 km (35 mi) of bordering and interior roads and trails. Maneuver, bivouac, and live fire for company to battalion-sized units take place. During battalion-sized exercises, upwards of 24 artillery howitzers are deployed, occupying up to eight firing points. Mechanized ground excavation for artillery positions is allowed at four of the firing points. An observation, control and communication station is located on top of Puu Menehune. Puu Menehune supports aerial gunnery (mostly from helicopters) and multi-purpose machine gun training operations at Range 11T. This station is commonly manned with 5-20 troops during training exercises.

TA 5 contains a forward arming and refueling point (FAARP) (Range 18). Range 18 averages 120 helicopter landings per year. In addition, 20 to 40 helicopter landings per year take place at firing points to insert howitzers and supplies. Each battalion-size maneuver generates about 50 helicopter landings for troop and sling load operations. There are three field ammunition holding areas (AHAs 1, 2, and 3) within TA 6 and 7. TA 7 also contains a FAARP (Range 12A). Also in TA 5 is an ammunition storage point (ASP) for munitions distribution during Army training.

TA 8 contains the BAX, which is used to train and test crews, sections, platoons, companies, and mounted/dismounted infantry squads on the skills necessary to detect, identify, engage, and defeat stationary and moving infantry and armored targets in a tactical array in both open and urban terrain environments. The BAX supports tactical live-fire operations independently of, or simultaneously with, supporting vehicles in free maneuver. Company-level CALFEX can be conducted on this facility. The BAX accommodates training with sub-caliber and/or training devices. A convoy live-fire route is included with use of qualification/tactical trails.

TAs 5 and 8 training is affected by measures in place for the Hawaiian hoary bat because of the treeland component. There are archaeological sites across all of these training areas. Current operating procedures are to avoid these sites, this includes the sites that are within the BAX.

### *Training Areas 10 and 11*

These two training areas comprise 1,296 ha (3,203 acres) and contain 16.3 km (10.1 miles) of bordering and interior roads and trails. Company to battalion-sized units use the training areas for maneuver and bivouac about four times a year. Large areas of level ground immediately west of the airfield are frequently used for staging of field gear and tactical equipment. About 15-20 times annually, one to two helicopters take part in transporting sling loads into and off the summit area of Puu Maau. During training exercises, communications stations may deploy to the summits of Puu Alakoki and Puu Maau.

No live fire is permitted in these training areas. All of TA 10 lies within the Palila Critical Habitat.

### *Training Areas 9, 12, 13, 14, 15, and 18*

These training areas comprise 1,315 ha (3,250 ac) and contain 37 km (23 mi) of bordering and interior roads and trails. Company to battalion-sized units use the areas for maneuver, bivouac, and live fire about 250 days per year. There are 30 firing points, of which 26 are actively used for artillery or mortar fire. Mechanized ground excavation for artillery positions is allowed at three firing points. Fixed-wing aircraft and helicopters frequently overfly the area at low altitudes in support of various training missions. About 20 to 40 helicopter landings per year take place at various firing points in this sector to insert howitzers and supplies in support of artillery live fire. Additionally, each battalion-sized maneuver generates about 50 helicopter landings for troop and supply movements.

An observation point and a range tower on Puu Ahi (TA 9) are occupied by small groups of troops to support aircraft and live-fire operations at Ranges 15 and 16 that fire into the impact area. At mid-elevation on the south slopes of Puu Ahi, about 30 foxhole fighting positions are partially re-dug and occupied by company-sized units about four times per year for firing of rifles at targets in the adjacent impact area. Hand digging is permitted for individual and crew-served fighting positions on Puu Moanalua, Puu Maile, and Puu Kea. Driving on cinder cones (puu) is restricted to existing roads.

TA13 is the site for a Mobile Modular MOUT training facility for the U.S. Marine Corps. MOUT is non-live fire, but smoke, simulators, and flash/bangs can be used. The use of pyrotechnics is subject to the burn index and approval by Range Operations. TA 13 also contains a burn pan that is used to dispose of excess propellants from artillery rounds and mortars. The burn pan generates hazardous waste, which is disposed of in accordance with federal and state regulations. The *Haplostachys haplostachya* fence unit is also present in this training area. TA 18 contains a forward arming and refueling point (Range 17).

Portions of TA 18 are in the Kipuka Kalawamauna Endangered Plants Habitat, an area with training restrictions. Hawaiian hoary bat restrictions are in effect because of the treeland component present in parts of these training areas.

### *Training Areas 16, 17, 19, and 20*

These training areas comprise 607 ha (1,500 ac) and contain 17 km (10 mi) of bordering and interior roads and trails. TAs 16 and 17 are used for maneuver and bivouac. There is an ammunition holding area (AHA) in TA 17, which is used for storing artillery rounds during training missions.

Puu Ka Pele is in TA17 and has special restrictions due to the high occurrence of endangered plants. Troops are directed to coordinate activities with the NRO. Portions of TAs 19 and 20 are in the Kipuka Kalawamauna Endangered Plants Habitat and are subject to training restrictions. Hawaiian hoary bat restrictions are in effect because of the treeland component present in parts of these training areas.

### *Training Area 21*

TA 21 comprises 4,864 ha (12,020 ac) and contains 19 km (12 mi) of bordering and interior roads and trails. This training area is used for maneuver, bivouac, and live-fire training. There are eight firing points located along Redleg Trail. Approximately half of the points are for firing mortars into the impact area about 250 days annually. Helicopters drop small observation groups onto the summit of Puu Kailua. Hand digging is permitted on Puu Kailua and Puu Kaneohe. This is also the location of the Puu Koli Fence Unit.

A convoy live-fire route initiates at Range 01, extends south on Redleg Trail, and then west along Hilo-Kona Highway. Ball ammunition is fired east, opposite of the impact area at one location. All other firing is west toward the impact area.

There are a number of sensitive archaeological sites west of Redleg Trail, as well as individuals of *Silene hawaiiensis* and *Asplenium peruvianum* var. *insulare*. Hawaiian hoary bat restrictions are in effect because of the treeland component present in parts of this training area. To the west of TA 21 is the impact area.

### *Training Area 22*

TA 22 comprises 8,373 ha (20,690 ac) and contains 63 km (39 mi) of bordering and interior roads and trails. The training area is used for maneuver training. Ground-training use is low and largely limited to infrequent helicopter insertions, most of which support land management activities. All of the western fence units are in TA 22. Fire danger is high due to the abundance of *Cenchrus setaceus* in parts of TA 22.

Rules that apply to the Kipuka Kalawamauna Endangered Plant Habitat are (USAG-P 2015):

- All vehicles and general restrictions apply. Vehicles are allowed for Range Control, Range Maintenance, and NRO staff.
- No bivouacking within 2,000 m of the Kona Highway.
- No construction of rock fortifications.
- Pyrotechnics, simulators, or other munitions with ignition sources are not allowed.
- Foot march is permitted. Rocky outcrops and caves are to be avoided
- Vehicle access is prohibited on new Bobcat Trail between the yellow gates.
- Firing points 701 and 703 are off limits.

There are a number of sensitive archaeological sites in TA 22. The whole TA has not been surveyed for archaeological sites. Some 90 archaeological sites have been identified to date. Hawaiian hoary bat restrictions are in effect because of the treeland component in parts of this training area.

### *Training Area 23*

TA 23 comprises 4,656 ha (11,505 ac) and contains 21 km (13 mi) of bordering and interior roads and trails. The area can support up to company-size units about twice a year when facilities throughout the installation are full. The airspace above TA 23 is available for military training.

TA 23 is open to training with the exception of the Multi-purpose Range Complex (MPRC), for which the NEPA process has not been completed for use. Access throughout TA 23 is restricted for training-related activities, due to all road access is through the MRPC. Units are required to coordinate with the NRO when accessing the Kipuka Alala fence.

This is also an area with a number of sensitive archaeological sites. Hawaiian hoary bat restrictions are in effect because of the treeland component in parts of this training area.

### *Keamuku Maneuver Area* (KMA)

KMA is used for mounted maneuvers training, dismounted maneuvers (i.e., off-road foot maneuvers) integrated with aerial training. Foot maneuvers are likely to remain a permanent training activity in KMA. Digging is permitted in specific areas. Mounted maneuvers are restricted to existing roads and trails, except for a very limited amount of off-road maneuvers in areas that have been surveyed for sensitive species and cultural resources. Wheeled and tracked vehicles are authorized for use. Training includes company to battalion-size tactical operations. Authorized ammunitions include blanks, smoke, and simulators; no live fire is permitted.

In a phased development approach, the Army is planning to construct helicopter landing zones in KMA, as well as a series of forward operating bases, drop zones (e.g., cargo loads and parachuting), and a loop trail. The drop zones will be overlaid with the helicopter landing zones. Training will require additional

construction of roads. Permanent infrastructure will include a network of dip tanks for fire control. Does tense need to be change from will be.

Several species of federally listed plants are located on two cinder cones in KMA (Puu Nohona o Hae and Puu Papapa). Both of the cinder cones are currently enclosed by 6-foot fences and a series of firebreaks/fuel breaks. No military training is allowed on these cinder cones.

The Hawaiian hoary bat restrictions are in effect because of the treeland component present in parts of this training area. There are also a number of sensitive archaeological sites in KMA.

#### *Infantry Platoon Battle Area/Infantry Platoon Battle Course* (IPBC)

An IPBA consists of an Infantry Platoon Battle Course (IPBC), live-fire shoothouse, and a MOUT facility. Funding has limited development to the IPBC. At this time the area is used to train and test infantry platoons and other small units on the skills necessary to conduct tactical movement techniques and detect, identify, engage, and defeat stationary and moving infantry and armor targets. Small-arms, machine guns, and other weapon systems are used as part of live-fire exercises and air-ground integration training. Target engagements scored. The IPBC was constructed in an area with federally listed species present and losses are expected (USFWS 2013). The species that have the potential of loss during construction or by UXO include *Asplenium peruvianum* var. *insulare, Kadua coriacea, Silene hawaiiensis*, *Spermolepis hawaiiensis*, and *Zanthoxylum hawaiiense*. A number of mitigation measures were put in place (e.g., restrictions on tracer ammunitions, use of palliatives to prevent loose soils from becoming airborne, institute methods to reduce the spread of invasive species, and consultations with the USFWS). There are a number of sensitive archaeological sites in the IPBC.

#### *Weapons Systems, Munitions, and Vehicles*

Weapons are standardized in the U.S. Armed Forces and are normally common among U.S. Allies. Munitions include blank ammunition, pyrotechnics, simulators, and similar devices. The use of pyrotechnics is governed by average wind speed and location. The concern with pyrotechnics is the potential to initiate a fire that could affect federally listed species. PTA (USAG-P 2015) defines pyrotechnics (i.e., fire starting ordnance) as:

- Tracer rounds
- 20/25/30-mm rounds fired from aircraft (hot brass)
- Simulators: grenade, artillery
- All flares: smoke, aerial signal, illumination, handheld, trip, ground flares
- 40-mm ordnance: illumination, smoke, practice (MK19)
- Mortars: illumination, white phosphorus
- Smoke grenades
- 2.75 rockets: white phosphorus, smoke
- 105-mm and 155-mm artillery rounds: illumination, white phosphorus, smoke
- TOW and Javelin missiles

### 2.11.2 External Encroachment

External encroachment is limited, given that most of the installation's boundary is surrounded by undeveloped lands. Much of the installation is bound by State of Hawaii lands. The Parker Ranch shares the northeast boundary of KMA. The southwestern boundary abuts Kamehameha Schools, Bishop Estate property. The far northwestern boundary comes in contact with Department of Hawaiian Home Land property. Waikoloa Village is a multi-owner allotment that is northwest of the Mamalahoa Highway (SH 190) and KMA and is largely undeveloped.

The Waikii Ranch, with multiple owners, is an inset to the installation boundary and surrounded on three sides by KMA. A Memorandum of Agreement (2006) was instituted between the installation and the Waikii Ranch Homeowner Association. The agreement was not renewed and has since expired.

The Mauna Kea Recreation Area, also known as Mauna Kea State Park, is east of the installation. An 8.3 ha (20.5 ac) park, the area is administered by the County of Hawaii, Department of Parks and Recreation. BAAF and artillery firing are a source of noise and the potential for fire in the area. A fire broke out between the recreation area and the training area in 2010. Dry conditions, strong winds, and steep terrain hampered efforts for fire control, which took over a week.

Convoys can impact travel on the David K. Inouye Highway, as well as the communities that the convoys pass through as troops and equipment are moved between Hilo and Kawaihae harbors to and from the installation.

## 2.12 Opportunities

### 2.12.1 Internal Opportunities

The Army has instituted a number of conservation measures that have improved conditions for federally listed species. Described in detail in Chapter 4, these measures include:

- Installation-wide surveys for an accurate accounting of all federally listed species present and their location.
- Establishment and maintenance of Areas of Species Recovery that encourages recruitment, habitat improvement, and reduces fire hazards.
- Intensive management of high priority endangered plant species to ensure their persistence. Includes genetic conservation, propagation, and outplanting.
- Short and long-term protection of sensitive areas through a system of fences that protect plants and habitats while permitting training opportunities.
- Invasive species monitoring, especially for incipient species, thereby controlling and limiting an invasive species' spread before it can only be maintained and not removed.
- Fuels monitoring along fire/fuel breaks.
- Proactive monitoring and management of federally listed wildlife species.
- Addressing issues using innovative measures; e.g., partnering with an outside agency to relieve the installation of some of the burden associated with federally listed species management while supporting training.
- Ongoing Soldier and public education and awareness training that increases protection and reduces management efforts.

### 2.12.2 External Opportunities

The PTA NRO has forged relations with a number of external agencies, utilizing their expertise and working to find resolutions to problems. Currently, the NRO is coordinating six projects with external organizations that will benefit the installation.

- *Recovery of native plant communities and ecological processes following the removal of non-native, invasive ungulates from Pacific Island Forests* (SERDP: University of Hawaii; Dr. C. Litton). This project is to quantify the impacts of ungulate removal on the biodiversity, structure, and function of two major ecosystem types (tropical wet forest, tropical dry forest) on DoD installations throughout the Pacific Island region.
- *Remote Sensing Technology for Threatened and Endangered Plant Species Recovery* (ESTCP: California State Polytechnic University - Pomona; Dr. E. Questad). The principal goal of this project is to identify areas of high quality habitat where growing conditions are optimized for

threatened, endangered and rare species across large geographic areas. The project will use state-of-the-art remote sensing technology and field observations to model habitat suitability for plant species.

- *The impact of non-native predators on pollinators and native plant reproduction in a Hawaiian dryland ecosystem* (SERDP: U.S. Forest Service; Dr. C. Liang). This project focuses on identifying impacts by some of PTA's most prominent non-native invasive arthropod and rodent predators and how invasive species impact the pollination ecology and genetic communication of native species.
- *Environmental science to support sustained use of the Keamuku Maneuver Area at Army Pohakuloa Training Area* (USAG-HI, USGS; Dr. J. Stock). This project uses high-resolution LiDAR topography with 1-ft contour intervals for engineering and hazard assessments. Studies will determine areas most likely to sustain repeated vehicular use that will remain usable by the military as well as identify conditions (soils, vegetation) that are the least resilient.
- *Evaluation of groundwater hydrology within the Humuula Saddle region of the Island of Hawaii on Army Garrison Hawaii—Pohakuloa Training Area* (USAG-HI: University of Hawaii; Dr. D. Thomas). Groundwater resources and geologic conditions at the Humuula Saddle region will be assessed and evaluated. Groundwater resources are to be identified and characterized to assist the Army evaluate the potential development of water production long-term and cost effectivity.
- *Field trial to evaluate the toxic rodenticide baits under operational field broadcast application scenario* (National Wildlife Research Center, Hawaii Field Station; Dr. Shane Siers; USFWS, Dr. Reese Phillips). Mice impact native species and habitats. Currently labelled toxicants are not very effective. Multiple toxicants will be used to monitor the success or failure of eradication of mice as well as non-targeted species.

Other external resources include the USFWS, a major cooperator in implementing this INRMP as well as providing guidance and recommendations that help to minimize impacts on federally listed species, the National Park Service at Volcanoes National Park that provides expertise on a number of topics from survey techniques to fence building; the DLNR as a source of information and support for hunting and game management and working with the installation in providing outplanting sites, including the Division of Forestry and Wildlife – Plant Extinction Prevention Program; USGS - Biological Resources Discipline; USDA-Animal and Plant Health Inspection Service, Natural Resources Conservation Service and U.S. Forest Service; USDOT – Federal Highway Administration; National Science Foundation; Hawaii Department of Agriculture; HDOT; Dryland Forest Working Group; the Hawaiian Hoary Bat Research Cooperative; Hawaii Seed Bank Partnership; Mauna Kea Watershed Alliance; Three Mountain Alliance; Nene (Hawaiian Goose) Recover Action Group; the Hawaii Conservation Alliance; Hawaii Biodiversity and Mapping Program; the Palila Working Group; Big Island Rare Plant Working Group the Dryland Forest Working Group; University of Hawaii; Colorado State University, and others.

## 2.13 Natural Environment

### 2.13.1 Climate

The Island of Hawaii is in the humid tropical Pacific, but elevation and orographic processes at PTA result in a climate classified as a cool, tropical dry climate. The installation is more "wet" at lower elevations. The position of the installation is to the west and below the Humuula Saddle and on the leeward side of Mauna Kea. Moisture carried by the summer easterly trade winds is lost as precipitation with the increase in elevation and rarely reaches PTA at higher elevation (Figure 2-5). Much of the installation is situated above the thermal inversion layer and is not influenced by the trade wind-orographic rainfall regime. Occasionally, moist air trapped below the inversion layer rises into the Saddle Region in the late afternoon. Fog is typical in late winter and early spring when trade winds fail.


Figure 2-5. Rainfall Isohyets (inches) for the Island of Hawaii (2000-2012). Source: Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte, 2013: Online Rainfall Atlas of Hawaii. Bull. Amer. Meteor. Soc. 94, 3.

Mornings can be clear and sunny at lower and mid-installation elevations, and in the afternoon, a cloud belt can develop from about 750 to 1675 m (about 2,500 to 5,500 ft). Visibility can become limited at lower elevations, whereas the base camp has clear skies. Fog and fog-drip is a source of precipitation and may equal rainfall on some parts of the island (Sato et al. 1973; Juvik and Perreira 1973). A comparison of precipitation at Mauna Kea Recreation Area (Pohakuloa Station, 107) to data collected at Waikii Ranch indicates an increase in precipitation to the west and in the KMA (USAG-HI 2010). A majority of the installation is above the thermal layer and dry. Drought is common when winter storms fail.

The 59-year average annual precipitation at Pohakuloa Weather Station (107[3]) is 35.4 cm (13.9 in). In comparison, the average precipitation at BAAF[4] the last 20 years (1996-2016) was 7.7 cm (3.0 in), identifying a significant drought period. In 2014 and 2015, rainfall was 46.4 cm (18.3 in) and 38.6 cm (15.2 in), respectively (Figure 2-6). KMA is below the thermal inversion, and rainfall and fog-drip is considerably greater than at PTA. Most rainfall occurs during the winter months.

The annual mean temperature is about 17° C (63° F) at the Waikii Ranch (USAG-HI 2010) and about 10° C (50° F) near the cantonment area (29 years of data, U.S. Army Engineering and Support Center 2000). Over the last 20 years, the average annual temperature at BAAF was 14.8° C (58.6° F), (https://www.wunderground.com/history/airport/PHSF 15 July 2016). Diurnal temperature fluctuations are greater than the seasonal variations.

[3] Pohakuloa Weather Station, 107 is located Latitude 19.7494, Longitude -155.5267 at Mauna Kea Recreation Area near Saddle Road.
[4] Bradshaw Weather Station is located Latitude 19.7600, Longitude -155.5538 at BAAF at the turn off the airstrip toward the tower.

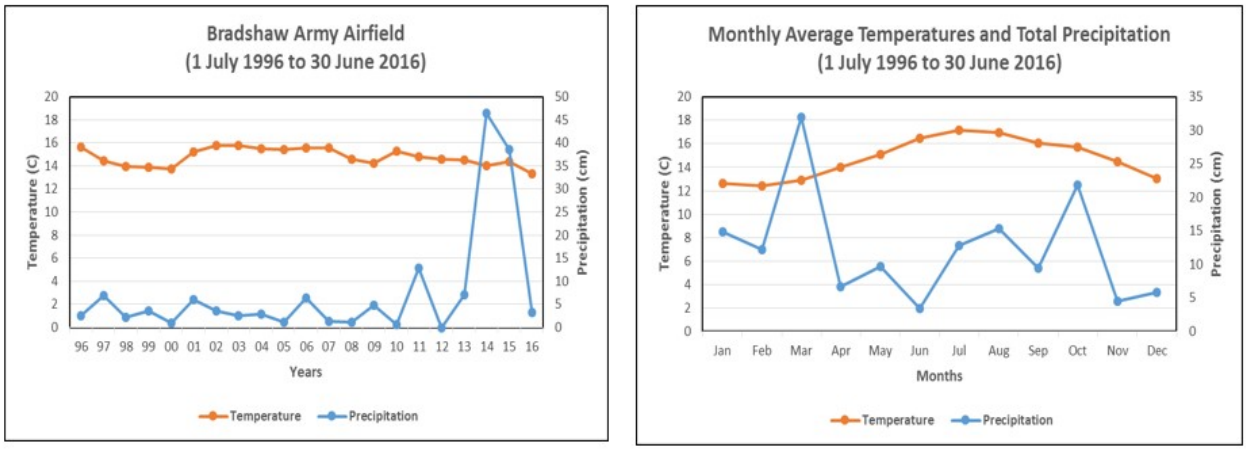


Figure 2-6. Climate Diagrams for Bradshaw Army Airfield (Wunderground.com). Average temperature and total precipitation documented from 1996 to 2016 (left) and monthly variation for average temperature and total precipitation by month (right). No data were recorded.

## 2.13.2 Ecoregions

PTA falls within the Hawaiian Island Section, of the Hawaiian Island Province of the Rainforest Regime Mountains Division within the Humid Tropical Domain, as do all of the Hawaiian Islands (M423A) (Bailey 1995). The potential vegetation is sclerophyllous forest, shrubland, grassland, and barren (Kuchler 1964). The landscape is dissected by volcanic outcrops with no surface waters.

## 2.13.3 Aquatic Habitats

There are no aquatic habitats at PTA.

## 2.13.4 Flora and Vegetative Communities

Soil and land types affect the type and amount of plant cover. Conditions that support the survival and plant growth differ from more classical primary succession scenarios. Cracks and crevices; blown soil, organic matter, seeds and spores; and sufficient moisture provide an advantage to woody species with deep roots. In recent years, invasive species such as *Cenchrus setaceus* and *Senecio madagascariensis* (Madagascar fireweed) have become an increasing part of the landscape, especially in disturbed sites (e.g., along roads and covering trails).

Plant communities range from barren lava with less than 5% plant cover to treelands, shrublands, and grasslands. The most complex, diverse, and the oldest communities are found in the kipuka (vegetated areas in older, more weathered lava surrounded by more recent lava flows). These are areas that persisted after more recent volcanic eruptions. Lava moves around rather than over these areas.

Grasslands are prevalent in KMA and the western part of TAs 5 through 16 and the western part of TA 20 where soils are more developed. Shrub and treelands dominate TA 1 to 4, TA 22 and 23, parts of TA 21, and about half of KMA.

### *Vegetation Classification*

Vegetation at PTA is classified according to the National Vegetation Classification System (NVCS) (Figure 2-7). The NVCS is useful for describing and inventorying plant communities, managing federally listed plant habitat, and controlling invasive species. These data are useful in the planning of infrastructure such as military training ranges and combat maneuver courses. The NVCS provides a thorough understanding of the vegetation communities and their distribution on the installation, which is essential for effective management of these military training lands.

The NVCS provides a standardized structure for developing a consistent classification of vegetation cover. Classifications are based on existing vegetation and not potential or climax vegetation. Current PTA vegetation maps reflect extensive changes to plant communities since 1997 (Shaw and Castillo 1997) that have resulted from a number of large fires, prolonged drought, and increasing invasive species.

Thirteen plant alliances/communities have been identified on PTA (Block et al. 2013). The alliances outside the impact area underwent an accuracy assessment, which was not the case within impact area due to unexploded ordnance. Of the 13 alliances, *Dodonaea viscosa* (aalii) *shrubland* comprised 25.2% of the cover, followed by barren lands (21.7 %) and *Metrosideros polymorpha* (ohia) shrubland (18.9%) (Table 2-3). Together these three land covers comprise 66% of the installation. *Cenchrus setaceus* and *Pennisetum clandestinum* (kikuyu grass) cover accounts for an additional 20% of soil cover.

Vegetation studies in the area of PTA began as early as 1888 with Hillebrand's *Flora of the Hawaiian Islands*. A comprehensive description of the vegetation was developed for an environmental impact statement (Environmental Impact Survey, Inc. 1977), which cited various earlier vegetation studies (Knapp 1965; Krajina 1963; Ripperton and Hosaka 1942; Robyns and Lamb 1939; Rock 1913). In 1997, as part of the *Endangered Species Management Plan Report for Pohakuloa Training Area*, an annotated bibliography was prepared, describing more recent surveys (R.M. Towill Corporation 1997).

### *Plant Species*

A total of 333 vascular plant taxa from 76 families and 226 genera have been identified on PTA (S. Evans per. comm. 2016). The most recent additions to the species list were of new species encountered during the installation-wide surveys in 2015 and surveys of the KMA. Most taxa are forbs (44%), followed by grasses and grasslike plants (17%) and shrubs (21%). Ferns comprise 7% of the taxa, vines 5%, and trees 7%. Most species are perennials (68%), while annuals constitute 24% with some species displaying multiple forms of duration. Approximately 36% of plants found at PTA are indigenous or endemic, and about 64% are non-native species.

Table 2-3. Alliance/Plant Community Types at Pohakuloa Training Area, Hawaii (Block et al. 2013).

| Alliance/Community Type | Hectares (ha) | Acres (ac) | Percent |
|---|---|---|---|
| *Dodonaea viscosa* shrubland | 13,593 | 33,589 | 25.2 |
| *Metrosideros polymorpha* shrubland | 10,183 | 25,163 | 18.9 |
| *Cenchrus* (*ciliaris, setaceum*) mixed medium-tall ruderal grassland | 4,994 | 12,340 | 9.3 |
| *Myoporum sandwicense-Sophora chrysophylla* shrubland | 4,235 | 10,465 | 7.9 |
| *Pennisetum clandestinum* semi-natural grassland | 3,797 | 9,382 | 7.0 |
| *Eragrostis atropioides* herbaceous | 1,640 | 4,052 | 3.0 |
| *Metrosideros polymorpha* sparsely vegetated woodland | 1,297 | 3,205 | 2.4 |
| *Myoporum sandwicense-Sophora chrysophylla* woodland | 1,039 | 2,567 | 1.9 |
| Semi-natural herbland | 684 | 1,690 | 1.3 |
| *Olea europaea* semi-natural woodland | 265 | 655 | 0.5 |
| *Chenopodium oahuense* shrubland | 226 | 558 | 0.4 |
| *Eucalyptus* ssp. semi-natural woodland | 152 | 376 | 0.3 |
| Barren[1] | 11,711 | 28,938 | 21.7 |
| Urban land cover | 80 | 198 | 0.1 |
| Totals | 53,896 | 133,178 | 100.0 |

[1]Barren lands include the sparsely vegetated semi-natural herbland alliance.

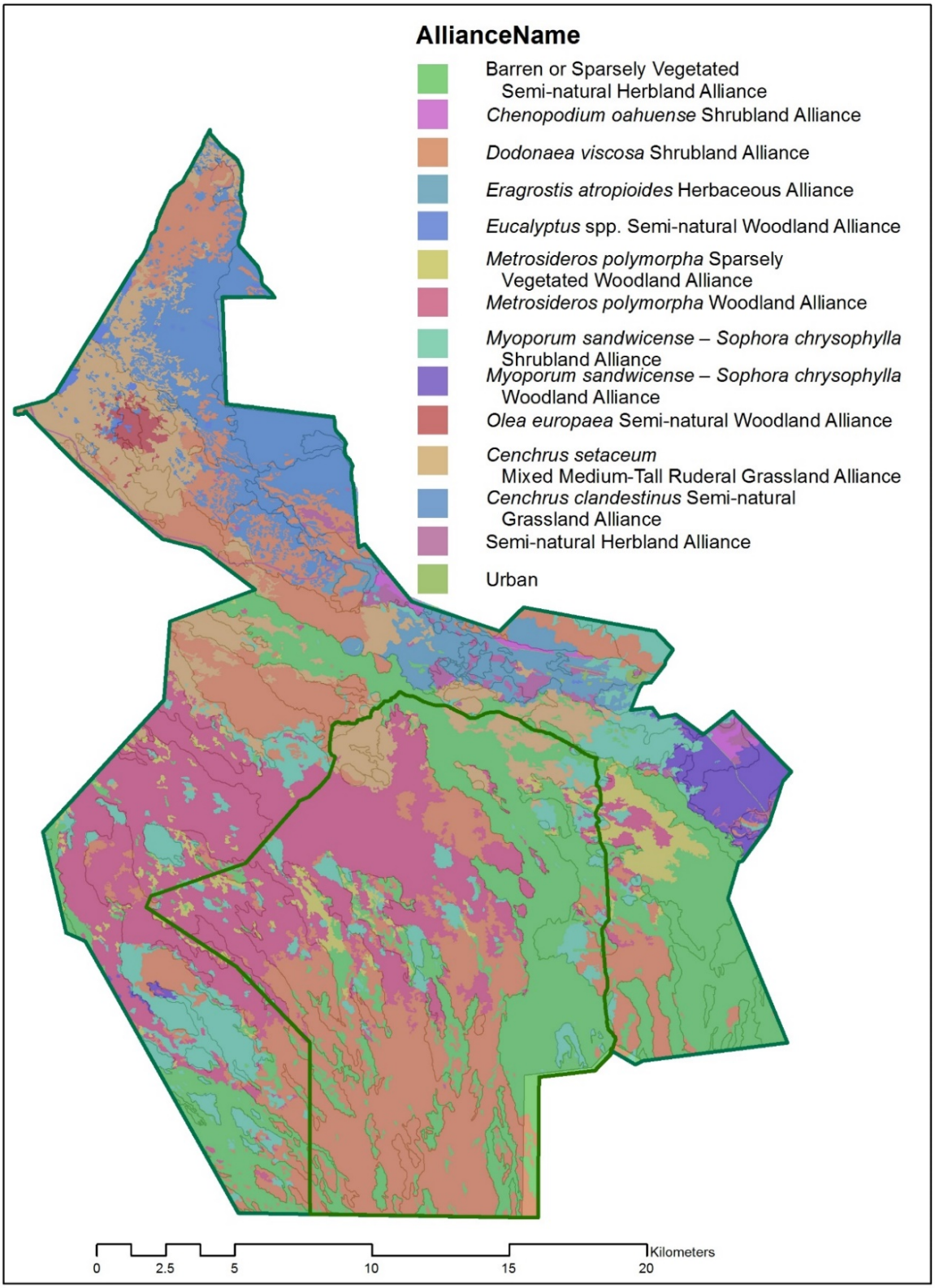


Figure 2-7. Vegetation Map Based on National Vegetation Classification System, Pohakuloa Training Area, Hawaii (Block et al. 2013).

### *Federally Listed Plant Species*

Twenty federally listed endangered plant species are present on PTA (Table 2-4, Figure 2-8 through Figure 2-12). In addition there is one undescribed *Tetramolopium* species that, due to its rarity and limited distribution, is managed like a federally listed species. Seventeen species have a Global Rank of G1 (critically imperiled) and 25 as G2 (imperiled) with the ranking extending to variety for two of the taxa. Eight species are categorized as G2/G3 (imperiled/vulnerable, See Plant Species List). Ten taxa have an infraspecific designation of T1 (infraspecific/subspecies or varieties, critically imperiled) taxon or T2 (infraspecific, imperiled). These ranks reflect an assessment of the condition of the species across its entire range (NatureServe Explorer 2016). The Army considers federal candidate species and G1-G2 and T1-T2 as species at risk. Proactive management that prevents federal listing is more cost effective and causes fewer impacts to military training.

Table 2-4. Federally Listed Endangered (E) and Threatened (T) Species at Pohakuloa Training Area.

| | |
|---|---|
| *Asplenium peruvianum* var. *insulare* (E) | *Schiedea hawaiiensis* (E) |
| *Exocarpos menziesii* (E) | *Sicyos macrophyllus* (E) |
| *Festuca hawaiiensis* (E) | *Silene hawaiiensis* (T) |
| *Haplostachys haplostachya* (E) | *Silene lanceolata* (E) |
| *Isodendrion hosakae* (E) | *Solanum incompletum* (E) |
| *Kadua coriacea* (E) | *Spermolepis hawaiiensis* (E) |
| *Melanthera venosa* (E) | *Stenogyne angustifolia* (E) |
| *Neraudia ovata* (E) | *Tetramolopium arenarium* var. *arenarium* (E) |
| *Portulaca sclerocarpa* (E) | *Vigna o-wahuensis* (E) |
| *Portulaca villosa* (E) | *Zanthoxylum hawaiiense* (E) |

### *Invasive Plant Species*

As mentioned above, about 60% of the species known to PTA are non-natives. The vast majority are forbs (63%), followed by grasses (19%) and woody plants (14%). Vines comprise 4% of the non-native plants. Of the 194 non-native plant species, 32 are considered invasive and six are under consideration for that distinction. The two most common weeds that are primary targets for control are *Cenchrus setaceus* and *Senecio madagascariensis* (Table 2-5). These two species are habitat altering and produce fine fuels. The other 30 weed species are classified as secondary in importance.

Table 2-5. Primary[1], Secondary, and Invasive Species Proposed[2] for Management at Pohakuloa Training Area, Hawaii.

| | | | |
|---|---|---|---|
| *Ambrosia artemisiifolia* | *Eschscholzia californica* | *Nicotiana glauca* | *Rhamnus californica* |
| *Acacia mearnsii* | *Festuca arundinacea*[2] | *Nicotiana tabacum*[2] | *Ricinus communis* |
| *Asclepias physocarpa* | *Foeniculum vulgare* | *Olea europaea* | *Rubus niveus* |
| *Cenchrus setaceus*[1] | *Grevillea robusta* | *Parthenium hysterophorus* | *Rubus rosifolius* |
| *Centaurea melitensis* | *Heteromeles arbutifolia*[2] | *Passiflora tarminiana* | *Salsola tragus* |
| *Cirsium vulgare* | *Kalanchoe tubiflora* | *Piptatherum miliaceum*[2] | *Sambucus mexicana* |
| *Cupressus* species | *Lantana camara* | *Pluchea carolinensis* | *Schinus molle* |
| *Datura stramonium* | *Leucaena leucocephala* | *Portulaca pilosa* | *Senecio madagascariensis*[1] |
| *Delairea odorata* | *Lophospermum erubescens* | *Prosopis pallida* | *Tribulus terrestris* |
| *Emex spinosa*[2] | *Melinis minutiflora*[2] | *Psidium guajava* | |

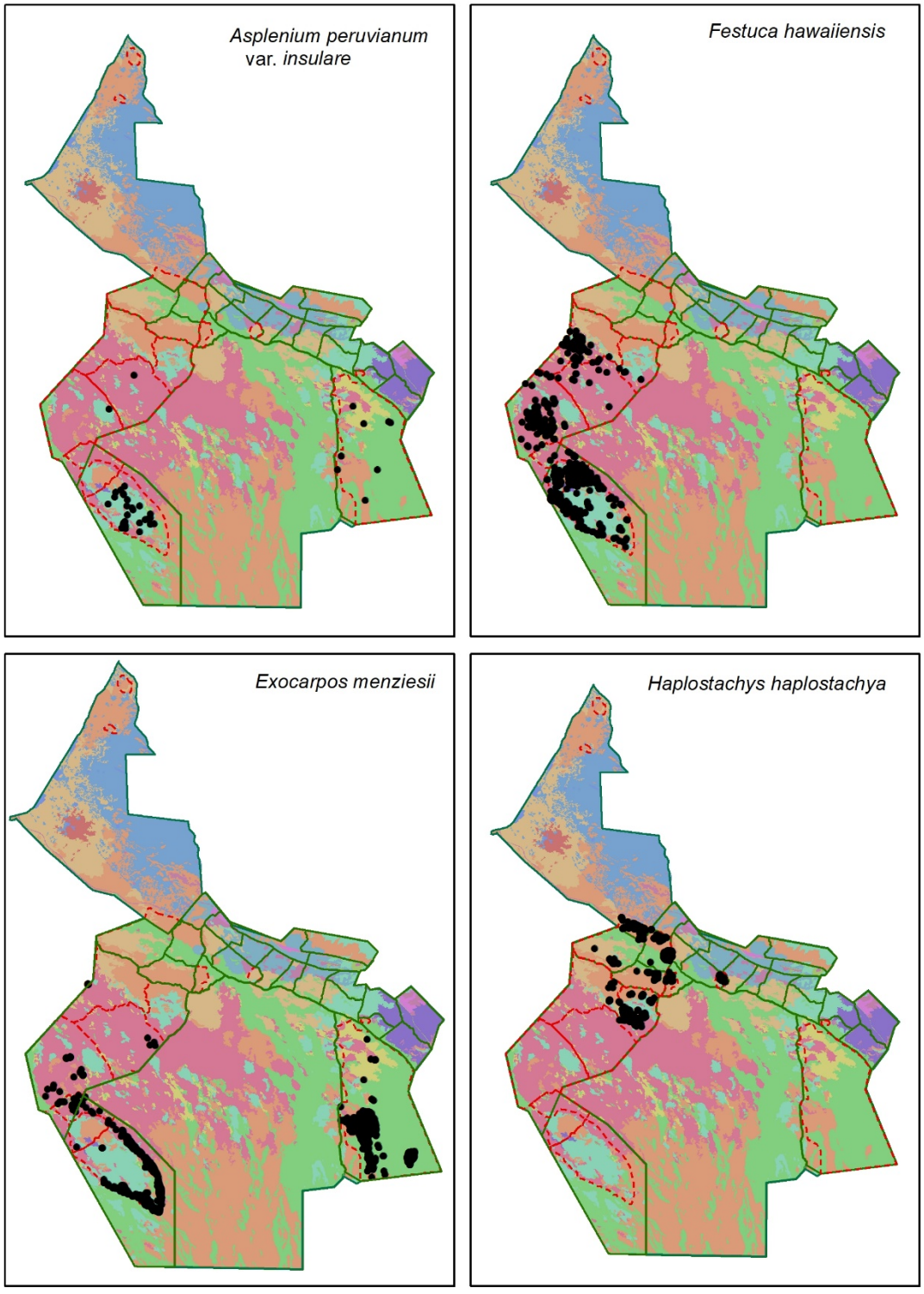


Figure 2-8. Distribution of *Asplenium peruvianum* var. *insulare*, *Festuca hawaiiensis*, *Exocarpos menziesii*, and *Haplostachys haplostachya* on Pohakuloa Training Area, Hawaii.

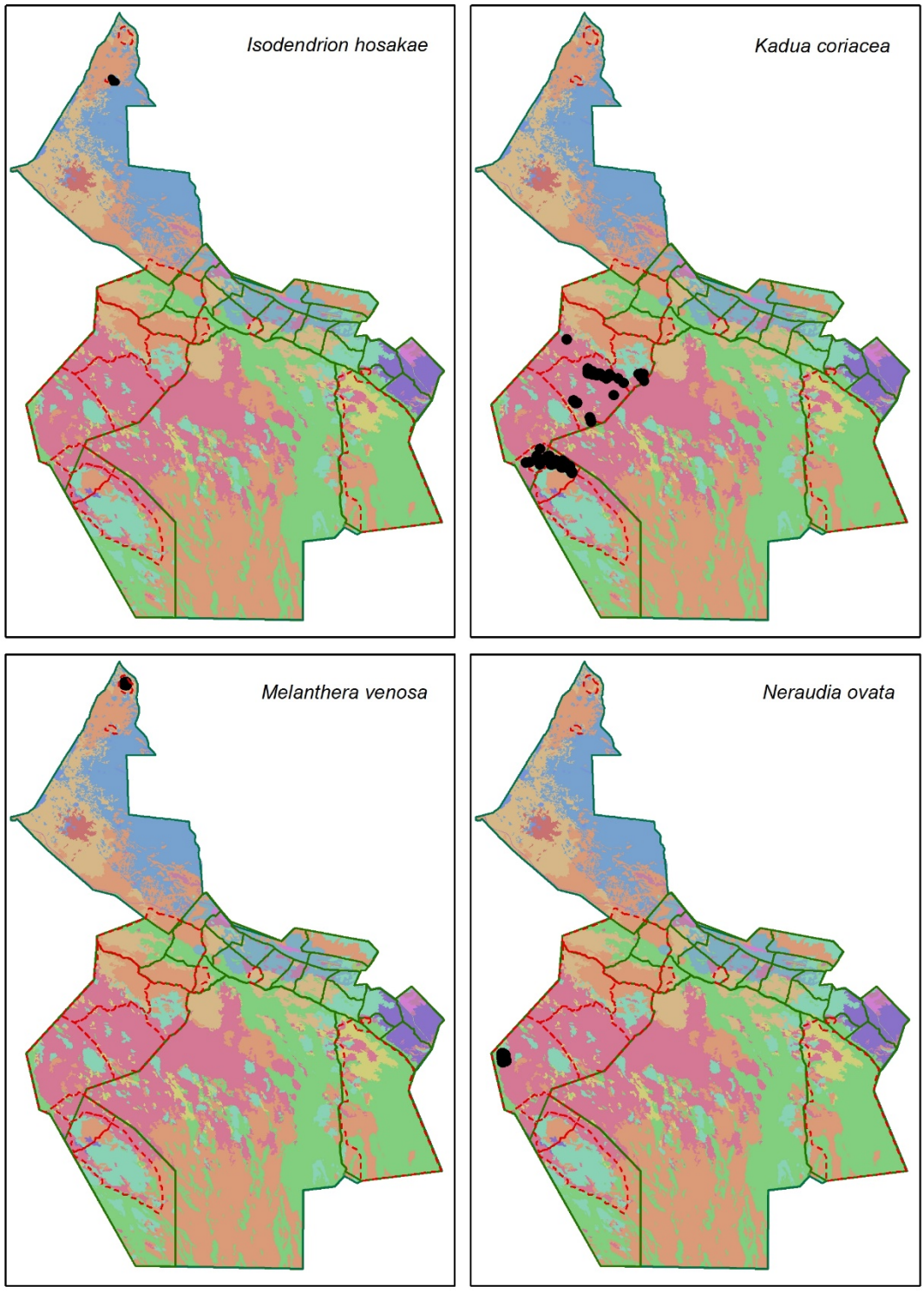


Figure 2-9. Distribution of *Isodendrion hosakae*, *Kadua coriacea*, *Melanthera venosa*, and *Neraudia ovata* on Pohakuloa Training Area, Hawaii.


Figure 2-10. Distribution of *Portulaca sclerocarpa*, *Portulaca villosa*, *Schiedea hawaiiensis*, and *Sicyos macrophyllus* on Pohakuloa Training Area, Hawaii.


Figure 2-11. Distribution of *Silene hawaiiensis*, *Silene lanceolata*, *Solanum incompletum*, and *Spermolepis hawaiiensis* on Pohakuloa Training Area, Hawaii.


Figure 2-12 Distribution of *Stenogyne angustifolia*, *Tetramolopium arenarium* var. *arenarium*, *Vigna o-wahuensis*, and *Zanthoxylum hawaiiense* on Pohakuloa Training Area, Hawaii.

## 2.13.5 Areas of Special Concern

### *Palila Critical Habitat*

The Palila Critical Habitat extends beyond the installation, circling the lower elevations of Mauna Kea. Overall, the vegetation of the Palila Critical Habitat consists of large and intermediate-sized *Sophora chrysophylla* and *Myoporum sandwicense* (naio). The Palila Critical Habitat consists of 24,356 ha (60,185 ac) of which, 2,063.9 ha (5,100 ac) are located on PTA. The Palila Critical Habitat circles Mauna Kea with two distinct units on the installation (see Figure 2-4). Palila are present in the western portion of the habitat but not on PTA. The PTA sites are potential reintroduction sites.

The western Palila Critical Habitat in TA 11 and 10 is separated from the installation by the Daniel K. Inouye Highway and is 834.3 ha (2,061.6 ac). The dominant vegetation is *Dodonaea viscosa* shrubland with *Eragrostis atropioides* (hardstem lovegrass) filling most interspaces, along with scattered pockets of *Sophora chrysophylla* and *Myoporum sandwicense*. *Cenchrus setaceus* is invading the area. The area is steep and has no firing points. The eastern habitat is also divided by the Daniel K. Inouye Highway, with most of TA 2 to the northeast of the highway and TAs 1 and 4 to the southwest. The eastern area consists of 1,229.6 ha (3,038.4 ac) of open *Sophora chrysophylla* and *Myoporum sandwicense* with an understory of grass. There are 11 firing points in the area.

Much of the Palila Critical Habitat has suffered from the presence of feral sheep and mouflon sheep breeding, feeding, and sheltering in the area. As such, *Sophora chrysophylla* is hampered. During the realignment of Saddle Road, part of the mitigation was to enhance a large portion of the *Sophora chrysophylla / Myoporum sandwicense* forest as potential habitat for the Palila in the Kipuka Alala in the southwestern portion of the installation. The fence was an outcome from the Saddle Road EIS where the USAG-HI and the Military Traffic Management Command joined with other federal and state agencies in a MOU (*Regarding Implementation of the Saddle Road Palila Critical Habitat Impact* Mitigation, 1998) to facilitate Palila Critical Habitat mitigation for the highway. A large fence unit was constructed in 2001 around the habitat not already fenced in the Kipuka Alala (1,622 ha, 4,008 ac). A smaller fence unit was built in 1999 (441 ha, 1090 ac) to protect federally listed plants and their habitat from feral and introduced ungulates.

Training permissions apply to the Palila Critical Habitat (USAG-P 2015). As for the Kipuka Alala, the only road access is through the MPRC, which has restricted access to non-training related activities until all NEPA review is completed.

### *Kipuka Kalawamauna Endangered Plants Habitat*

The Kipuka Kalwamauna Endangered Plant Habitat was designated as sensitive by the U.S. Army when two federally listed plants (*Haplostachys haplostachya* and *Stenogyne angustifolia*) were discovered during a floristic survey in 1977 (USFWS 2003). These species were subsequently listed as endangered in 1979. The Endangered Plant Habitat covers approximately 3,178 ha (7,853 ac). The Army recognized its biological significance and designated it an area of concern. The Kipuka Kalawamauna Endangered Plant Habitat was fenced partially in 1998 (754 ha / 1,863 ac) with the rest of the area fenced in 2010. Other rare and federally listed plants identified in the area include *Chamaesyce olowaluana* (akoko), *Eragrostis deflexa* (Pacific lovegrass), *Kadua coriacea* (E), *Melicope hawaiiensis* (mokihana), *Pittosporum terminalioides* (hoawa), *Portulaca sclerocarpa* (ihi, E), *Silene hawaiiensis* (T), *Silene lanceolata* (lance-leaf catchfly, E), *Solanum incompletum* (E), *Zanthoxylum hawaiiense* (E), and *Tetramolopium arenarium* var. *arenarium* (Mauna Kea pamakani, E). The site is also used by the Hawaiian hoary bat (E).

### *Large-scale Fence Units*

The large-scale fence units were completed at PTA in 2013 (Figure 2-13). Fencing is a conservation measure to protect federally listed plant species and is a requirement of the 2003 and 2008 USFWS biological opinions issued to USAG-HI. The large-scale fence units are intended to provide protection to

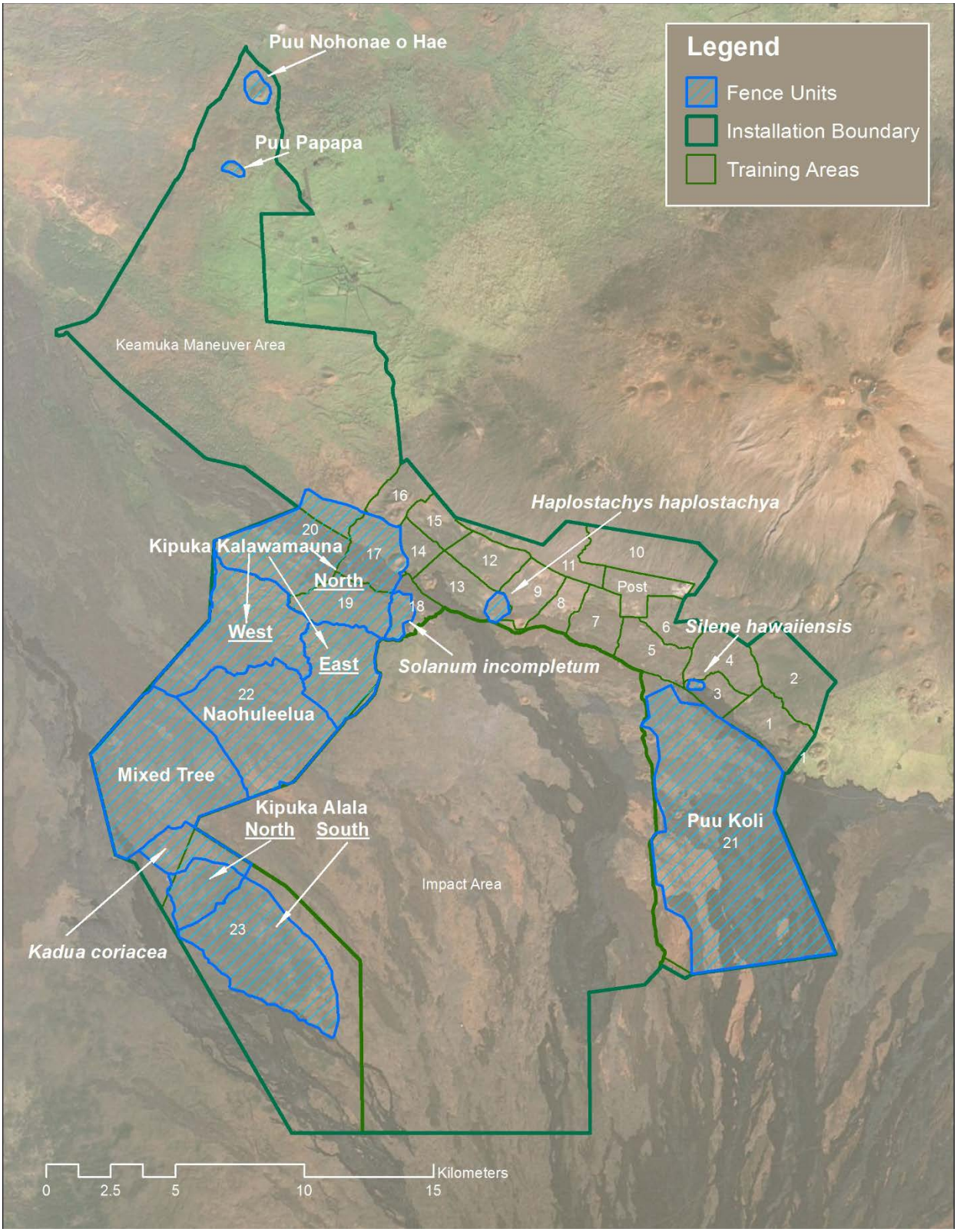


Figure 2-13. Fence Units at Pohakuloa Training Area, Hawaii.

Table 2-6. Conservation Fence Units on Pohakuloa Training Area, Hawaii (USAG-P GIS Database 2016).

| Fence Unit | Kilometers (km)* | Miles (mi)* | Hectare (ha) | Acres (ac) |
|---|---|---|---|---|
| Puu Nohona o Hae | 3.4 | 2.1 | 79.0 | 195.2 |
| Puu Papapa | 2.1 | 1.3 | 27.6 | 68.2 |
| *Haplostachys haplostachya* | 3.1 | 1.9 | 66.8 | 165.1 |
| *Silene hawaiiensis* | 1.7 | 1.1 | 18.0 | 44.5 |
| *Solanum incompletum* | 5.1 | 3.2 | 118.7 | 293.3 |
| Puu Koli | 30.4 | 18.9 | 4,290.0 | 10,600.0 |
| Kipuka Kalawamauna North | 20.6 | 12.8 | 2,155.0 | 5,325.1 |
| Kipuka Kalawamauna West | 20.4 | 12.7 | 1,377.7 | 3,404.4 |
| Kipuka Kalawamauna East | 12.1 | 7.5 | 794.0 | 1,962.0 |
| Naohuleelua | 17.5 | 10.9 | 1,636.0 | 4,042.6 |
| Mixed Tree | 18.6 | 11.6 | 2,083.7 | 5,148.9 |
| *Kadua coriacea* | 10.1 | 6.3 | 392.2 | 969.2 |
| Kipuka Alala North | 8.9 | 5.5 | 431.5 | 1,066.3 |
| Kipuka Alala South | 18.1 | 11.2 | 1,622.3 | 4,008.9 |
| Total | 172.1 | 106.9 | 15,094.0 | 37,291.0 |

*Some fences are shared between units. The overall total linear distance is 140 km (87 mi).

species and their habitat at the landscape scale. There are 14 large-scale fence units at PTA totaling 140 km (87 mi) in length (Table 2-6). These fence units protect approximately 15,256 ha (37,698 ac). A fence unit that had been placed around a grouping of *Silene hawaiiensis* and monitored from 1999 to 2002 provided evidence of the positive effect of fencing. The removal of ungulates increased the average height of plants. Native trees in the two Kipuka Alala Fence Units show regeneration, demonstrating the ability of native ecosystems to recover with the absence of ungulate pressure. The fences allow the Army to manage lands using an ecosystem approach rather than concentrate on individual species management.

The nine fence units in the southwestern portion of the installation are contiguous. The western units are smaller, which has no other ecological significance (USAG-HI 2006a). Ten of the fence units are ungulate-free, and four are pending as of December 2016 (R. Doratt, per. com. 2016). Aerial surveys are made to ensure the units remain ungulate-free. Fence lines are walked and checked for breaches and repaired as necessary. The southwestern area shows the greatest diversity with 16 of the 20 federally listed plants present. Absent are *Melanthera venosa* (spreading nehe), *Sicyos macrophyllus* (anunu), *Vigna o-wahuensis* (Oahu cowpea), and *Isodendrion hosakae* (aupaka), which are only found in KMA.

The Puu Koli fence unit contains over 300 lava caves that provide suitable habitat and potential support for *Asplenium peruvianum* var. *insulare.* The 2003 USFWS Biological Opinion required a minimum of 20 lava tubes to be protected to minimize training activities and browsing and trampling in areas where *Asplenium peruvianum* var. *insulare* may occur. The fence does not break up the area and maximizes potential military use. The Puu Koli fence primarily protects *Silene hawaiiensis*, with seven sites containing *Asplenium peruvianum* var. *insulare*.

## 2.13.6 Fauna

The native fauna of the Hawaiian Islands evolved in the absence of predators or competitors. As such, they were susceptible to the introduction of non-native species, agricultural development, and other changes that came with development.

### *Mammals*

The Hawaiian hoary bat (*Lasiurus cinereus semotus*) is the only native land mammal in Hawaii, occurring in a wide variety of habitat types from barren lava to open forests. Treeland, shrubland and grassland

communities provide sufficient availability for foraging and habitat. The Hawaiian hoary bat was first documented at PTA in 1992. The species is thought to be present throughout the installation, but distribution and activity levels are currently unknown. The species is Federally and State listed as endangered.

All mammals other than the Hawaiian hoary bat are non-native, and individual perceptions can affect their designation as game or as an invasive/nuisance species. There are 10 non-native mammal species. Common game mammals include feral goat, sheep, and pig. Other species include three rat species (*Rattus* spp.), mongoose (*Herpestes auropunctatus*), mouse (*Mus domesticus*), and feral dogs and cats are considered nuisance species and harmful to the persistence of many native species.

### *Birds*

PTA has 8 native bird species (7 endemic, 1 indigenous), along with 29 non-native bird species, which have been documented on the installation during various surveys in the last 10 years (R. Doratt, per. Comm. 2016; Freed 1991; Gon et al. 1993; David 1995; and HDOT and USDOT 2010) (Table 2-7). Twelve of the non-native species are game birds. All of the native bird species, are protected by the MBTA, as are six of the non-native species. Four species are federally listed as endangered (E) (Table 2-8). Seven species are identified by a "*" are listed by the state of Hawaii and identified as endemic and species with breeding populations in the state (http://dlnr.hawaii.gov/dofaw/files/2013/09/Chap124a-Ex.pdf). Three species with "**" are identified as priority species by Partner's in Flight.

In 1998, the Pohakuloa NRO staff initiated avian surveys of forest populations. A series of transects were established and monitored in the Kipuka Alala, the Palila Critical Habitat, and TA 22.

The Hawaiian goose has been observed at various locations at PTA. Core areas include the Range 01 Complex, FOB Warrior, and BAAF. In past years, the Hawaiian goose's breeding activity has been exceedingly rare at the installation. However, with the recent introduction of nearly 600 translocated geese from Kauai to Hawaii Island, new visitation patterns and breeding behaviors are developing. All geese translocated from Kauai were released and managed at Puu Oo Ranch, 18 km southeast of PTA. Two successful nesting events occurred at PTA in 2014 from two pairs of translocated Kauai geese, which warrants concern for the possibility of future nesting attempts at the installation. The Army will continue to coordinate with the USFWS and DOFAW to reduce the likelihood of PTA becoming a new breeding center for the species.

The Hawaiian hawk occupies most native and exotic forests on Hawaii Island, but the species is not common on the arid plains of PTA. Hawks may occasionally use habitat at the installation but individuals are believed to be transient. The 2013 Biological Opinion issued by the USFWS included a "no effect" determination for the Hawaiian hawk for all military training activities at PTA, and the Army is no longer required to manage for this species.

The Hawaiian petrel colonies are typically located at high elevation, xeric habitats or wet, dense forests. Nests are located in burrows, crevices, or cracks in lava tubes. Extant breeding colonies are located in Hawaii Volcanoes National Park on Mauna Loa and possibly on the windward side of Mauna Kea, but no colonies have been confirmed there to date. Archaeological evidence suggests that the Hawaiian petrel was once common in the saddle region of Hawaii Island. The species has been detected at PTA since 1995 in TAs 21 and 23. The Hawaiian petrel is believed to transit the area, but no active nesting colonies have been discovered at the installation.

The Band-rumped storm petrel (*Oceanodroma castro*) habitat is thought to be similar to the Hawaiian petrel; individuals are assumed to nest in burrows, crevices, or cracks in lava tubes at high-elevation, inland habitats. The Band-rumped storm petrel has been recorded at PTA since 2008 in TAs 21 and 23.

Table 2-7. Inventory of bird species for the last ten years (2006-2016), Pohakuloa Training Area, Hawaii.

| Common Name | Species | Origin | Status | Federal List |
|---|---|---|---|---|
| African Silverbill | *Lonchura malabarica* | Introduced | None | |
| Apapane | *Himatione sanguinea* | Endemic | Protected | MBTA |
| Band-Rumped Storm Petrel* | *Oceanodroma castro* | Indigenous | Protected/Endangered | MBTA / ESA |
| Barn Owl | *Tyto alba* | Introduced | Protected | MBTA |
| Black Francolin | *Francolinus francolinus* | Introduced | None | |
| California Quail | *Callipepla californica* | Introduced | None | |
| Chukar | *Alectoris chukar* | Introduced | None | |
| Common Myna | *Acridotheres tristis* | Introduced | None | |
| Erckel's Francolin | *Francolinus erckelli* | Introduced | None | |
| Gray Francolin | *Francolinus pondicerianus* | Introduced | None | |
| Hawaii Amakihi | *Hemignathus virens* | Endemic | Protected | MBTA |
| Hawaiian Goose | *Branta sandvicensis* | Endemic | Protected/Endangered | MBTA / ESA |
| Hawaiian Hawk | *Buteo solitarius* | Endemic | Protected/Endangered | MBTA / ESA |
| Hawaiian Petrel | *Pterodroma sandwichensis* | Endemic | Protected/Endangered | MBTA / ESA |
| Hawaiian Short-eared Owl | *Asio flammeus sandwichensis* | Endemic | Protected | MBTA |
| Hawaiian Thrush-Omao | *Myadestes obscurus* | Endemic | Protected | MBTA |
| House Finch | *Carpodacus mexicanus* | Introduced | Protected | MBTA |
| House Sparrow | *Passer domesticus* | Introduced | None | |
| Japanese Quail | *Coturnix japonica* | Introduced | None | |
| Japanese White-eye | *Zosterops japonicus* | Introduced | None | |
| Junglefowl | *Gallus lafayetii* | Introduced | None | |
| Kalij Pheasant | *Lophura leucomelanos* | Introduced | None | |
| Lavender Waxbill | *Estrilda caerulescens* | Introduced | None | |
| Melodious Laughing Thrush | *Garrulax canorus* | Introduced | None | |
| Mourning Dove | *Zenaida macroura* | Introduced | None | MBTA |
| Northern Cardinal | *Cardinalis cardinalis* | Introduced | Protected | MBTA |
| Northern Mockingbird | *Mimus polyglottos* | Introduced | Protected | MBTA |
| Nutmeg Mannikin | *Lonchura malacca* | Introduced | None | |
| Pacific Golden-Plover | *Pluvialis fulva* | Visitor | Protected | MBTA |
| Red-billed Leiothrix | *Leiothrix lutea* | Introduced | None | |
| Ring-necked Pheasant | *Phasianus colchicus* | Introduced | None | |
| Rock Pigeon | *Columba livia* | Introduced | None | |
| Saffron Finch | *Sicalis flaveola* | Introduced | None | |
| Sky Lark | *Alauda arvensis* | Introduced | Protected | MBTA |
| Spotted Dove | *Streptopelia chinensis* | Introduced | None | |
| Wild Turkey | *Meleagris gallopavo* | Introduced | None | |
| Yellow-fronted Canary | *Serinus mozambicus* | Introduced | None | |
| Zebra Dove | *Geopelia striata* | Introduced | None | |

Table 2-8. Federally Listed Endangered Bird Species at Pohakuloa Training Area, Hawaii.

| | |
|---|---|
| *Branta sandvicensis* | *Oceanodroma castro* |
| *Buteo solitarius* | *Pterodroma sandwichensis* |

Call activity suggests the taxon is present in portions of these training areas seasonally; however, at this time it is unclear how this species is using habitat at PTA. In 2015, a colony was discovered at PTA with confirmed activity at a burrow, and this is significant because no active nesting burrows have been previously documented in the Hawaiian Islands.

Hawaiian amakihi (*Hemignathus virens*; native) was the most frequently documented species during these surveys, averaging 26% of the sightings from 2003 to 2005; followed by the Japanese white-eye (*Zosterops japonicus*; non-game, non-native, 19%), Erckel's Francolin (*Francolinus erckelli*, non-native, game bird, 11%), and house finch (*Carpodacus mexicanus*; non-native, non-game, migratory bird, 10%) (USAG-HI 2007a). The Band-rumped storm petrel (*Oceanodroma castro*) is known to use the pahoehoe lava flows and to saddle region as a flyway to nesting habitat on the northeast rift zone of Mauna Loa, within Hawaii Volcanoes National Park (USMC 2013). Typically found in heavily vegetated locations on steep slopes, this colony is accessible. Little is known about this elusive species and the discovery of the colony will help advance the scientific knowledge of the taxon.

### *Invertebrates*

There is one federally listed invertebrate, the Hawaiian yellow-faced bee (*Hylaeus anthracinus*). Typically a coastal species, an individual was collected at PTA in 2004. This collection may have been a vagrant (USFWS 2013). The precise locality is unknown, but was found in a fruit capsule of the endangered *Kadua coriacea. Kadua coriacea* typically occurs in open *Metrosideros* treeland, which is considered a poor habitat for the Hawaiian yellow-faced bee (Magnacca and King 2013). This taxon is found on rocky shorelines that is either landscaped or composed of alien vegetation and/or farther inland on bare rock. The presence of the species has not been confirmed at PTA, and therefore it is questionable whether a permanent breeding population exists at or near the installation.

A 1996 to 1998 arthropod study found at least 485 morphospecies of invertebrates at PTA (The Nature Conservancy of Hawaii 1998). In 2000-2001 another arthropod survey found over 500 morphospecies in Kipuka Alala. In 2004 (Gregor et al. 2001, Oboyski et al. 2002). Invertebrates are important pollinators for native plants. Observations are documented to understand associations.

# 3 SUPPORTING SUSTAINABILITY OF THE MILITARY MISSION AND THE NATURAL ENVIRONMENT

## 3.1 Integrate Military Mission and Sustainable Land Use

This INRMP supports the Army mission by identifying ways to conserve and enhance training lands on which the military's mission is dependent. It further describes impacts of the military mission on natural resources and vice versa. The successful implementation of this INRMP requires the support of natural resources personnel, installation staff, command personnel, and installation tenants. This document will be reviewed annually to update issues, goals, and actions; identify and resolve potential conflicts; and identify funding and resources as appropriate.

## 3.2 Sustainability Challenges

The integration of the military mission and effective land use practice is necessary for sustainable land use when resources are limited. Natural recovery is rarely an option due to time constraints, limited land extent, and non-renewable resources. Section 101(b)(1)(I) of the Sikes Act Improvement Act (SAIA) states that each INRMP will provide for "no net loss in capability of military installation lands to support the military mission of the installation" where appropriate and applicable. The statement, "where appropriate and applicable" recognizes that there are instances where resources will be lost. Effective planning and conservation measures are required for protecting future mission capabilities. Conservation compliance helps direct long-term efforts for resource sustainability. The biological setting is only one factor under the installation's command when determining land use. It becomes the responsibility of the NRO to understand the mission, to meet compliance requirements, and to effectively address conflicting issues. Involvement by land users and the land managers is a valuable mechanism for achieving a balance that supports the mission and resources.

PTA training and natural resources management communities share the goal of sustaining the landscape to accommodate continued training with minimizing and eliminating restrictions. Sustaining the natural landscapes ensures that resources not only sustain the mission, but allow troops to train in realistic conditions. This shared value is attainable through cooperation and collaboration. Open communication and information sharing is imperative. Several forums exist to facilitate coordination.

- The Command holds weekly staff meetings to present and review existing issues, providing opportunities to coordinate mission training exercises with natural resources. There are also monthly updates with the NRO that focus on natural resources issues.
- Regular interaction between NRO and ITAM personnel.
- Regular communications with Cultural Resources staff.
- Annual reports on natural resource activities are provided to the Command, Range Control, USFWS and other parties.

### 3.2.1 Range Complex Management Plan and Other Operational Area Plans

Integration is the sharing and utilization of information between disciplines, offices, directorates, and agencies. Four plans share environmental data and concerns: (1) the Range Complex Master Plan (in progress), (2) the ITAM Work Plan (updated annually), (3) the Integrated Cultural Resources Management Plan (as needed), and (4) the INRMP (as needed). This coordination helps to establish common installation goals and objectives as well as: (1) reduce duplication of efforts and maximize

critical resources, (2) site future ranges and avoid environmental or encroachment issues, and (3) identify problems areas and establish procedures and actions to avoid loss of valuable training lands.

## 3.3 Encroachment Management

The Department of Defense (DOD) uses the term "encroachment" to describe "the cumulative result of any and all outside influences that inhibit normal military training and testing" (Santicola 2006) and includes urban growth, interference with radio frequencies, air and noise pollution, interference with airspace, and endangered species habitat. Goals include (1) improve public support, (2) increase public awareness of current range management activities, (3) communicate training doctrine and philosophy, and (4) ensure consistency with broader Army and DoD efforts (Army Regulation 350-19). PTA works to identify encroachment challenges early and fosters means to mitigate and minimize the loss of training potential.

### 3.3.1 Palila Critical Habitat

Training follows established rules in the Palila Critical Habitat, such as not permitting live fire, limiting the number of artillery pieces to 24, the restriction not to burn or cut trees, establishing a maximum number of troops to bivouac at 500, restricting aircraft and limiting the number of helicopters to seven and not allowing pyrotechnics, simulators, and other munitions with ignition sources. With these and other restrictions, training areas in critical habitat are accessible and useable.

### 3.3.2 Encroachment Partnering

Much of PTA is bordered by lands owned by the State of Hawaii, Kamehameha Schools, and the Richard Smart Trust (Parker Ranch). These lands are undeveloped and some are used for ranching. The Keamuku Maneuver Area has placed training around three sides of a residential area (Waikii Ranch), and the redesign of Saddle Road (Hawaii Route 200) has established the Daniel K. Inouye Highway, effectively linking the western and eastern communities of the island.

The Waikii Ranch Homeowners Association and the Department of Army established a Memorandum of Agreement for the Implementation of an Intensive Fire Management Zone in the Proposed West PTA (PTA) Acquisition Area, 2006. The Memorandum of Agreement (MOA) establishes a one-mile buffer around the subdivision. Within the one-mile buffer:

- Tactical military vehicles will not operate.
- Foot troops have access up to 305 m (1,000 ft) of the boundary during the day and up to 610 m (2,000 ft) at night.
- No buildings or structures are allowed except to support fire suppression or grazing purposes.
- Firebreaks are to be constructed around the one-mile buffer.

### 3.3.3 Army Compatible Use Buffers

The U.S. Army Environmental Command (USAEC) provides program management and execution for the Army Compatible Use Buffer (ACUB) Program. Through the ACUB Program, the Army partners with public and private organizations to identify mutual objectives for land conservation. Under 10 USC 2864a, the Army may contribute funds to its partners to purchase easements or properties from willing landowners through a cooperative agreement. As USAG-HI's ACUB Program matures, biennial reviews are necessary for the government to review original assumptions, refine the need for protection, and re-prioritize across the program, as necessary (USAEC 2007).

ACUBs support the Army's mission to fight and win the nation's wars. Winning wars requires a trained and ready force. Trained and ready troops require land for maneuvers, live fire, testing and other operations. ACUBs establish buffer areas around Army installations to limit effects of encroachment and maximize land inside the installation that can be used to support the installation's mission.

ACUBs support the Army's responsibility as a federal agency to comply with all environmental regulations, including endangered species habitat protection. By working in partnership with conservation organizations, ACUBs can coordinate habitat conservation planning at the ecosystem level to ensure that greater benefits are realized towards species and habitat recovery.

ACUBs support local and regional planning and sustainability efforts by emphasizing partnerships with state and local governments and private conservation organizations to work towards common objectives and leveraging public and private funds towards those common goals.

Currently, there are no ACUBs associated with PTA.

## 3.4 Achieving No Net Loss

### 3.4.1 Encroachment Management

The Department of Defense (DoD) uses the term "encroachment" to describe "the cumulative result of any and all outside influences that inhibit normal military training and testing" (Santicola 2006). According to the DoD, the eight encroachment issues of concern are "urban growth around military installations" and training ranges, radio frequency interference, "air pollution [and] noise pollution," airspace interference, unexploded munitions, and "endangered species habitat and protected marine resources." The military identifies urban sprawl as the primary source of encroachment in the United States and believes it will continue to present the greatest challenge in the future; however, any and all outside influences that inhibit normal military training, testing, and operations is encroachment.

Much of the installation boundary is shared with State of Hawaii lands (68%, some of which is subleased, e.g., grazing) and the remainder is held by: Mauna Kea Recreational Area (county park), Hawaiian Homelands (2.9%), Kamehameha Schools (8.8%), multiple land owners northwest of Mamalahoa Highway (8.9%), and Waikii Ranch (subdivision, 8.9%). See Section 2.2. Regional Land Use. Unlike other installations, external encroachment is limited and the installation takes measures to minimize impacts to neighbors (e.g., a buffer around Waikii Ranch).

The goal of encroachment management is to optimize and maintain mission capable training resources while minimizing restrictions. This calls for:

- Intergovernmental regional planning
- Maintaining current holdings to minimize future/new encroachment issues (e.g., leases)
- Communication to abate conflicts with adjacent land holders/users (e.g., utilize the PTA Advisory Committee, interact with/inform local communities)
- Interagency consultation and partnerships (e.g., Endangered Species Act, critical habitat, etc.)
- Sustained excellence in environmental stewardship
- Address potential climate change impacts
- Continued assessment and analysis of encroachment issues

## 3.5 Natural Resources Consultation Requirements

### 3.5.1 Sikes Act Improvement Act

The SAIA requires that the INRMP be prepared, reviewed, and updated in coordination with the USFWS and the appropriate state fish and game agency, which is the Department of Land and Natural Resources (DLNR) in Hawaii. The resulting INRMP reflects the mutual agreement of USFWS, Hawaii DLNR, and PTA concerning the conservation, protection, and management of plant and wildlife resources as are applicable to their respective legal authority (i.e., SAIA, ESA). USFWS and Hawaii DLNR were invited to participate in the update of this INRMP.

### 3.5.2 Endangered Species Act

Section 7(a)(1) of the ESA states that all federal agencies, in consultation with USFWS and the NMFS, shall use their authorities to further the purpose of the act by carrying out programs for the conservation of endangered and threatened species. Section 7(a)(2) requires that federal agencies in consultation and assistance with USFWS or NMFS "insure that any action authorized, funded, or carried out . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species."

Further, DoD Instruction 4715.03 stipulates that procedures to comply with the ESA shall emphasize military mission requirements and interagency cooperation during consultation, species recovery planning, and management activities.

### 3.5.3 Endangered Species Act, as amended by the National Defense Authorization Act, 2004

The National Defense Authorization Act for Fiscal Year 2004 changed the ESA regarding INRMPs. Under Section 4(a)(3)(B)(i) of the act, the Secretary of Interior or the Secretary of Commerce, as appropriate, is precluded from designating critical habitat on any areas owned, controlled, or designated for use by the DoD where an INRMP has been developed that, as determined by the Secretary of Interior or Secretary of Commerce, provides a benefit to the species subject to critical habitat designation. In addition Section 4(b)(2) allows the Secretaries of Interior and/or Commerce to specifically preclude designation of critical habitat on military facilities if they conclude that the benefits of such designation are outweighed by the impact on national security, as long as such exclusion does not cause the extinction of a species.

As such, this INRMP addresses the benefits of management actions taken for federally listed species and their habitats. The following plan demonstrates management actions that (1) benefit these species so as to maintain or increase populations or to enhance or restore habitat, (2) provide certainty that the management plan will be implemented, and (3) measures will be taken to demonstrate that conservation efforts are effective (e.g., includes biological goals and objectives that are quantifiable through monitoring and will be reported).

### 3.5.4 Conservation of Migratory Birds

The MBTA controls the taking of birds, nests, eggs, as well as parts and products of species identified as migratory. Congress passed the National Defense Authorization Act (December 2002), which allows incidental take of migratory birds as a result of military readiness activities. This act was codified in 2010 (50 CFR 21.15 *Authorization to take incidental to military readiness activities*) and is known as the "Readiness Rule." This rule authorizes the take of migratory birds, incidental to military readiness activities, where there can be a significant adverse effect on a population. In these cases, the military is required to confer and cooperate with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate the significant adverse effects. The implemented conservation measures require monitoring. Information is reported to the USFWS during annual INRMP reviews and includes the effectiveness of the measures in avoiding, minimizing, or mitigating take of migratory birds. Authorization can be withdrawn or suspended if incidental take during a readiness activity is found incompatible with one or more migratory treaties.

The DoD and USFWS entered into an MOU in 2014 to promote the conservation of migratory bird populations while sustaining the use of military-managed lands and airspace in accordance with EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*). The intent of the MOU is to describe actions to be taken to advance migratory bird conservation, avoid or minimize bird take, and ensure DoD operations are consistent with the MBTA. The MOU describes how USFWS and DoD will work together to achieve these ends.

The MOU is based on the common interest to conserve and manage the nation's natural resources and views migratory birds as an important component in sustainable ecological systems in ways that do not conflict with or impede military training and testing. This requires (1) developing and implementing conservation that reduce take or enhance quality habitats, (2) identifying significant conservation sites on DoD-managed lands, (3) minimizing detrimental alterations to the environment, and (4) preventing the introduction and establishment of non-native species that may be harmful to native flora and fauna. Also identified is (1) engaging with landowners near or adjacent to military boundaries; (2) working on collaborative projects that inventory and monitor to assess the status and trends of bird populations, share information and develop conservation measures, form partnerships, and improve habitats; and (3) working cooperatively to identify, develop and utilize conservation measures.

Migratory bird management objectives should then be incorporated into relevant DoD planning documents such as INRMPs, Integrated Pest Management Plans (IPMPs), Installation Master Plans, NEPA analyses, and other relevant documents. The NEPA process is an appropriate mechanism to assess if ongoing or proposed military readiness activity is "likely to result in a significant adverse effect on the population of a migratory bird species," whether it is or is not a readiness action. If a significant adverse effect is identified, the installation will confer with USFWS to develop and implement appropriate conservation measures to minimize or mitigate any significant adverse effects. An MBTA scientific collection permit is required and must be applied for and received for scientific collecting, bird control on military lands, or any other activity that is addressed in current permit regulations.

### 3.5.5 Memorandum of Understanding (Department of Defense, U.S. Fish and Wildlife Service, and International Association of Fish and Wildlife Agencies)

The DoD, USFWS, and the International Association of Fish and Wildlife Agencies signed an MOU that helps manage natural resources on military installations under provisions of the SAIA. The MOU encourages the signatories to coordinate and discuss cooperative elements of the SAIA as well as to establish INRMP implementation teams.

### 3.5.6 Executive Order 13352, Facilitation of Cooperative Conservation

EO 13352 (August 2004) ensures the Departments of Interior, Agriculture, Commerce, and Defense, and the Environmental Protection Agency implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation, with an emphasis on appropriate inclusion of local participation in federal decision-making, in accordance with their respective agency missions, policies, and regulations.

## 3.6 National Environmental Policy Act Review

The NEPA review process requires federal agencies to consider the environmental consequences of proposed major federal actions. The premise of the act is that the decision-makers (project proponents) take a "hard look" at the environmental consequences of proposed actions (e.g., 32 CFR Part 651, *Environmental Analysis of Army Actions*). The project proponents then share this information with public officials and citizens and provide them the opportunity to participate in evaluating environmental factors and alternatives before a final decision is made. Types of actions that require NEPA review include construction, repair, remodeling activities, repair and maintenance of all range roads, the airfield, range and training area modifications and upgrades.

### 3.6.1 Levels of Documentation

The three common levels of evaluation are:

1. A Categorical Exclusion (CATEX or CX) where the Army has determined that proposed actions do not "individually or cumulatively have a significant effect on the human environment" and

neither an Environmental Assessment (EA) nor Environmental Impact Statement (EIS) is needed (40 CFR 1508.4). Certain CXs require a Record of Environmental Consideration (REC). A REC is a statement that briefly describes the proposed action and timeframe, identifies the proponent, and clearly shows how the proposed actions qualifies for a CX or is already covered by an existing EA or EIS. A CX is intended to reduce paperwork and to eliminate delays where an action has no significant impact.

2. An EA is appropriate when a CATEX does not apply to a proposed action. An EA determines whether or not a federal action has the potential to cause a significant environmental effect.
3. An Environmental Impact Statement (EIS) is necessary if a proposed major federal action is determined to significantly affect the quality of the human environment.

Two other categories include: (1) exemptions by law when an "agency's operations expressly prohibits or makes compliance impossible" (40 CFR 1500.6 *Agency authority*), and (2) emergencies when the Army needs to take immediate actions that may have environmental impacts (40 CFR 1506.11 *Emergencies*).

Twice a month the Hawaii Office of Environmental Quality Control publishes *The Environmental Notice*, which announces the availability of EAs and EISs under environmental review (http://health.hawaii.gov/oeqc/). This site also hosts a library of past NEPA documents. RECs are published in the Federal Register.

### 3.6.2 Army Regulations 200-1 and 200-2

AR 200-1, *Environmental Protection and Enhancement*, implements federal, state, and local environmental laws and DOD policies for preserving, conserving, and restoring the quality of the environment. Published 13 December 2007, AR 200-1 is a major revision to the February 1997 document. The document incorporates policy and related requirements from AR 200-3, AR 200-4, and AR 200-5. This revised regulation addresses changes to the DA's organization, implements applicable portions of DoD Instructions and Directives, and revises terminology to clarify mandatory and desirable activities. Program requirements for INRMPs are addressed in Section 4.3 d. (1) *Integrated Natural Resources Management*. This section addresses current policies, responsibilities, and procedures relating to natural resources management that may be included in an installation's INRMP.

AR 200-2, *Environmental Analysis of Army Actions*, dated March 29, 2002 (32 CFR Part 651), dictates policies, responsibilities, and procedures for integrating environmental considerations into Army planning and decision-making. It implements the Council of Environmental Quality's NEPA regulations and directs installations to integrate environmental analysis as much as practicable with other environmental reviews, laws, directives, and EOs. This regulation requires that INRMPs be evaluated for environmental impacts (Section 651.10 (b) of AR 200-2).

## 3.7 Consultation Requirements

### 3.7.1 Hawaii's Comprehensive Wildlife Conservation Strategy

Hawaii's Comprehensive Wildlife Conservation Strategy outlines a statewide strategy for native wildlife conservation (DLNR 2005). The strategy reviews the status of the state's native terrestrial and aquatic species and presents methods for long-term conservation and is currently under revision. Seven threats were identified in the initial strategy and include:

- Loss and degradation of habitat resulting from human development, alteration of hydrology, wildfire, invasive species, recreational overuse, natural disaster, and climate change.
- Introduced invasive species (e.g., habitat-modifiers, including weeds, ungulates, algae and corals, predators, competitors, disease carriers, and disease).
- Limited species information and insufficient information management.

- Uneven compliance with existing conservation laws, rules and regulations.
- Overharvest and excessive extractive use.
- Management constraints.
- Inadequate funding to implement needed conservation actions.

The intent of the *Comprehensive Wildlife Conservation Strategy* (2005) is to address these threats by taking the following seven steps:

- Maintain, protect, manage, and restore native species and habitats in sufficient quantity and quality to allow native species to thrive.
- Combat invasive species through a three-tiered approach combining prevention and interdiction, early detection and rapid response, and ongoing control or eradication.
- Develop and implement programs to obtain, manage, and disseminate information needed to guide conservation management and recovery programs.
- Strengthen existing and create new partnerships and cooperative efforts.
- Expand and strengthen outreach and education to improve understanding of our native wildlife resources among the people of Hawaii.
- Support policy changes aimed at improving and protecting native species and habitats.
- Enhance funding opportunities to implement needed conservation actions.

The PTA INRMP is referenced in the Strategy as an existing management plan and tool. The use of exclosures and "intensive management areas" are noted along with ongoing monitoring and fire prevention and control. The Strategy identifies the need to assess possible impacts by the Stryker on current natural resources management activities as a future need. (Note there are no longer Strykers at PTA.) A second reference in the Strategy documents the cooperative efforts of the U.S. Army, DLNR and the Hawaii Department of Forestry and Wildlife at the Mauna Loa Forest Reserve. Collectively, these agencies work to (1) identify more proactive predator control to protect nesting seabirds, (2) prevent fire, (3) fence areas where plant communities are rare or largely intact, and (4) research rare invertebrates, which includes determining limiting factors and conservation actions that could enhance populations.

The NRO staff includes many of the approaches and methods outlined in the Comprehensive Wildlife Conservation Strategy in its operations as outlined in the INRMP with the intent of engaging a range of audiences and groups, garnering information, and building support for its programs. These elements are accomplished by (1) public participation and education; (2) participation by resource managers in collaborative efforts; (3) identifying species requiring the greatest conservation needs and their habitats; (4) identifying threats, conservation objectives, research needs, establishing monitoring programs; (5) utilizing maps and geographic information systems collaborative; and (6) reviewing plans and encouraging public input.

## 3.8 Beneficial Partnerships and Collaborative Resource Planning

### 3.8.1 Outside Relationships

PTA has developed relationships with the Hawaiian Hoary Bat Research Cooperative; Department of Lands and Natural Resources (DLNR), Division of Forestry and Wildlife; and Big Island Game Bird Hunters. Other interested parties are discussed in Section 1.5.2. and include the U.S. Forest Service, National Park Service, USFWS-Hawaiian Goose Conservation Program and rodenticide field trails, U.S. Geological Survey – Biological Resource Discipline, Hawaii Conservation Alliance, Hawaii Biodiversity

and Mapping Program, Hawaii Seed Bank Partnership, Nene (Hawaiian Goose) Working Group, Mauna Kea Watershed Group, Three Mountain Alliance, Big Island Rare Plant Working Group, Dryland Forest Working Group, University of Hawaii (Hilo and Manoa), and Colorado State University. These associations provide working avenues for communication, exchange of information, and collaboration.

### 3.8.2 Collaborative Resource Planning

Informal and formal consultations with the USFWS are collaborative efforts to maximize training while protecting resources. An example is the hunting program that has been revitalized to support wildlife management and build a stronger relationship between the installation and the DLNR Division of Forestry and Wildlife.

## 3.9 Public Access and Outreach

"The principal purpose of DoD lands and waters is to support mission-related activities. Those lands and waters shall be made available to the public for educational or recreational use of natural and cultural resources when such access is compatible with military mission activities, ecosystem sustainability, and other considerations such as security, safety, and fiscal soundness. Opportunities for such access shall be equitably and impartially allocated" (DoDI 4715.03). "Hunting, Fishing, and Trapping provide for controlled recreational access where feasible at Army installations containing land and water areas suitable for recreational use" (AR 200-1).

Public access is a tradition at PTA, which has been open to the public for hunting and other limited recreational uses for more than 50 years. In maintaining a policy of public access, PTA relies on a responsible public to adhere to restrictions placed on range access.

Public access for outdoor recreational activities and the harvest of game mammals and birds is permitted when compatible with environmental conditions or restrictions and the objectives of sustained multiple use and the continued accomplishment of the military's mission. All activities must comply with state, federal, and U.S. Army statutes and regulations and is controlled by the Garrison Commander (USAG-P 2016).

All hunters must possess or obtain a valid state of Hawaii hunting license including appropriate stamps, create a profile in iSportsman, and secure appropriate validations (e.g., criminal background check, complete an online safety briefing, firearms registration, and if appropriate, Disabled Hunter Validation). Firearms are registered with the installation. Online iSportman features are used for check-in and check-out. Hunters and other recreationists must sign a "hold-harmless" agreement, to limit Army liability on Army lands.

PTA has supported various outdoor recreational activities (e.g., motocross races, hunting, mountain bike races, archery, bird dog training, etc.). Activities that are found to be consistent with use of lands and do not conflict with the military mission are considered by the Command. The hunting program and other public uses are presented in detail in Chapter 4.

# 4 PROGRAM ELEMENTS

This chapter presents information based on the overall structure of PTA's NRO. Five management sections are in place for the execution of projects: botanical, invasive plants, wildlife, and ecological data, along with administrative.

PTA[5] does not meet the environmental and physical conditions to support wetlands or agriculture. While there are open, sparse tree stands, there are no specific forestry actions (e.g., timber harvest). Forested areas are treated as an important ecosystem. Forested areas are managed as part of the Botanical or Wildlife programs as an invaluable habitat for the Hawaiian hoary bat and for native birds, such as Apapane (*Himatione sanguinea*), Amakihi, (*Chlorodrepanis virens*), and Omao (*Myadestes obscurus*).

## 4.1 Species Management

### 4.1.1 Policy and Background

There are three acts that provide the principal focus of the PTA NRO's program: the ESA, the SAIA, and the MBTA. These acts provide the programmatic structure of the PTA Natural Resources Program.

#### *Endangered Species Act and Section 7 Consultation*

The ESA, SAIA, DoD Instruction 4715.03 (*Environmental Conservation*) and AR 200-1 (*Environmental Quality, Environmental Protection and Enhancement*) mandate the management of threatened and endangered species on military lands. PTA supports 19 federally listed endangered plants species, along with one threatened species. Also present are one endangered mammal and four endangered bird species, and one endangered insect. The installation works to maintain habitat quality in the Palila Critical Habitat.

Much of the installation's Natural Resources Program is an effort to comply with the ESA. Implementing conservation and management activities for federally listed species benefits the installation's ecosystems and associated plants and animals.

- 23 December 2003 Biological Opinion of the U.S. Fish and Wildlife Service for *Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Military Installations, Island of Hawaii* (1-2-2003-F-002)
- 12 December 2008 Reinitiation for Formal Section 7 Consultation for *Additional Species and New Training Actions at PTA, Hawaii* (2008-F-278)
- 11 January 2013 Informal Consultation and Formal Consultation with a Biological Opinion for *Construction, Maintenance, and Operation of an Infantry Platoon Battle Area and Installation-Wide Impacts of Military Training on Hawaiian Geese (Branta sandvicensis) at PTA, Hawaii* (2012-F-0241)

The 2003 biological opinion addresses impacts associated with the Legacy and Transformation military missions and training activities at PTA. The species covered in the opinion include 15 plant taxa—*Asplenium peruvianum* var. *insulare*, *Haplostachys haplostachya*, *Kadua coriacea*, *Isodendrion hosakae*, *Melanthera venosa*, *Neraudia ovata* (maaloa), *Portulaca sclerocarpa*, *Silene hawaiiensis*, *Silene lanceolata*, *Solanum incompletum*, *Spermolepis hawaiiensis* (Hawaii parsley), *Stenogyne angustifolia*, *Tetramolopium arenarium* var. *arenarium*[6](Maui tetramolopium), *Vigna o-wahuensis*, *Zanthoxylum*

[5]"Pohakuloa Training Area" refers to Pohakuloa proper and the Keamuku Maneuver Area. U.S. Army Garrison—Pohakuloa refers to the administrative responsibilities of the Installation Management Command (IMCOM).
[6] *Tetramolopium arenarium* ssp. *arenarium* var. *arenarium* will be referred to as *Tetramolopium arenarium* var. *arenarium* throughout the remainder of this document.

*hawaiiense*; one mammal—Hawaiian hoary bat; and the designated critical habitat for the Palila. The biological opinion required additional surveys to determine the status and abundance of the Hawaiian goose, Hawaiian petrel (*Pterodroma sandwichensis*), and Hawaiian hawk on the installation.

A series of species specific conservation measures were established to reduce the overall project impacts associated with Legacy and SBCT transformation training and construction activities (USFWS 2003). Some of the more general measures included:

- Construction of fence units to minimize threats by feral animals on federally listed plants, and indirectly enhance Hawaiian hoary bat habitat.
- Institution of training restrictions and requirements including restriction of artillery training to established firing points and ranges, off-road maneuver in designated areas, survey and approval of new field bivouac sites by the NRO staff; measures to reduce dust, inspections for invasive species at construction sites, restriction of smoking to particular areas when training and in when training at specific locations (e.g., Palila Critical Habitat), and reporting all bird and bat strikes.
- Execute biological studies such as those on the effects of dust on federally listed plants and native habitats; surveys for species presence, abundance, and habitat use by the Hawaiian petrel[7], Hawaiian hawk, and Hawaiian goose; surveys to determine species abundance and habitat use of the Hawaiian hoary bat; and impact of rodents on *Sophora chrysophylla*.
- Survey of gulches and gullies in KMA, along with the collection of seed from federally listed species.
- Changes to the Wildland Fire Management Plan to address the establishment of fire/fuel breaks and fuels monitoring corridors, fire suppression measures, and implementation of the Fire Danger Rating System.
- Invasive plant and animal species control within and adjacent to landing zones, trails, and roadsides; removal of invasive species from vehicles prior to transport; and the implementation of an education program on the consequence of invasive species on installation properties.
- Creation and maintenance of a buffer outside Palila Critical Habitat Area B to reduce and understand the impacts of Stryker off-road maneuvers.

In 2008, the Army reinitiated section 7 consultation of the 2003 biological opinion with the USFWS (USAG-HI 2008b). The consultation addressed (1) Hawaiian goose nests located in KMA and the seasonal visitation of the species at Range 1, (2) fencing requirements for additional locations of *Silene hawaiiensis* and caves suitable for *Asplenium peruvianum* var. *insulare* in TA 21, (3) new locations of *Solanum incompletum* east of Kipuka Road, and (4) use of Puu Omaokoili in the Palila Critical Habitat for helicopter pinnacle training.

A number of nondiscretionary measures were presented to the Army by the USFWS and included:

- Annual reporting on Hawaiian goose research, conservation measures, and use of Range 1 as presented in the 2008 biological assessment (USAG-HI 2008b) and 2008 biological opinion (USFWS 2008a).
- Reporting on the application and success of conservation measures for *Silene hawaiiensis*, *Asplenium peruvianum* var. *insulare*, and *Solanum incompletum* as outlined in the 2003 and 2008 biological opinions and biological assessments (USAG-HI 2008b and USACOE 2003).

[7] NRO convention is to use scientific names when referencing plants and common names for wildlife.

- Developing a Hawaiian goose monitoring protocol.
- Minimizing impacts to the Hawaiian goose from training on PTA.
- Reporting and transferring dead Hawaiian geese and Hawaiian hoary bats.
- Removing of barbed wire from fences to protect the Hawaiian hoary bat.
- Fencing and removing of ungulates from Training Area 21, and fencing to protect *Solanum incompletum*.

A third consultation led to the 2013 biological opinion with the proposed development of the Infantry IPBA to the west of the impact area. Addressed were military training impacts installation-wide to the Hawaiian goose. The noted requirements from the previous two biological opinions were still in effect with the exception of the Hawaiian hawk and the Hawaiian goose. The Army was no longer required to survey for the Hawaiian hawk, and additional data collection on the Hawaiian goose was required in the impact area.

Conservation actions presented to the Army by the USFWS were for *Asplenium peruvianum* var. *insulare* (a, b, c), *Kadua coriacea* (d, e), *Silene hawaiiensis* (d, e), *Spermolepis hawaiiensis* (f, c), and *Zanthoxylum hawaiiense* (g, c) in the UXO cleared area in the IPBA. The letters refer to the species-specific actions below:

a. If an individual is found within the UXO cleared area, the Army would compensate for the loss of the individual by collecting genetic material prior to construction, attempting propagation, out-planting, and maintenance to reproductive maturity.

b. Outplanted individuals would be in a fenced, ungulate-free area with supplemental water and weed control as necessary.

c. After relocation outside of the UXO cleared area, individuals would receive the same consideration for compensation as its potential loss.

d. Collection of viable seeds and the making of cuttings (as many as possible) from plants within the UXO cleared portions of the IPBC. Cuttings would be propagated in the Pohakuloa Rare Plant Facility and seeds would be collected once cuttings produce flowers.

e. Established plants would be outplanted and outplants would number at least as many plants as were removed from the UXO cleared portions of the IPBC.

f. Representative seeds from plants in the UXO cleared area would be hand broadcasted over a comparable area that is fenced and ungulate free.

g. Collection of available and realistically accessible pollen from males and seed from females from all individuals in the UXO cleared portions of the IPBC would be made. This genetic material would be used if possible to propagate additional individuals via outcrossing to reproductive maturity for at least as many plants as were present in the UXO cleared area pre-IPBA. Up to 15 out-plants would be fenced in ungulate-free areas as well as watered and weeded as necessary.

Hawaiian Goose—

- Unit leaders are to be briefed to avoid and minimize impacts and inform troops of their responsibility to protect the Hawaiian goose on PTA, especially when driving and during live-fire exercises.
- The Army may benefit the Hawaiian goose by funding an off-site project at Hakalau Forest National Wildlife Refuge, as recommended in the 2013 Biological Opinion in a phased approach as the Refuge allows/permits work to progress. The project may include the construction and maintenance of two 20-acre predator-proof fences as well as personnel (one full-time equivalent) to maintain the fences, control predators, improve vegetation, and encourage the use of the fenced areas by the Hawaiian goose both passively and aggressively. The goal is to produce 21 adults from 26 fledglings per year over a 20-year period starting by year five.

#### *Sikes Act*

The SAIA (16 USC 670a-670o) was enacted to provide a mechanism for the cooperation among the Department of Interior the DoD, and state agencies in the planning, development, and maintenance of fish and wildlife resources on military lands in the United States. The intent is to enhance and protect fish, wildlife, and other natural resources, while military operations needs continue to be met. The principal tool for achieving conservation goals is the INRMP. An INRMP is completed by the installation and is executed in cooperation with the USFWS and the appropriate state fish and game agency (Hawaii DLNR) for the proper consideration of fish, wildlife and habitat needs to include regional biodiversity, wildlife and habitat assessments and surveys, invasive species control, land management, enforcement of applicable natural resources laws (including regulations), hunting program management, and the no net loss in the capability of military installations lands to support the military mission.

#### *Migratory Bird Treaty Act*

Eight native and six non-native bird species are protected by the MBTA and EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*, 10 January 2001) on PTA. Historically, an additional five native bird species have been documented on the installation.

The MBTA decreed that all migratory birds and their parts (including eggs, nests, and feathers) are fully protected. The act is a domestic law that affirms and implements the U.S. commitment to four international conventions for the protection of a shared migratory bird resource.

The SAIA was amended 19 December 2014 (P.L. 113-291) and states that INRMP's are authorized to carry out programs for the "conservation, restoration and management of migratory game birds on military installations."

### 4.1.2 Management Approach

The PTA INRMP works to balance military readiness and natural resources conservation. The overarching goals of this INRMP are to:

1. Provide a comprehensive plan for the management of all natural resources while providing support for USARPAC training, fulfill PTA goals and vision, and meeting environmental compliance standards.

2. Provide conservation benefits to species through enhancement and restoration of habitat and the multi-purpose use of resources (e.g., hunting, public access, military mission).

3. Establish biological goals and measurable objectives that demonstrate achievements and support management decisions.

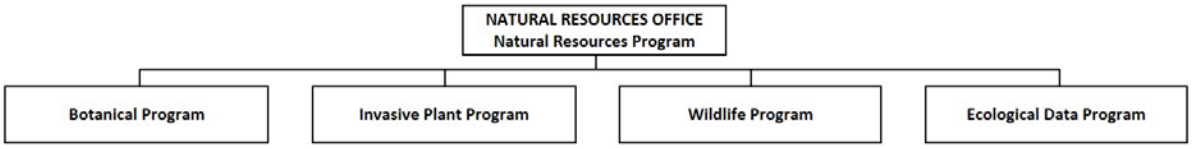


Figure 4-1 Natural Resources Office Program Components.

4. Ensure installation lands remain available and are sustained for the military mission (i.e., no net loss in the capability of installation land's supporting the military mission).
5. Enhance and develop relationships with state, county, and civic organizations.
6. Seek mutual agreement with the USFWS and the DLNR with respect to applicable legal authorities concerning the conservation, protection, and management of resources and to provide information for annual program review.

The PTA NRO consists of four Natural Resources Program areas—Botanical, Invasive Plants, Wildlife, and Ecological Data. A number of related subprograms/sections fall under most of these headings (Figure 4-1). Each section has its own program goals and objectives for meeting regulatory mandates as well as specific protocols and SOPs. Also part of the program is an administrative program that provides centralized administrative support for all programs. The primary function is to execute administrative requirements for personnel, procurement, vehicles, environmental compliance, and safety.

The following discussion is adapted from the PTA NRO Program Plan (USAG-P 2016) and the NRO Biennial Report, PTA, Island of Hawaii (USAG-P 2014).

### 4.1.3 Botanical Program

Nineteen federally listed endangered plant species and one federally listed threatened plant species are present on PTA, along with one undescribed plant species that, due to its rarity and limited distribution, is managed like a federally listed species**.** These species differ in abundance and distribution and, as such, management needs are prioritized from greatest (1) to limited (3) assistance (Table 4-1).

Table 4-1. Federally listed Endangered (E) and Threatened (T) Plant Species by Priority Levels at Pohakuloa Training Area, Hawaii.

| | |
|---|---|
| ***Priority 1*** | |
| *Isodendrion hosakae* (E) | *Schiedea hawaiiensis* (E) |
| *Kadua coriacea* (E) | *Solanum incompletum* (E) |
| *Melanthera venosa* (E) | *Tetramolopium arenarium var. arenarium* (E) |
| *Neraudia ovata* (E) | *Vigna o-wahuensis* (E) |
| *Portulaca sclerocarpa* (E) | *Sicyos macrophyllus* (E) |
| *Portulaca villosa* (E) | |
| ***Priority 2*** | |
| *Asplenium peruvianum var. insulare* (E) | *Zanthoxylum hawaiiense* (E) |
| ***Priority 3*** | |
| *Exocarpos menziesii* (E) | *Silene hawaiiensis* (T) |
| *Festuca hawaiiensis* (E) | *Spermolepis hawaiiensis* (E) |
| *Silene lanceolata* (E) | |
| *Haplostachys haplostachya* (E) | *Stenogyne angustifolia* (E) |
| ***Priority Undetermined*** | |
| *Tetramolopium* sp.1 (undescribed) | |

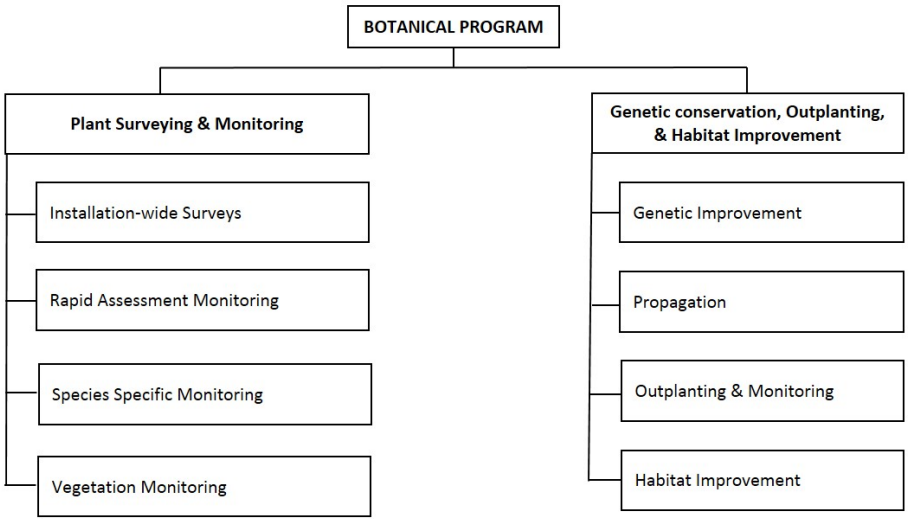


Figure 4-2. Structure of the Botanical Program in the Natural Resources Office at Pohakuloa Training Area, Hawaii.

Federally listed plant species management falls under two sections within the Botanical Program: (1) Plant Survey and Monitoring and (2) Genetic Conservation, Outplanting, and Habitat Improvement (Figure 4-2). Each section has a specific regulatory focus that dictates goals and objectives, which in turn drive the management actions for each section.

#### 4.1.3.1 Policy and Background

Botanical management at PTA provides for plant populations and their habitats consistent with accepted scientific principles, the ESA, and other applicable laws and regulations. AR 200-1 requires 100% inventory of suitable habitat for listed and proposed species that may occur on an installation to effectively balance mission and conservation requirements.

***Planning Level Surveys*** are an initial step to understanding the floral resources present on an installation. AR 200-1 advises that planning level survey information be current and reviewed and updated if necessary prior to an INRMP's revision. DoD Instruction 4715.03, *Environmental Conservation Program* (18 March 2011), suggests that installation-wide surveys be conducted for federally listed and keystone species. Department of Army memorandum, *Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys and Integrated Natural Resources Management Plan* (21 March 1997) further states "an installation-wide vascular plant survey produce a list of plant(s)." Lists of federally listed and keystone species are available from the Hawaii Biodiversity & Mapping Program and Hawaii's DLNR, Comprehensive Wildlife Conservation Strategy (2005). These data provide support materials for NEPA and other documents.

***Vegetation Mapping*** assists vegetation management by using remotely sensed data to define community or plant characteristics and then using that information to locate potential locations for new populations or potential habitats. AR 200-1 requires the distribution and extent of dominant and co-dominate plant communities (alliances) be mapped and supported by field data. In 2013, a new map, including KMA, was produced (Block et al. 2013). Plant communities were delineated using aerial photographs.

Accuracy was validated through field reconnaissance and found to be 96% accurate. The map is consistent with standards established by the National Vegetation Classification System. The process followed that of the National Park Service and is directly comparable with the ecological classification work at Hawaii Volcanoes National Park. The new map reflects extensive changes in the vegetation since

the original map was prepared (Shaw and Castillo 1997) as the result of a number of large fires, prolonged drought, and the increasing presence of invasive species (Block et al. 2013). New technologies and the re-application of existing technologies (e.g., unmanned aerial vehicles) could be used to address vegetation questions in the future.

***Floristic Surveys*** were conducted during the 1997 mapping project (Shaw and Castillo 1997), in KMA (Arnette 2002b) and during the large-scale fence surveys. The 2010-2014 INRMP reported 193 taxa on the installation. An installation-wide survey (2011-2015) determined the number of taxa was 333.

***Permits*** are held from the USFWS and the State of Hawaii. The USFWS, section 10(a)(1)(A) recovery permit allows the Army to collect seeds, inflorescences, spores, fruits, cuttings, and leaves from listed plant species found on PTA. Collection material is for propagation and genetic storage. This permit also authorizes the transfer of permitted species to other agencies working toward species conservation. The State permit falls under the authority of Hawaii Administrative Rules §13-104, §13-107, §13-124, and Hawaii Revised Statue §195D.

#### 4.1.3.2 Management and Execution

The NRO manages a limited number of factors to promote natural recruitment, growth, and proliferation. This includes the fuels management, ungulate control, invasive plant control, and localized habitat enhancement. Management actions include plant survey and monitoring and genetic conservation.

##### *Plant Survey and Monitoring*

The Plant Survey and Monitoring Section conducts management actions for natural occurrences of federally listed plant species in accordance with the 2003 Biological Opinion to delimit species' distributions, document abundance, monitor vegetation in threatened and endangered federally listed species habitats, and monitor emerging threats. The Plant Survey and Monitoring Section is divided into four project areas: (1) installation-wide surveys, (2) rapid-assessment monitoring, (3) federally listed species monitoring, and (4) vegetation monitoring.

The overall operational goals of the Plant Survey and Monitoring Section are to (USAG-P 2016):

- Survey large-scale fence units on a five-year cycle to provide information relevant for military training, regulatory compliance, and resource management.
- Designate Areas of Species Recovery (ASR) for focus management so species have high potential for survival and natural recruitment.
- Assess federally listed plant species status throughout each species' distribution.
- Monitor selected federally listed species to guide management.
- Provide short-term protection of federally listed plant species directly impacted by military construction projects.
- Assess native, non-native, and invasive species response to management actions.

***Installation-wide Surveys—***The intent is to systematically and comprehensively survey for federally listed and common plants, thereby providing the information needed to execute future program direction and management within the fence units. These surveys assess the impacts of previous program actions and determine benefits. As an example, with the removal of ungulates, the effect on plant regeneration can be assessed. The goal is to conduct surveys in specific areas on a five-year cycle and determine if management actions should continue or be adjusted. This survey method documents federally listed plant locations. At the conclusion of 2015, all fence units had been surveyed, providing an unprecedented level of detail and information.

IWS are planning level surveys in that they are the basis for subsequent prioritization of management actions. The fact that surveys will be repeated on a five-year cycle reflects the dynamics of the system and will help assess changes in species abundance and distribution.

IWS information helps prioritize management actions, including identifying ***Areas of Species Recovery (ASR).*** ASRs are a management tool that focuses on supporting the greatest potential for species survival and natural recruitment. An ASR is established as a 100-m (328-ft) radius around federally listed plants, with the goal of improving the surrounding habitat to allow species to increase in abundance and distribution. Islands of improved habitat are the management goal. To be identified as an ASR, the area has to have high natural resource value for federally listed plant species. Threats to listed species present are assessed. *Priority Levels* are based on threats and sensitivities. Ranking prioritizes the importance of an action relative to an individual taxon and assists with the execution of tasks (1=high priority to 3=low priority), and areas are prioritized for various management actions. Ranking is a guide and not an absolute management directive. Species with the fewest individuals or those who show poor recruitment receive greater attention. A species may have divergent ranks based on specific criteria; such as *Silene lanceolata* is ranked Priority Level 3 for seed collection and Priority Level 2 for weed control.

***Rapid Assessment Monitoring (RAM)—***This monitoring is a less intensive assessment than is conducted in the ASRs. Executed quarterly, RAM is intended to detect emerging threats, document abundance and distribution, and provide basic life history information (e.g., phenology). There are approximately 420 plots focused on the highest priority species. Additional plots will be emplaced for lower priority species with greater abundance and/or distribution. Monitoring provides the opportunity for responsive management actions. As an example, monitoring has documented an increase in recruitment/visibility for some species has occurred with ungulate removal. This, in turn, reduces the need for other management activities (e.g., rodent control).

***Species-Specific Monitoring—***As specific questions for individual species arise, species-specific monitoring will occur for the effective management of federally listed species. The goal of species-specific monitoring is to selectively monitor federally listed species to improve management efficacy. A protocol is tailored to the species and is dependent on the information needed, such as developing targeted monitoring questions, addressing life history characteristics, factors limiting recruitment, impacts from other life forms (e.g., non-native invertebrates, birds, or mammals).

***Vegetation Monitoring—***Vegetation monitoring takes place in the conservation fence units to track changes in habitat condition over time and to determine if areas are moving toward the desired end-state. It is the shift in the relationship between native and invasive species that is used to assess habitat improvement and to infer the stability of the federally listed species present.

### *Genetic Conservation, Outplanting, and Habitat Improvement Section*

The collection and preservation of plant propagules (seeds, spores) and greenhouse maintained plants from natural federally listed species populations are safeguards against unexpected loss and provide materials for outplanting and research. The intent is to protect species against extinction should a catastrophic event occur that threatens natural populations. The level of effort of seed collecting, propagation, and outplanting is dependent on the individual species and takes into consideration the inherent variability among mature plants as well as seeds and the influence of environmental factors. To obtain the best genetic representation, NRO staff collect materials during multiple sampling periods, at various intervals, targeting a subset of plants within a population. Staff prioritizes collections according to a species population numbers, the level of natural recruitment, and current representation in storage. Seeds are stored based on their known or determined longevity. For those species with limited information, seeds are replaced on a 3-5 year cycle to ensure viability.

The overall operational goals of the Genetic Conservation, Outplanting and Habitat Improvement Section are to:

- Increase species distribution and abundance of listed plant species through outplanting on PTA.
- Improve habitat for listed species.
- Maintain an inventory and a list of species available for other agencies.
- Maintain the Rare Plant Propagation Facility in sound working order.
- Maintain founders/genetic material in the Rare Plant Propagation Facility for collection of seeds, spores, or cuttings.
- Collect propagules from natural locations for propagation and use at outplanting sites and for outside agencies and researchers.
- Propagate federally listed plant species for outplanting or transfer to other agencies/organizations and researchers.
- Assess the status of outplanted occurrences of listed on an annual or other appropriate recurring cycle.
- Determine germination/propagation requirements for federally listed species.
- Propagate common native species to be used for habitat improvement.
- Provide forage plants for federally listed species.
- Preserve genetic variability (e.g., propagules, vegetative propagation) from species directly impacted by military construction.

***Genetic Conservation—***The goal of this project is to maintain an *ex situ* collection of genetic material for each federally listed species. Seeds are collected from all known plants on the installation when the number of plants is limited or a subsample made when 50 or more plants are present in a population unit. Seed collection and storage are ongoing efforts, along with refining propagation and seed storage protocols. Currently collected seed are refrigerated with moderated humidity. This practice will change as seed biology is better understood and species characteristics differentiated. Seeds are catalogued by species, collection date, collection location, and founders (i.e., a wild individual from which seeds are collected or cuttings are made). Seeds are collected from multiple individuals from various populations throughout the course of a year for a number of years. Living collections are another seed source. Seeds are replaced on a three to five year cycle to ensure viability. Seeds are provided to a number of conservation agencies to facilitate work on these species by agencies other than the Army. Species-specific germination regimes are documented and compared with those from other conservation agencies.

***Propagation Project—*** Techniques have been and continue to be developed for the propagation and growth of the listed plants present on PTA. Plants are grown for outplanting and for transfer to other agencies. Priority species propagation goals are addressed first. In some cases, genetic material is maintained vegetatively when threats to the persistence of the species is high (e.g., *Melanthera venosa*) or seed germination is poor (e.g., *Haplostachys haplostachya*).

In 1997, Natural Resources and Public Works personnel constructed a 9.75 x 18.29 m (32 x 60 ft) Rare Plant Propagation Facility (a type of greenhouse), rated to withstand winds up to 90 miles per hour. This facility has automatic climate controls and was completed in July 1998. This facility is the location for seed germination, propagation, and growth before transplanting individuals into the field.

***Outplanting and Monitoring—***The goal of outplanting is to increase listed species' abundance and distribution in their known historic ranges as required by the 2003 and 2013 Biological Opinions. Outplanted groupings are monitored annually for success. Suitable sites are locations where 50% or more of the plants survive and at least 50% healthy vigor is achieved. At this time, 15 outplanting sites have been established on PTA and 5 sites are on State lands off the installation. These sites represent a variety

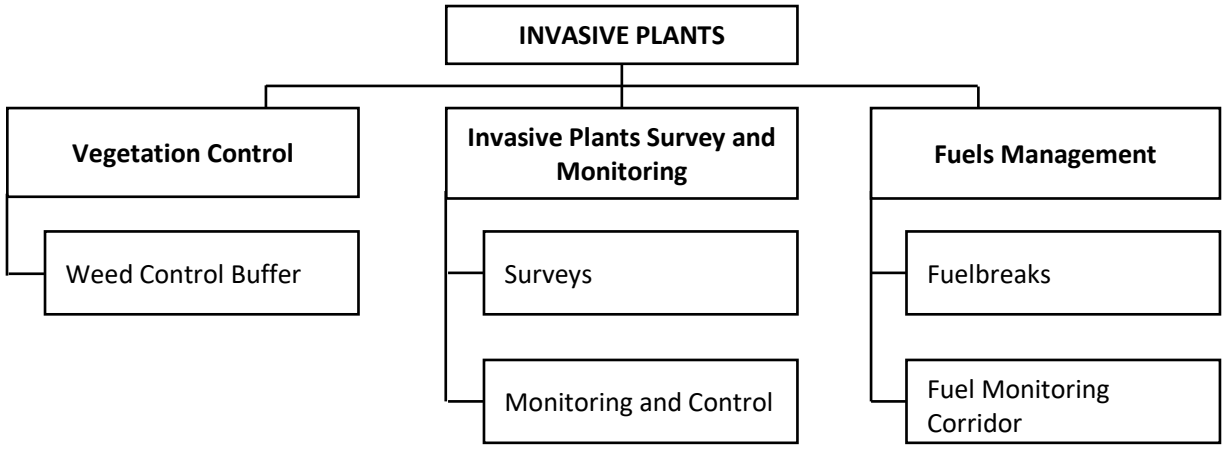


Figure 4-3. Structure of the Invasive Plants Program in the Natural Resources Office at Pohakuloa Training Area, Hawaii.

of elevations, substrates, moisture regimes, and community types. In 2016, The NRO management decided to de-emphasize the use of additional State lands and to focus on PTA assets.

***Habitat Improvement Project—***The intent of habitat improvement is to provide a community structure that supports the persistence and/or recovery of listed plant and animal species. An effective habitat is one that facilitates natural recruitment of native and listed plant species and/or provides forage and community structure for listed and native animals. Management (e.g., weed control, insect and fungal control, etc.) is provided on a case-by-case basis.

### 4.1.4 Invasive Plants Program

The goal of the Invasive Plants Program (IPP) is to aid the recovery and continuance of federally listed species by reducing impacts from invasive plants to listed species and their habitats. Areas around federally listed plants are managed to reduce invasive plant competition, fine fuels in fire-prone habitats, and aids in recovery of native plant communities. Ultimately, an effective weed control program identifies primary and secondary target weeds, reduces fuels, and increases resources for native plant.

The IPP consists of three sections: (1) Vegetation Control, (2) Invasive Plants Survey and Monitoring, and (3) Fuels Management (Figure 4-3). All of these areas provide support to the federally listed species programs (botanical, wildlife). The principal function of the IPP is to protect federally listed species and their habitats from habitat modification/degradation due to competition from invasive plants, wildfires, and subsequent changes in fire regime. Program staff develop and implement management actions to address established and incipient invasive plants and fuels to meet conservation compliance objectives described in the biological opinions (USFWS 2003, 2008, 2013) issued to PTA by the USFWS.

#### 4.1.4.1 Policy and Background

EO 13112 (*Invasive Species*, 3 February 1999) requires all federal agencies to prevent the introduction of invasive species, provide control, and to minimize the economic, ecologic, and human health impacts that invasive species may cause. The effects of invasive species is further addressed in an Army Policy Guidance (*Management and Control of Invasive Species*) distributed June 2001. The requirement to implement invasive species management is identified in the U.S. Army Environmental Program Requirements under the SAIA for natural resources stewardship, the ESA when protecting or managing listed species and critical habitat, and the Clean Water Act when invasive species are involved in erosion control and wetlands (DA 2001). Installations are required to “monitor invasive species populations, and

track the presence and status of invasive species over time to determine when control measures are necessary and to evaluate the effectiveness of prevention, control/eradication, and restoration measures."

Invasive species are defined as non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive species include plants, animals, and other organisms (e.g., microbes). These species are typically introduced by human actions; however, they can be unconsciously carried to new locations by other organisms (e.g., seed in a bird's gullet), wind, and water. Invasive species can be a threat to natural resources, impact local economies, and adversely affect the military mission. An invasive species is further defined as any species part, including its seeds, spores, or other biological material, capable of propagating the species.

Stable ecosystems are thought to be invasion-resistant and a combination of species assemblages that effectively exploit resources in balance with productivity for their maintenance (Smith 1985). However, fire, non-native grazers, and invasive introductions have extensively altered the environment of Hawaii. Disturbance facilitates the success of many invasive species. Successful invasive species capture space and other resources such as light and nutrients faster than native species. Over time, invasive species can affect native species, the persistence of communities (Vitousek 1985), and landscape characteristics.

Control of invasive plants is extremely important for the management of federally listed species in Hawaii. Approximately 61% of the NRO staff's invasive plants management field time is spent controlling invasive weed species around federally listed plants, and along fuel breaks, fences, and roads.

Part of the IPP is driven by the IWFMP (USAG-P 2013 draft). The IWFMP's goal is to reduce the threat and impact of wildland fires by limiting their frequency, size, and severity while supporting the Army's combat readiness training.

#### 4.1.4.2 Management and Execution

***Vegetation Control—*** Vegetation control focuses on weed control in and around federally listed plant management units; that is, ASRs. The intent is to reduce invasive plant cover near federally listed plants by creating weed control buffers. The size of a buffer is determined by the presumed fire risk and the maximum area anticipated that can be effectively managed. Ideally, buffers are maintained with less than 10% weed cover. Currently, there are 112 weed control buffers or approximately 114.9 ha (284 ac). Each ASR is visited quarterly to annually, dependent on site characteristics, historic management data, and precipitation, which dictates the rate of invasive species growth. Management actions not only benefit the federally listed species of interest, but all native plants within the buffer. Management includes:

- Hand pulling or cutting weeds within one meter of the listed plant
- Cutting weeds in the weed control buffer with line trimmers (initial)
- Application of herbicides on regrowth of target weeds
- Continued hand clearing, cutting and spraying as needed to achieve 90% weed-free cover

Primary weed control targets are *Cenchrus setaceus* (fountain grass) and *Senecio madagascariensis* (Madagascar fireweed) due to their invasiveness, habitat altering nature, and fine fuel production.

The overall operational goals of Vegetation Control activities are to:

- Ensure state and federal pesticide regulations are followed when applying herbicides for invasive species control and follow manufacturer's directions and Army SOPs during application.
- Ensure federally listed plant species are free of invasive plants in their immediate vicinity, within managed units, and at outplanting sites.

***Invasive Plant Survey and Monitoring—*** Invasive plants survey and monitoring was developed to meet the requirement to detect and control new, potentially invasive or incipient plant species establishing on PTA. The intent is to limit the ecological impact and to be cost effective. Roadsides are surveyed annually, and BAAF, earthwork construction sites, and the area around the washrack are surveyed quarterly. Constructions sites are surveyed for two quarters beyond the conclusion of construction and annually thereafter. Other activities include identifying and ranking target invasive species by risk level and feasibility of control, implementing control measures, and monitoring the status of weed management areas for follow-up control. Aggressive invasive species are identified as secondary target weeds. Currently, there are 31 species ranked as secondary target weeds and another 7 that have not been ranked. Typically, the higher the ranking, the more aggressive the species; however, other factors play into the ranking. Incipient and secondary target weeds detected during roadside weed surveys are treated as soon as possible.

***Road Surveys—*** Roadside surveys cover approximately 270 km (168 mi) of roads by two people surveying both sides of the roadway for incipient and target invasive plant species. The installation is divided into four geographic areas and roads are surveyed during different seasons in subsequent years. Newly occurring invasive species are evaluated as they are observed.

***Control and Monitoring of Secondary Target Weeds—***Most secondary target species are treated for control installation-wide, except for select species that are not controlled in KMA due to their widespread distribution in the area. Incipient and secondary target weeds along roadsides are treated immediately, if time and resources permit. In those cases, where time or resources do not permit treatment, treatment is scheduled as appropriate. New species treatment is evaluated after several weeks to determine effectiveness.

The overall operational goals of Invasive Plants Survey and Monitoring activities are to:

- Be aware of all current and planned construction support sites for construction projects.
- Ensure equipment (e.g., bulldozers) are clean prior to arrival at PTA for IPBC, south impact area trails and landing zones, and Urban Close Air Support Range.
- Ensure construction sites and areas around BAAF are kept free of incipient invasive plants through site inspections and eradication.
- Conduct roadside surveys for invasive incipient plant species. Treat immediately and track plant locations.
- Reduce or eliminate secondary target weed around federally listed plant species and in their habitats throughout PTA.

***Survey and Monitoring for Rapid Ohia Death***—Two recently evolved *Ceratocystis* fungi, *C.* Species A and *C.* Species B, are infecting and killing ohia (*Metrosideros polymorpha*) trees over large areas of Hawaii Island. Research continues to reveal new information about the pathology and vectors that spread the disease. The Hawaii Department of Land and Natural Resources leads strategic and operational planning initiatives including the development of rapid response guidelines and best management practices (BMP).

Ohia forests at PTA are distributed across approximately 113,331 ha (28,000 ac), representing 5% of the island-wide distribution. Ohia forests at PTA are generally sparse to open and these woodlands are habitat for many native species including 15 of the 20 endangered plant species present at PTA, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), and the endangered yellow-faced bee (*Hylaeus anthracinus*). NRO staff participate with the Rapid Ohia Death working group and are partnering with Federal and State agencies to develop an operational plan for PTA that includes survey, monitoring, and sampling methods and BMP for sanitation/prevention and rapid response.

***Fuels Management—*** Fuels management is required in the biological opinions (USFWS 2003, 2013). The management goal is to mitigate risks from wildland fire by limiting frequency, size, and severity to listed species and their habitats while supporting Army training for combat readiness. Fuel breaks and firebreaks are managed based on standards detailed in the programmatic environmental assessment (USAG-HI 2006b) and the 2013 draft Integrated Wildland Fire Management Plan; that is, to a 20/20/20 standard (20-ft wide road with 20-ft buffers to each of the sides) (Colorado State University, CEMML 2013).

***Fuel Breaks—***There are 13 fire breaks[8], ten of which include firebreak roads. The three without an accompanying firebreak road are in KMA and have a fire access road. The fuel breaks cover about 61 km (37.9 mi) and comprise the Conservation Fuel Break System. All vegetation is removed from a firebreak to mineral soil. Within a fuel break, fine fuels and shrubs are kept to less than 20% total crown cover or a maximum of 0.3-m (1-ft) tall. Trees near the perimeter of the firebreak may be left intact to create shade and reduce grass growth. All fuel breaks are maintained at least annually. Fuel breaks are 12-m (39.4-ft) wide and fuel break/firebreak combinations are 18-m (59-ft) wide. Fuel breaks require the removal of most fuels. The fuel breaks in KMA are 18-m (59 ft) wide and cannot be denuded of vegetation to bare mineral soil because of erosion (i.e., ashy soils). All fuel/firebreaks are complete with the exception of the one expected to be constructed near the IPBC. This fuel/firebreak combination will bring the final number to 14.

Vegetation control along fuel and firebreaks consists of fine fuels reduction, brush removal, and the removal of tree limbs and fallen wood. Fine fuel reduction is accomplished by cutting or mowing plants, followed by herbicide application (pre-emergent) or maintenance cutting. KMA fuel breaks are cut and mowed with a selective herbicide application (non pre-emergent) for *Cenchrus setaceus* where needed.

***Fuels Monitoring Corridors—*** Fuel Monitoring Corridors (FMCs) were established as natural barriers to wildland fire to protect threatened and endangered species habitat at PTA from fire escaping from the Impact Area. An FMC is a designated belt of land at PTA at least 100 m wide within which fuels are monitored to ensure separation of contiguous fuels that may exist on one side of an FMC from contiguous fuels on the other side of the FMC; with a break in continuity defined as an area where total herbaceous crown cover is less than 20%. Essentially, FMCs are natural barriers void of contiguous fine fuels (i.e., invasive grasses) within which fire is not likely to spread (i.e., burn across from one side of the FMC to the other). There are five FMCs with sparse to no fuels present. These areas are assessed on a five-year cycle.

The overall operational goals of Fuels Management activities are to meet the standards set in the Integrated Wildland Fire Management Plan and biological opinions by:

- Protecting federally listed plant species from wildfires by establishing a network of fuel and firebreaks.
- Removing/reducing herbaceous and woody vegetation along designated fuel and firebreaks.
- Removing/reducing invasive plants of all life forms from fuel and firebreaks.
- Establishing fuel breaks and removing herbaceous and woody vegetation around Puu Papapa and Puu Nohona o Hae in KMA to an 18.3-m (60-ft) wide standard.

[8] Firebreak—a linear path where fuel has been completely cleared to mineral soil; fuel break—a linear path where surface fuels and canopy fuels have been reduced, but not entirely removed; and fire access road—a road that provides access that must be maintained for firefighters to drive to critical areas with a 4-wheel drive Type 6 brush engine truck.

- Establishing and maintaining a fuel break along the southeast KMA boundary to protect the Palila Critical Habitat by removing herbaceous and woody vegetation.
- Ensuring fuel monitoring corridors are functional and meet specifications.

### 4.1.5 Wildlife Program

The Wildlife Program consists of three areas of focus: (1) Wildlife Management, (2) Threat Management, and (3) Game Management (Figure 4-4). All of these areas provide support to the federally listed wildlife species programs. The principal function of the Wildlife Program is to protect federally listed species and their habitats from habitat modification/degradation. Program staff develop and implement management actions to meet conservation compliance and objectives described in the biological opinions (USFWS 2003, 2008, 2013) issued to PTA by the USFWS.

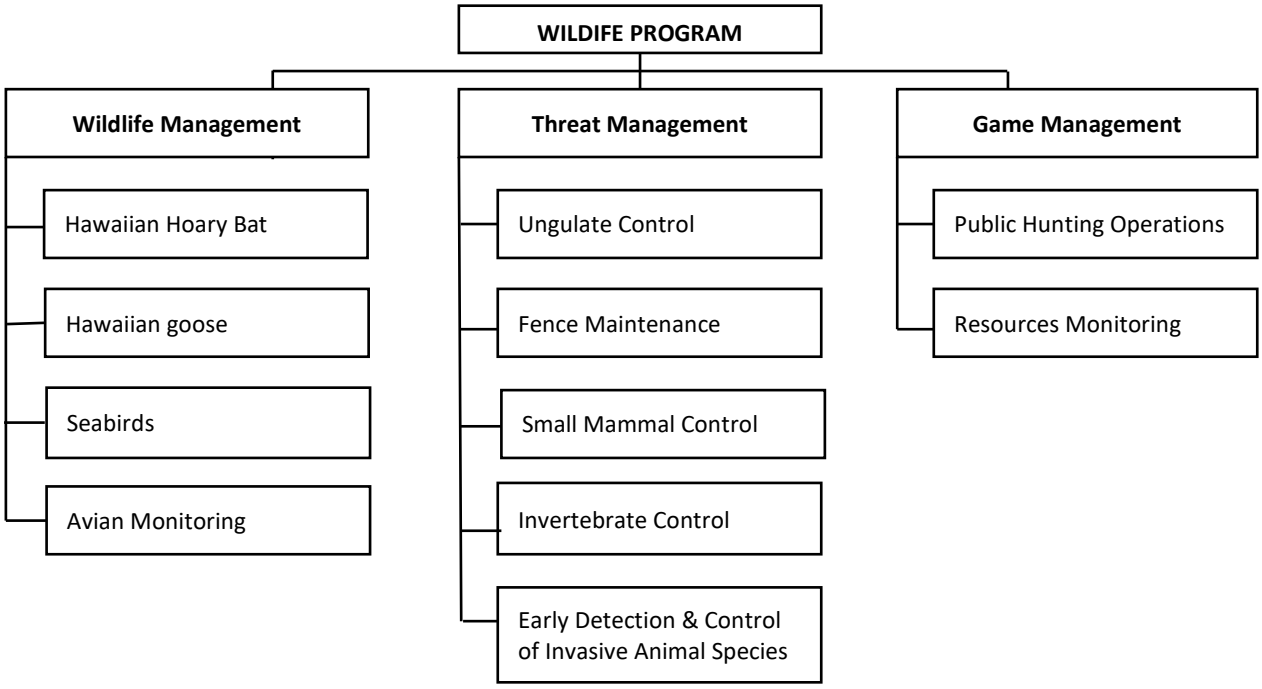


Figure 4-4. Structure of the Wildlife Program in the Natural Resources Office at Pohakuloa Training Area, Hawaii.

One federally listed mammal, the Hawaiian hoary bat, four federally listed bird species (Hawaiian goose, Band-rump storm petrel, Hawaiian petrel, and Hawaiian hawk), and one federally listed invertebrate, the Hawaiian yellow-faced bee (*Hylaeus anthracinus*) detected at PTA. The Wildlife Program's principal responsibility is species management, which consists of surveying to determine presence and population trends, reporting incidental take, invasive animal control, and inspecting and maintaining the large-scale fence units. The Wildlife Program executes conservation measures to meet the terms and conditions stipulated in the biological opinions (USFWS 2003, 2008, and 2013) and manages native and non-native wildlife in accordance with the ESA, MBTA, SAIA, and the NRO mission.

### 4.1.5.1 Policy and Background

Wildlife populations and their habitats are managed consistent with accepted scientific principles and applicable laws and regulations (e.g., AR 200-1). This INRMP acts as the required Wildlife Cooperative Plan for PTA, a Category I installation with adequate acreage of land resources. Funds are programmed for wildlife and game management as required by the SAIA. Wildlife resources are managed through agreement by the SAIA's required partners: USAG-HI, USFWS, and Hawaii DNLR. The goal of the cooperative plan is to provide direction for program planning and development, maintenance, and coordination of wildlife, and game conservation. The plan outlines measures for wildlife habitat improvements and modifications, wildlife considerations in range rehabilitation, control of off-road vehicle traffic, use and protection of wildlife resources to include both consumptive and non-consumptive use, natural resources law enforcement requirements, and designated responsibilities for the control and disposal of feral animals.

DoDI 4715.03 (*Environmental Conservation Program*, 18 March 2011) and AR 200-1 (*Environmental Quality—Environmental Protection and Enhancement,* 13 December 2007), advises installations to conduct thorough initial faunal and floral inventories and that species lists be reviewed during the INRMP review process. This regulation further states that faunal surveys are to include field data that describes and maps the distribution and extent of animals. Faunal surveys at PTA identify native, neotropical, upland game, and raptor bird species.

### 4.1.5.2 Management and Execution

#### *Wildlife Management*

***Hawaiian Hoary Bat Project—***The 2003 and 2008 biological opinions required year-round, installation-wide bat monitoring to determine bat occupancy and seasonal activity. The opinions also required the Army to implement terms and conditions as part of the bat incidental take authorization for military activity at PTA. The terms and conditions include development of a species conservation plan, implementation of monitoring programs for bats and treeland vegetation, and the minimization of military impacts to the bat and their potential treeland roosting habitat. The 2008 biological opinion also called for the removal of all barbed wire after a bat was found impaled on the western portion of PTA. All barbed wire was removed from conservation fence units by May 2013. Barbed wire remains on security fences, such as barbed wire at BAAF and cantonment. Those fences are monitored quarterly as required by the 2008 biological opinion. Direct and incidental take is reported annually.

In 2014, the NRO implemented a monitoring project that includes 45 periodic and five permanent sampling locations in five defined regions of the installation. One permanent sampling location has been established in each of the five regions along with a weather station that measures precipitation, wind velocity, temperature, relative humidity, and moonlight. Three of these regions have habitat with potential treeland roosting habitat. The 45 periodic survey locations are sampled quarterly for seven consecutive nights, and the five permanent locations are monitored year-round. This project runs through 2017. Survey information will address bat occupancy and nightly and seasonal activity (Miller 2001).

Some efforts that benefit the bat include education efforts to inform the training community to avoid cutting vegetation, trimming trees, and/or tree removal from 1 June to 15 September (breeding season); moving targets away from trees; use of amber lights; reduction of barbered wire; and a 15 mph speed limit. All bat strikes are required to be reported.

Overall, habitat quality has benefited from constructing conservation fence units, removing feral ungulates, and implementing the Integrated Wildland Fire Management Plan. In recent years, a vegetation map and RTLA survey were executed to provide supplemental information on Hawaiian hoary bat habitat.

***Hawaiian Goose Project—***The USFWS 2013 biological opinion addressed installation-wide impacts from training, and an incidental take statement was authorized for the Hawaiian goose with the Army partnering with an outside agency to promote successful breeding conditions at an off-installation location. As a result of formal consultation, the Army agreed to fund a conservation effort, which may include predator-proof fences, habitat improvement, and bird monitoring with the goal of producing an average of 26 fledgling geese per year to compensate for the potential incidental take of 20 adult geese annually on PTA. The opinion addressed briefing military unit leaders on their responsibility to protect geese, especially while driving or conducting live-fire exercises, modification of conditions at Range 1 Complex, the control of small mammals during goose molting and breeding periods, and the reporting of incidental takes and hazing activities annually. The 2013 opinion removed a number of requirements instituted in the earlier opinions. The intent is to maximize training when Hawaiian geese are present, flexibility through the take statement, and allowing hazing.

Project goals for Hawaiian Goose Project include:

- Identify the species distribution throughout the installation.
- Minimize the interruption of training caused by geese on live-fire ranges.
- Monitor and report all incidental take.
- Monitor and document breeding activity.
- Control small mammals that could prey on nests, eggs, goslings and molting geese in specified management areas.
- Protect nests, eggs, goslings, and molting geese from small mammals as deemed necessary.
- Educate and increase awareness amount military unit leaders, troops, and installation personnel to avoid and minimize take and/or negative impacts to geese.
- Establish and promote enhanced breeding conditions for geese with a partner agency outside of PTA.
- Obtain the objective of producing an average of 26 geese to fledglings annually at an off-site mitigation area for a 20-year period, the duration of the 2013 biological opinion, and monitor success.

Attaining these goals requires a number of actions including the control of predators inside and outside of the fence units, monitoring geese activities, documentation (database), securing funds for the duration of the opinion, construction of fence units and maintaining grassland habitat, creating of educational materials, modifying Range 01 habitats, and documenting and reporting incidental takes and hazing activities.

***Seabird Project—***The 2003 biological opinion required surveys of Hawaiian petrel. Two federally listed endangered seabird, the Hawaiian petrel and the Band-rumped storm petrel, comprise the Seabird Project. Very few Hawaiian petrel call events have been detected, but numerous Band-rumped storm petrel call events have been recorded. There are no extant Hawaiian petrel colonies at PTA, but further data analysis and fieldwork is needed to understand how and with what frequency the Band-rumped storm petrel use PTA. While the audio dataset answered questions about the presence of the two petrel species, questions remain regarding abundance and habitat use by the birds.

To address the lack of information for either petrel, the Army is planning to use various survey methods including dog searches, video surveillance, night vision surveys, acoustic monitoring and burrow characteristics collections to identify if colonies exists at PTA, and determine the activity rate and flight of transiting petrels at PTA.

Project goals for Seabird Management include:

- Identify and determine the level of seabird activity at PTA to maximize training capacity.
- Determine flight characterizes of transient petrels at PTA.
- Survey for and mark areas suitable as potential breeding habitat (e.g., lava openings) in construction areas.
- Improve lighting systems for the least impact on bird night flights.
- Install reflective tape along fence units that have petrel colonies so that the tape deters seabird strikes.

***Avian Project—***There are four principal drivers for avian project: the ESA, the MBTA, EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*), and the 2003 USFWS biological opinion. The Army has conducted annual avian surveys using the USFWS Hawaiian Forest Bird Variable Circular-Plot distance sampling method since 1998 (Reynolds et al. 1980; Scott et al. 1986). The survey potentially documents federally listed species, birds that fall under the MBTA, and non-native species. All native species fall under the ESA and/or the MBTA. A few of the non-native species fall under the protection of the MBTA (e.g., Barn owl, Northern cardinal, and Northern mockingbird). Data are collected according to state-wide protocols set forth by the Hawaii Forest Bird Interagency Database Project. It is from these data that the installation bird list has determined 37 taxa are present on the installation. Population and abundance are then estimated using the program DISTANCE (Version 5.0; Thomas et al. 1998; Buckland et al. 2001).

Monitoring utilizes 15 transects 2.0 to 3.5 km (1.2 to 2.2 mi) long in three areas with transects in TA 1-4 (4 transects), TA 22 (4 transects), and TA 23 (7 transects). All birds detected are recorded by detection category (site, aural, or combination) along with a horizontal distance in meters. Surveys take place in December to early January.

Two statutory requirements (USFWS 2013) associated with the construction footprint of the Urban Close Air Support Range and Aviation Landing Zones at PTA require avian nest surveys for federally listed seabirds and species covered by the MBTA.

Other activities include the PTA collaborating with the University of Hawaii, Hilo, Listening Observatory for Hawaii Ecosystems (LOHE). The LOHE developed a computer algorithm to automatically detect species calls from recordings. PTA is seeking Army permission to add its recordings to the LOHE sound library. Another future collaboration that PTA NRO is seeking permission for is adding its monitoring data to the DoD Partners in Flight national database.

Project goals for Avian Management include:

1. Survey for Palila presence and habitat use on the installation.
2. Ensure the Army meets MBTA requirements through survey for migratory birds, bird nesting at military range construction sites, and reporting of avian species protected by the MBTA incidentally taken by military readiness activities.
3. Implement conservation actions consistent with the DoD Partner's in Flight strategic plan.
4. Continue to support collaborative research.

***Invertebrate Monitoring—***There is limited knowledge about the invertebrate species at PTA. At least three arthropods and eight snails are species of concern and known to occur. Department of Army Memorandum (*Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys and Integrated Natural Resources Management Plan,* 21 March 1997) and AR 200-1, 4-3.d(1)(r), directs installations to conduct (at a minimum) surveys for all locally rare and keystone faunal species. The

Comprehensive Wildlife Conservation Strategy notes that keystone species in the Orders Coleoptera (beetles), Diptera (true flies), Heteroptera (true bugs), Homoptera (aphids, plant hoppers, leaf hoppers, etc.), Hymenoptera (ants, bees, and wasps), Lepidoptera (moths, butterflies, and hyposmocoma), Odonata (damselflies and dragonflies), and Orthoptera (grasshoppers, crickets, and katydids) are present on the Island of Hawaii.

A wingless weevil (*Rhyncogonus stellaris*) has been studied at PTA. This species appears to be restricted to the installation, but it was once known from lower elevations in the North Kona and South Kohala districts (Samuelson 2003). From August to September 2004, a study was conducted at eight sites. Each site was visited once or twice per month. Eighteen weevils (*Rhyncogonus stellaris*) were observed on *Chamaesyce olowaluana* at one site in a single day (16 August 2004). Limited sampling may be a consequence of sample size and season. *Asynonychus godmanni* (Syn. *Naupactus godmanni*), an introduced weevil, was observed at all of the study sites. The role of this species to the native species cannot be addressed without additional information.

Other important invertebrates include:

- **Hawaiian helicoverpa moth (*Helicoverpa confusa*),** identified on the installation in 1998. Like the weevil, this moth has a restrictive range and more information is necessary.
- **Kona yellow-faced bee (*Hylaeus kona*)** is endemic to the Island of Hawaii and restricted to the area between Hualalai, Mauna Kea, and Mauna Loa (Magnacca 2005), whereas the **Yellow-footed yellow-faced bee (*H. flavipes*)** is known from widely scattered locations on Hawaii. Both bees were collected at TA 4, adjacent to Mauna Kea State Park and Puu Koli, and TA 21, along Redleg Trail (Magnacca and King 2013) July 2012. Previous collections sites of the Kona yellow-face bee include Kipuka Alala (TA 23) and Kipuka Kalawamauna (TA 22). No individuals were encountered during the 2012 survey at these locations.
- **Volcanoes Cave Cricket/Hawaiian Cave Tree Cricket** (*Thaumatogryllus cavicola*) is known to be present on the Big Island. An endemic species, the cave cricket spends its life on the ceilings of lava tubes, eating roots. There are three other species, one each, on Nihoa, Maui, and Kauai islands.
- **Eight rare snails** have been identified on the installation. *Leptachatina* spp., *Euconulus gaetanoi*, *Nesopupa subcentralis*, *Nesovitrea hawaiiensis*, *Striatura* ssp., *Succinea konaensis*, *Philonesia* sp. and *Vitrina tenella*.
- A lava tube and cave study identified sites as potential locations, not only for rare species, but also for previously undescribed species (Howarth et al. 1996). Howarth found at least 90 species of arthropods (60 native) and six other invertebrates including a rare native snail, *Leptachatina lepida*, found during a 1996 survey of proposed sites for the realignment and upgrading of Saddle Road east of the state park (Evenuis et al. 1996).This taxon was also found and recorded in TA 23 at the MPRC (Cowie and Nishida 1993). It is listed by the International Union for Conservation of Nature (IUCN) and red-listed as endangered. Three endemic caterpillar species, *Schrankia* sp., were noted during a subsequent survey of lava tubes (Garcia and Associates 2003). Overall, some 500 arthropod taxa have been collected at PTA, representing 5 classes, 22 orders, and 127 families (Hawaii Natural Heritage Program 1998). Most are introduced species or with insufficient identification, leaving 33% consider native.

Invertebrate information is not only helpful for maintaining the native species but for understanding their relationships with other life forms. As potential pollinators, food sources, and predators, invertebrates are a key component to ecosystems.

Project goals for Invertebrate Management include:

1. Seek funding for a comprehensive invertebrate survey of the installation.

2. Research biological information of Hawaiian yellow-faced bee and Volcanoes cave cricket. Continue with individual species studies for species of concern/risk: wingless weevil (*Rhyncogonus stellaris*), Hawaiian helicoverpa moth (*Helicoverpa confusa*), and Kona yellow-headed bee.

### *Wildlife Threat Management*

A principal function of the Wildlife Threat Management Section is the control of invasive animals as part of the conservation measures and terms and conditions as stipulated by the biological opinions (USFWS 2003, 2008, 2013). Also, this program works to prevent the establishment of new non-native, invasive animal species at PTA and prevent the spread of invasive animal species to other areas.

***Ungulate Control—***Following formal consultation with the USFWS, the Army removed all ungulates (i.e., sheep, goats, and pigs). Conservation fences were constructed to partition biologically important area into manageable areas for ungulate control. The Army completed its first conservation fence in 1998 around the eastern portion of Kipuka Kalawamauna, followed by a fence around the northern part of Kipuka Alala in 1999, the *Silene hawaiiensis* in 1999, and the southern portion of Kipuka Alala in 2001. Most of the fences were constructed following the 2008 biological opinion. Currently, there are 14 fence units, with 10 units that are or are relatively ungulate-free. Four units are pending ungulate removal by contracted professionals. Potential ingress is monitored by trail cameras, incidental sighting reports, and aerially. Collared sheep and goats are tracked to find persisting groupings, and group members are removed on a bi-monthly basis until the fence units are ungulate free. Fence units are maintained on a regular schedule.

The project goal is to maintain conservation fence units ungulate-free to reduce negative effects from ungulates to threatened and endangered species and to enhance plant habitat.

Project goals for Ungulate Control are:

- Reduce the negative impacts on federally listed species and their habitats through the maintenance of ungulate-free fence units.
- Maintain conservation fence integrity to prevent ingress by ungulates.
- Report and record ungulate sightings to the Wildlife Program.
- Develop and maintain an ungulate monitoring database.

***Fence Maintenance and Construction—*** Currently, there are over 104.6 km (65 mi) of 1.8 m (6 ft)-tall and 1.2 m (4 ft)-tall fences and over 33.8 km (21 mi) of 1.2 m (4.9 ft)-tall fences. These fences enclose approximately 15,256 ha (37,695 ac) that fall within 14 conservation fence units. The fences were constructed to create an ungulate (i.e., goat, sheep, and pig) free area to protect and enhance the majority of federally listed plant species present at PTA. The fences were constructed from 1998-2013. This project ensures that the fences remain ungulate-proof and structurally intact. Fence maintenance includes inspecting fence lines, making repairs, controlling vegetation (0.9 m/3 ft clear to either side of the fence), and checking fence locking mechanisms.

Fence lines are units of fencing that two people can inspect in a day and vary in length based on the surface spanned, vegetation present, and roadways. Each fence line and gate is assigned a priority level, with some sections requiring more frequent visits than others. The priority for a section can be affected by

public hunting activities, severe weather conditions, and wildland fires. Survey date is documented and information logged by fence line section.

New fences will be limited in scale, and address any newly found listed plant locations in KMA. Small fence units are a necessary tool for ungulate exclusion. The Hawaiian goose project at an off-site location is to include management and construction of two predator-proof fences up to 8.1 ha (20 ac) to protect nesting and young Hawaiian geese. These fences will be built to exclude small mammal predators and follow the standards noted in the 2013 biological opinion.

Project goals for Fence Maintenance are:

- Inspect and maintain all NRO conservation fences on a rotational basis based on priority rankings, remove vegetation, and check for ungulates or other damage/breaches.
- Inspect and maintain vehicle and personnel gates. Look for gateless options (e.g., wildlife guards) to assist training unit access.
- Inspect and maintain fences and gates that could be damaged by catastrophic events (e.g., wildland fire, windstorm, and rainstorm) or public hunter activities.
- Inspect and maintain barbed wire security fences for entangled Hawaiian hoary bats and report to the proper authorities.
- Construct new fences as necessary for newly discovered listed species and for Hawaiian geese locations.

***Small Mammal Control—***Small mammals (e.g., rodents, mongoose, feral cats and dogs) can have both direct and indirect impacts on federally listed species (plants, birds). Invasive small mammals affect birds by predation, competition, habitat degradation, and subsidization of other predators (Lindsey et al. 2009). Most island bird species lack an antipredator response and are not able to defend themselves (Lindsey et al. 2009). Rodent control was identified in the 2003 USFWS biological opinion for *Neraudia ovata*, *Solanum incompletum*, and *Zanthoxylum hawaiiense*, and in the 2013 USFWS biological opinion for nests, eggs, goslings and molting Hawaiian geese. The standard method for rodent control is small-scale bait station grids in combination with snap traps. The NRO staff utilize integrated-multiple control methods (e.g., snap traps, Goodnature traps, and rodenticides). Locations requiring rodent control often begin with observations made by the Botanical Program Team. Site-specific rodent control was executed at Range 01 Complex to protect molting Hawaiian geese. PTA plans to participate in a statewide programmatic environmental impact statement with the USFWS and the State DLNR, Division of Forestry and Wildlife for the broad-scale aerial application of rodenticide.

Project goals for Small Mammal Control are:

- Reduce/remove the negative impacts of small mammals on federally listed species and their habitats.

***Invertebrate Control—***Aphids, scales, and ants were identified in the 2003 biological opinion as threats to federally listed species. Aphids are known to impact *Haplostachys haplostachya*. Aphids can transmit pathogenic viruses as well as cause damage to plants when feeding (Messing et al. 2006). There are two invasive ants of concern, the Argentine ant (*Linepithema humile*), present on the installation, and the little red fire ant (*Wasmannia auropunctata*, found in moist, shaded areas) not found on the installation.

The NRO staff uses an integrated approach to control invertebrates that does not solely rely on insecticides, which includes inspecting and sanitizing vehicles, machinery, and construction materials prior to arriving at PTA, and Soldier education.

Project goals for Invertebrate Control include:

- Enhance the health and vigor of federally listed plants with special attention to *Haplostachys haplostachya.*
- Manage and reduce the inadvertent spread of invasive ants.

***Early Detection and Control of Invasive Animal Species—***Early detection and control of invasive animal species is addressed in the 2003 USFWS biological opinion. The intent of this program is to educate troops, staff, and other land users on the impacts of invasive species on federally listed species and their habitats. Education increases the understanding and appreciation of the rare resources held and managed by the Army's efforts. Troops provide more eyes on the ground for animal sightings (e.g., brown tree snake, veiled chameleon, monitor lizards, axis deer, rabbits, little red fire ants, and coconut rhinoceros beetle), and their involvement is instrumental in limiting the transport of invasive species on vehicles, clothes, and construction materials.

Project goals for the Early Detection and Control of Invasive Animal Species are:

- Educate, increase awareness, and encourage the reporting among the military, PTA staff, and other land users for the removal of all reptiles and other invasive species.
- Monitor and remove invasive species from BAAF and PTA construction sites.
- Inspect all plant or plant products brought to PTA for invasive species and remove any species discovered at PTA.
- Survey for non-native species and remove invasive animal species identified at new construction, wash racks, and auxiliary sites at PTA.

### *Game Management*

Outdoor recreation and public access to military lands is supported by the SAIA for the sustainable multi-purpose uses of resource, which include hunting and non-consumptive uses [Sec 670a.(a)(3)(B)] and public access [Sec 670a(a)(3)(C)] when consistent with military use. Section 670c (*Program for Public Recreation*) authorizes the Secretary of Defense to "carry out a program for the development, enhancement, operation, and maintenance of public outdoor recreation."

PTA is opened to outdoor recreation activities, provided such activities are in deference to military activities. The Command Group in coordination with Natural and Cultural Resources implements rules governing hunting activities at PTA to ensure no negative effects occur by issuing permits, controlling public access, establishing protocols, and scheduling areas available for hunting each weekend. Appropriate access control procedures are established for each approved outdoor recreation activity. Collected funds are used for fish and wildlife conservation and management, and can be used to for funding partnerships and cooperative or research agreements as well as to support wildlife and habitat management (DoDI 4715.03, enclosure 3(6)b). There is no priority to those who are members of any installation club or organization (DoDI 4715.03, enclosure 3(6)c).

***Public Hunting Operations—***Hunting is open to the general public on weekends and national holidays. In 2016, new PTA hunting regulations were developed and adopted. The rules address access requirements, permits and associated fees, prohibited activities, restricted areas, safety zones, transport of firearms, and general hunting information. All hunting activity at PTA is subordinate to the military training schedule. Based on the training schedule, the PTA Range Control staff identifies areas that are available for hunting activity. To assist with the management of public hunting activities, the Army purchased the iSportsman service, which is an easy-to-use interactive service developed to assist natural resource managers to manage resources and activities. The web-based program is designed to manage access with online and remote check-in/check-out, hunter registration, permit sales, dissemination of

weekly hunting information, harvest reporting, and automated data tabulation and analysis. Six hunting units have been designated at PTA for game mammals and upland game bird hunting. If training is scheduled for one or more training areas within a unit, the entire unit is closed for that weekend to reduce the potential overlap of hunters and training activity.

PTA uses a "hold-harmless" agreement, which outdoor recreationists must sign to limit Army liability while on Army lands.

Most accessible portions of PTA (non-impact and non-dudded areas) are leased from the State of Hawaii under Lease No. DA-94-626-ENG-80 (State of Hawaii 1964), which expires 16 August 2029 (65 years). The following provision regarding hunting on these leased lands is described in the lease:

> 17. To the extent permitted by training requirements the Government will cooperate with the Lessor (the state) in the game development and hunting programs of the Lessor and, in connection therewith, the Government agrees that Parcels "A" (all or part of Training Areas 5-9 and 11-20), "B" (Training Area 10 and part of Training Area 11) and "C" (Training Areas 1-4) hereof shall remain available for the aforesaid programs of the Lessor and, further, that Parcels "B" and "C" and all that part of Parcel "A" which lies to the north of the Saddle Road shall be made exclusively available to the Lessor for hunting during the periods 1 July through 15 July and 1 December through 15 January and on national holidays from dawn to midnight and on weekends from midnight Friday through midnight Sunday during the periods 1 November through 30 November and 16 January through 31 January. The Lessor shall also have the right to construct a road along a mutually agreeable route through the northerly portion of Parcel "C" hereof." (Note: parenthetical comments were added for clarity.)

Three types of hunting are permitted: game mammals (e.g., wild sheep, feral goats, and feral pigs) most months of the year, fall upland game birds (first Saturday of November to the last Sunday of January), and spring wild turkey (March 1st to April 15th).

Special youth hunts are offered for licensed hunters aged 10 to 17 years per revision of the PTA Hunting Policy. A program facilitating hunts for disabled hunters is under development.

Project goals for the Game Management are:

- Build and maintain facilities necessary for successful game management (e.g., signage, fencing, vegetation control, existing bird watering units, etc.)
- Effectively use iSportsman to encourage public use
- Deconflict game management access with training

***Game Bird Monitoring—***Game bird monitoring is part of Game Management. More knowledge about game bird distribution, abundance, and activity is needed to determine the appropriate number of hunting days. There are 12 upland game bird species on PTA, and all are introduced.

Point counts and flush counts are two methods for addressing the information needs under consideration. Point counts occur along established survey routes and are conducted annually in early fall (August to October) prior to the game bird hunting season (November through January) to determine distribution and abundance. Flush counts, or simulated hunts, are a more realistic assessment using a bird dog. All bird encounters are documented with a global positioning system (GPS), noting species, numbers, habitat structure and condition, and accessibility.

Project goals for the Game Bird Monitoring are:

- Conduct game bird surveys.
- Meet the data decision-making needs regarding distribution, abundance, and composition.

- Maintain a viable game bird population.

***Game Mammal Monitoring—***Monitoring is part of Game Management. Game mammals are a resource for the hunting program that requires supporting viable populations for long-term yield while reducing potential impacts to federally listed species. More knowledge about game mammal distribution, abundance, and activity is needed to determine the appropriate number of hunting days. Effective game management is based on the ability to estimate population size accurately and precisely.

Three methods for addressing the information needs under consideration are camera trapping, aerial surveys, and home range and movement/GPS collar:

***Camera trapping*** involves the use of multiple motion-activated cameras over a period of time to determine distribution and, to some extent, occupancy of mammal species within the area surveyed. Camera data (photographs) are analyzed to derive an occupancy estimate, the probability a species will be detected within the survey area. Occupancy can be used over time to compare habitat preference, hunting pressure, or other factors on habitat use. Camera trapping provides continuous data for multiple species over a period of years and is only limited by the number of cameras deployed at any given time. Cameras may also be helpful in identifying newly introduced invasive animals such as Axis deer (*Axis axis*).

***Aerial surveys*** are considered the standard for game animal monitoring; however, these surveys are costly and generate a relatively small data set, biased to the conditions on the day of collection. Aerial surveys in conjunction with camera surveys can complement each other and reduce sampling bias for greater precision (e.g., aerial surveys could assist in identifying camera placement locations within habitat types).

***Home range and movement*** (GPS collars) provides information about habitat selection, home range, and responses to habitat enhancement, hunting pressures, and other factors. Establishing collared animals is initially time and cost expensive, but subsequent information is significant to game management decisions.

Project goals for the Game Mammal Monitoring are:

- Conduct game mammal surveys.
- Meet the data decision-making needs regarding distribution, abundance, and composition.

### 4.1.6 Ecological Data Program

The Ecological Data Program provides centralized data support to all parts of the NRO (Figure 4-5). This program provides staff and managers with statistical design, data collection protocols, data management, GIS applications and computer network support. NRO data resides on a standalone system. The NRO has internal policies for the collection, handling, and distribution of data.

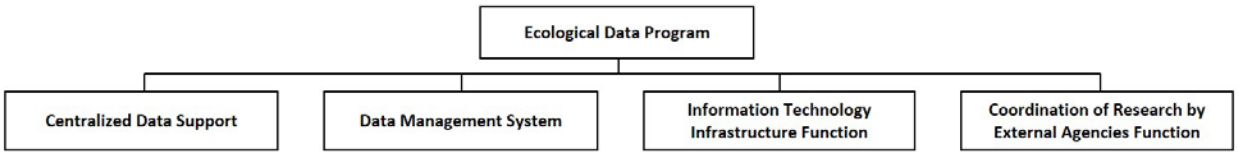


Figure 4-5. Structure of the Ecological Data Program in the Natural Resources Office at Pohakuloa Training Area, Hawaii.

### 4.1.6.1 Management and Execution

#### *Centralized Data Support*

Centralized data support manages spatial and tabular data. This section also provides expertise in field data collection methods, statistical sampling design, and analysis for incorporation into protocols. The goal is for protocols to address pre-established questions pertinent to the NRO mission, including assessment of management efficacy, strategy optimization, and budget tracking and accounting.

Project goals for Centralized Data Support are:

- Provide a centralized, specialized expertise for the development of appropriate field data collection methods, statistical design, and data management and analysis for the NRO.
- Provide guidance for appropriate field data collection.
- Provide guidance for overlaying experimental design onto existing management operations for optimal assessment and optimized management.
- Conduct spatial and statistical analyses in collaboration with technical program managers to provide metrics of management success and information on modifying management approaches to optimize efficacy.
- Ensure technical program managers understand all potential applications and limitations of various types of data collection and analytical approaches.
- Provide support for synthesis and incorporation of results from ecological data analyses including graphical representation into meaningful and targeted reports for appropriate entities (e.g., USAG-HI, PTA Commander, USFWS, etc.).

#### *Data Management System*

Data management systems include providing and maintaining properly designed, highly functional tabular and spatial data management systems (e.g., GIS). Data input interfaces and databases infrastructure has been developed for data entry, storage, analysis, and reporting, which facilitates day-to-day operations and large-scale planning, accounting, and reporting. Established principles and theories of data management and database design are used for optimal functioning of the NRO programs.

- Provide computer-based information tracking systems to ensure proper tabular and spatial data management for entering, storing, analyzing and reporting results.
    - Manage GIS data for maximum utility and functionality.
    - Acquire, deploy, and manage GIS-related field data collection devices for maximum use and compatibility.
    - Develop and maintain a Management Actions Tracking System that works with other databases to provide accurate tracking and reporting of expenditures in fulfillment of NRO requirements.
    - Develop and maintain databases to facilitate other NRO programs (e.g., Botanical, Wildlife, Invasive Plants programs, and administrative functions).

#### *Information Technology Infrastructure*

This section supports staff computer workstations, printers, and access to data stored on a central network server for day-to-day activities.

- Oversee the acquisition, deployment, and maintenance of all NRO information technology components (e.g., computer systems, network, printers, plotters, telecommunication, etc.)

- Select proper workstation-level computer equipment based on end-user requirements.
- Implement and administer local area network that stores and shares large data files throughout the NRO.
- Acquire, deploy, and administer cross-program peripheral computer equipment.

### *Coordination of Research with External Agencies*

The Army biologist approves all ecological research on the installation. This section:

- Serves as the initial liaison to gather pertinent information (e.g., project goal, study duration, frequency of visits, etc.).
- Benefit of the project to the PTA Command Team is determined through a cost/benefit approach and no interference with the training community.
- Oversee coordination with the technical program managers.

### *Technical Assistance to the Army*

The Army biologist provides technical assistance to the Army by supporting initiatives for training capacity, cooperative initiatives with state and federal agencies, and expert support.

The goals for providing Technical Assistance are:

- Provide NRO expertise and support to the Army through data acquisition, evaluation, and synthesis; mapping and graphics support; and document preparation.

## 4.2 Soil Surveys and Erosion

A soil survey was conducted on the Island of Hawaii in 1973 (Sato et al.). All of the installation was included. These data provide the installation with information on the types of soils present and their location. These data should be periodically checked to determine if current Natural Resources Conservation Services' survey standards for the classification, categorization, and description for soils by map unit as set forth in AR 200-1 are being met.

Soil data are valuable for assessing each soil map unit's tolerance value to erosion. By comparing actual erosion rate to the tolerable rate, the potential soil erosion status can be determined. Slope and vegetative cover are essential components in moderating and accelerating soil erosion. Soil erosion can be modeled and validated with satellite imagery and field data.

Much of PTA has no surface soils, but rather is pahoehoe lava (36.4%), aa lava (30.8%), or other rocky soil units (17.4%; cinder land, rock land, very stony land), with about 15.4% of the land surface covered with "developed" soil units (e.g., loams, fine sand, etc.)

Areas with lava can be crushed and graded. As lava or cinder cone materials are modified, dust becomes an issue. The north portion of PTA has the best-developed soils. Dust generation is a problem at firing points when vegetative cover is less than 12% (Gleason and Faucette pers. com.). Application of palliatives helps remediate dust problems.

Soil erosion is being addressed in KMA through work executed by the U.S. Geological Survey. Soil resiliency to training activities is being assessed to determine the maximum sustained use of the area.

## 4.3 Climate Change

Species with a limited distribution are more vulnerable to extinction due to changes in climate and localized catastrophes such as hurricanes, landslides, flooding, and disease. Endemic species developed in

relative isolation until recent human-mediated impacts (e.g., invasive species, predators, disease, and changes in land use). Refugia can no longer provide essential conditions for endurance with changes in temperatures, precipitation, storm intensity and frequency, or other factors. Changes in temperature could affect reproductive transitions, the incidence/distribution of vector-borne disease, and wildland fire risk. Changes in precipitation, which realize extended periods of drought as well as extreme precipitation events, can affect soil loss, impact groundwater, stress plants and animals and weaken resistance to disease, reduce fecundity, and cause shifts in interspecific relationships (DoD 2012).

Changes in climate are expected to disrupt the connectedness among species and lead to the realignment of communities and the loss of some species (Root et al. 2003). Each species has an ability to cope within some limitation to atypical events. Fortini and others (2013) consider persistence under climate change to be dependent on a species' ability to tolerate projected changes, endure in microrefugia, and migrate to new climate-compatible areas. The species most vulnerable to climate change events tend to be the species that are also most threatened by non-climatic threats (e.g., non-native species competition, land-use change).

The impacts of military activities and existing problems can be amplified by climate change. Extended droughts increase the potential for fire and heavy and enduring rains increase the frequency and extent of slope slippage.

Army conservation measures are in place to help minimize the potential effects of climate change for the near future such as genetic storage, species reintroductions, and habitat protection and restoration, thereby creating ungulate-free zones with fences. As more is learned about the individual species, their minimum requirements, and their plasticity to environmental changes, the measures currently in place offer mechanisms for preserving current populations and ecosystems as well as future ones.

## 4.4 Pest Management

### 4.4.1 Policy and Background

There are no statutory requirements for pest management plans; however, the DoD has been granted authority by the Environmental Protection Agency through the Federal Insecticide Fungicide and Rodenticide Act (40 CFR 171.8) to disseminate training and certification requirements for DoD pest management personnel on installations. One of the requirements for pesticide applicators is to perform duties under standards established by an installation's pest management plan that have been reviewed and approved by DoD pest management consultants (Bennett 1996). DoD Instruction 4150.07 (*DoDI Pest Management Program*, 23 May 2013) applies to all DoD activities and installations with pest management requirements to have pest management plans that are annually reviewed and updated. The manual provides procedures for DoD training and certification of pesticide applicators. This instruction addresses the application of pesticides in the vicinity of federally listed species or species proposed for listing, including the requirement to consult or confer with the USFWS on activities that may affect those species [(ESA, Section 7(a)(2)].

Army pest management planning requirements are provided in AR 200-1. A pest management plan is required if 50% or more than a productive work-year of pest management occurs. This includes program administration, quality assurance evaluation, and contract supervision. Pest management plans are reviewed and approved by USAEC for the Installation Management Command. A pest management plan promotes effective integrated pest management, safeguards the environment and human health, supports stewardship of natural and cultural resources, protects property, and complies with applicable laws, regulations, and policies.

The initial pest management plan for USAG-HI was authorized in 1997. A subsequent plan was authorized January 2008 (USAG-HI 2008c), under which PTA falls. The execution of the plan is under the Installation Pest Management Coordinator. Annual review reports are submitted.

The installation pest management plan for USAG-HI describes the installation management requirements; outlines the resources necessary for pest surveillance and control; describes the administrative, safety, and environmental requirements of the program; and how resources and requirements enable USAG-HI to provide effective pest control (USAG-HI 2008c). The installation pest management plan includes implementation and coordination for optimum sanitation, sound structural design and maintenance of facilities, and mechanical, regulatory, cultural, and biological controls.

USAG-HI recognizes nine categories of pests and undesirable vegetation that requirement management:

1. Real property pests (structural/wood destroying pests (e.g., termites, powder post beetles)
2. Disease vectors and medically important arthropods (e.g., mosquitoes; house, blow, and moth flies; bees, wasps, spiders and other stinging and biting arthropods)
3. Stored products pests (e.g., rodents)
4. Ornamental plant and turf pests (e.g., various noctuid caterpillars, scale insects, beetles, etc.)
5. Undesirable vegetation (e.g., weeds control along fence lines, ditches, roadsides, firebreaks, cantonment area, etc.)
6. Vertebrate pests (e.g., rodents, mongooses, cats, dogs, birds, etc.)
7. Household and nuisance pests (e.g., cockroaches, ants, fleas, etc.)
8. Quarantine pests (i.e., the inspection of cargo for pests such as the brown tree snake)
9. Other pest management (e.g., removal of dead animals)

The installation pest management plan addresses the sale and distribution of pesticides, health and safety (e.g., hazard communications, pest control vehicle standards, use of spill kits and spill response, fire protection), environmental considerations (e.g., protection of the public, sensitive areas, species of concern, and pollution abatement procedures), and administration (e.g., staffing, facilities, reporting, training, and contracts).

Pest control on the cantonment is managed by the installation. Incipient weed and animal detection on BAAF and in the training areas are conducted by NRO staff. Weed control as related to federally listed species is performed by the NRO weed crew.

NRO staff efforts focus on those pest management issues outside of the cantonment and BAAF. There can be overlap and, as such, some activities need to be coordinated. NRO staff works to minimize the effects of undesirable vegetation, vertebrate pests, and, with the help of ITAM staff, quarantine pests.

## 4.5 Community Involvement and Education

### 4.5.1 Policy and Background

Community involvement is an installation's opportunity to demonstrate measures taken to protect, preserve and enhance the public lands that have been entrusted to it. Effective land management includes addressing local community issues and concerns. An installation typically grows with its neighbors, and the community boundaries between the two tends to lessen. Community involvement is an important mechanism for sharing information, resources, and concerns. At PTA, this includes establishing partnerships for off-site plantings, involving the public in planning documents, recycling, hosting visits to the greenhouse and interpretive garden, granting access to university researchers, and hosting school and scouting groups for educational and community outreach projects.

The SAIA and NEPA describe types of community involvement needs: (1) public outreach/community planning —involvement in decision-making issues, and (2) outdoor recreation and community involvement—providing education on resources and land use.

## 4.5.2 Public Outreach/Community Planning

### 4.5.2.1 Policy and Background

DoD uses the term "outreach" for coordinating military issues involving the public; however, outreach implies one-way communication rather than open, two-way communication (DoD 2002). DoD recognizes that the public requires open, transparent, and inclusive processes for determining how important specific lands are for military use. Far too often, perception does not equal reality. As such, involving the public early and often in the decision-making processes enables public stakeholders to help agencies make cost-effective decisions. Early and often inclusion establishes credibility and trust. DoD Memorandum for Secretaries of Military Departments (*Guidance for Fiscal Years 2006-2011 Sustainable Range Programs*, 26 June 2003) directs that installations "implement sustainment outreach efforts that will improve public understanding of DoD requirements for training and support coalition-building and partnering on range sustainment issues important to DoD readiness." EO 13352 (Facilitation of Cooperative Conservation) requires that the DoD implement laws relating to the environment and natural resources "in a manner that promotes cooperative conservation with an emphasis on appropriate inclusion of local participation in Federal decision making." AR 200-1 provides summaries for Army actions that necessitate public involvement. This regulation notes that public participation should be included in Installation Restoration, Base Realignment and Closure, and Formerly Used Defense Sites cleanup programs' restoration activities.

The Office of Environmental Quality Control, State of Hawaii, publishes The Environmental Notice semi-monthly (http://health.hawaii.gov/oeqc/; EA and EIS Library). The notice announces the availability of environmental studies and reports under agency or public review. This is a site where the public can find notifications and copies of PTA actions and documents.

## 4.5.3 Community Education

### 4.5.3.1 Current Management

Information collected by and about the NRO staff over the course of a year are made available to the public in the biennial reports that summarize activities, research, lessons learned, and discoveries. Other forms of community education include:

- **Posters** are created for educational and presentations at professional meetings purposes, thereby further demonstrating stewardship of installation resources.
- **Stewardship award** by the USFWS recognize efforts of PTA in 2006 (*Military Conservation Partner Award).* The PTA and the USFWS have a cooperative work relationship that has created a win-win situation between federally listed species and military training.
- **Hawaii Army Weekly** (http://www.hawaiiarmyweekly.com/) serves USAG-HI, 2$^{5th}$ ID and USARHAW and is an effective means to educate military personnel, civilian personnel, and military family members about general conservation issues at PTA.
- **Sustainability and Environmental Management**, **Natural Resources Program** website hosts documents and brochures specific to PTA, including biological opinions, implementation plans, awards, brochures and more. (https://www.garrison.hawaii.army.mil/sustainability/NaturalResources.aspx).

- **Other media** (television and outside newspapers) cover various aspects of natural resources management at PTA (e.g., wildfires, endangered species). These are coordinated with the Public Affairs Office (PAO).
- **Earth Day** events occur annually. The event is advertised to the public. Participants learn about how the NRO manages natural resources on the installation and see native and federally-listed species during PTA Interpretive Garden tours.
- **Other Groups—**The NRO staff work with the Command to accommodate all requests to visit federally listed plant sites, the greenhouse and interpretive garden, or just to pull some weeds.

Natural and Cultural Resources personnel developed an interpretive garden outside their offices at the PTA cantonment in 2000. The garden is fenced to exclude ungulates, particularly feral goats and sheep. A similar project is underway at the new NRO. The gardens contains common native plants, listed plants, and archaeological features. Both series of gardens provide a visual experience for military personnel and the public with regard to issues involving natural and cultural management.

Efforts to involve people and target groups (groups interested in environment issues, individuals with experience in environment, and people with a diverse mix of interests and backgrounds) is at the discretion of the PTA Commander and the Army Biologist.

The NRO staff participated in regional initiatives, including the following:

- Dryland Forest Working Group
- Hawaii Rare Plant Restoration Group – shares ideas to restore rare plants. Includes about two dozen groups and agencies including USAG-HI, Environmental Division, and PTA staff.
- Mauna Kea Watershed
- Three Mountains Alliance
- Hawaii Hoary Bat Working Group
- Hawaii Conservation Conference
- Nene (Hawaiian goose) Working Group
- Department of Lands and Natural Resources, Division of Forestry and Wildlife
- Big Island Game Bird Hunters
- Big Island Rare Plant Working Group
- Dryland Forest Working Group
- University of Hawaii

Part of the NRO community education extends to the military and to contractors and the construction projects. The 2003 USFWS biological opinion requires oversight of construction projects for the introduction of invasive plant and animal species. Contractors are required to access PTA with “clean” vehicles and to properly dispose of petroleum, oils, and lubricants when working on-site. In part, the ability to relax requirements during training exercises for Hawaiian geese in the 2013 USFWS Biological Opinion, rests on educating troops on safe activities when geese are present in a training area or firing range. The NRO staff has developed best management practices to address these issues. The External SOPs addresses range and training area use (USAG-P 2015).

The goals for Community Education include:

- Explore new outdoor recreational opportunities and community activities.

- Provide educational materials about the natural resources of the installation to all users.
- Develop an active volunteer program where volunteers help complete required natural resource management actions.
- Continue to review and update the hunting SOPs.
- Participate in regional and national initiatives.

## 4.6 Bird/Wildlife Aircraft Strike Hazard

### 4.6.1 Policy and Background

Birds and other wildlife can cause hazards with aircraft (Bird/Wildlife Air Strike Hazards or BASH/WASH), and the potential is present within PTA airspace. The USARHAW *Installation Standardization Committee Aviation Local Flying Rules* (October 2001) notes that areas need to be inspected and identified hazards addressed. The BASH/WASH policy is an integral componenet of the installation's Pest Management Plan as required by AR 200-1 *Environmental Protection and Enhancement* and DoD Directive 4150.07 *Department of Defense Pest Management Plan* (M. Leong per. com. 2010).

Records from 1979 to 2011 document 2,511 wildlife strikes by helicopters for the military branches (Chow 2014). Birds comprised 91% of the cases and 9% involved bats. Data recorded by the Federal Aviation Administration (1990-2008) reported 97.4% of reported civil aircraft strikes were birds, 2.1% were terrestrial mammals, 0.3% were bats, and 0.1% were reptiles (Dolbeer et al. 2009; Biondi et al. 2013). Two bird airstrikes by Army aircraft were documented from 2001-2010 (CW4 P. Mansoor pers. comm. 2011, cited in USAG-P 2012).

No bat impacts were documented for Hawaii during the 19-year period for civil aircraft and none documented by Army aircraft from 1990-2011 (Washburn et al. 2014).

BASH/WASH actions are for Soldier and aircraft safety, which result in the management of wildlife populations and habitats. Suggestions include avoiding takeoffs/landings at dawn/dusk ± 1 hour, reporting observed wildlife activity, being aware of seasonal changes in activities and numbers, utilizing air traffic control radar to identify possible bird activity, limiting/prohibiting formation takeoffs and landings, and more. Wildlife strike incidents are reported to the airfield manager, airfield safety program manager, and the NRO for identification.

### 4.6.2 Current Management

USAG-HI currently implements the BASH/WASH per the USAG-HI Integrated Pest Management Plan with occasional assistance from the PTA Conservation Law Enforcement Office, who is assigned to the Department of Army Police.

Bird control programs have been in effect at all USAG-HI airfields since 1989 (M. Leong per. com. 2010). At BAAF, control work includes removing hazards such as feral dogs, cats, sheep, and pigs. The area of interest extends 2 km (1.2 mi) beyond the airfield. A Work/Financial Plan notes the objective at BAAF is to control nuisance wildlife typically by trapping and hazing. Hawaiian geese are sometimes present near BAAF and other landing zones and can pose strike hazards, but geese are large birds and are highly visible inflight. Daily BASH/WASH activities are reported quarterly.

Any bird and bat strikes are documented and the NRO staff notified. If there are sufficient remains, the materials are turned over to the NRO staff for identification. If the remains are identified as those of a listed species, the USFWS is notified (USACE 2003).

The Bird/Wildlife Air Strike Hazard goals are to:

- Have no BASH/WASH incidents at BAAF or at any other location within the boundaries or training associated with PTA.
- Document strikes that occur and to reported and have materials identified.
- Manage wildlife and the area surrounding BAAF to prevent strike hazards.

# 4.7 Wildland Fire Management

## 4.7.1 Policy and Background

The development and implementation of an Integrated Wildland Fire Management Plan (IWFMP) is necessary to address safety, land management, and environmental compliance. "Installations with unimproved grounds that present a wildfire hazard and/or installations that use prescribed burns as a land management tool" are required to have an IWFMP (AR 420-90 *Facilities Engineering, Fire and Emergency Services*, 8-3, 4 October 2006; AR 420-1 *Facilities Engineering, Army Facilities Management* 25-39, 28 March 2009). The plan is to be compliant with and integral to an installation's INRMP and an installation's existing fire and emergency services program (DA Memorandum *Army Wildland Fire Policy Guidance*, 4 September 2002).

An IWFMP was completed October 2003 (25th ID(L) and U.S. Army, Hawaii) and a programmatic environmental assessment for the implementation of the plan was completed in June 2006 (25th ID (L) and USARHAW 2006b). The 2003 IWFMP was revised in 2013 and remains a draft plan. Currently, the draft plan that is being executed (A. Beavers per. comm. 2016). Both the current and the draft provide methods and protocols to control fire frequency, intensity, and size on USARHAW lands to comply with federal and state laws and to meet USARHAW's land stewardship responsibilities (25th ID(L) and USARHAW 2003). The IWFMP intends to use fire prevention, pre-suppression, and suppression in support of land management plans goals and objectives. The plan recognizes the need to avoid damage in areas of high natural resource value during fire suppression activities. The PTA External SOP provides guidance on some of the changes (e.g., no live-fire in KMA).

The Hawaiian ecosystem is not fire dependent, and any fire in native vegetation is considered detrimental. Fire is a major disturbance and accelerates the conversion of native-dominated communities to non-native dominated ones (25th ID(L) and USARHAW 2003).

## 4.7.2 Current Management

Within the IWFMP are the PTA standard operating procedures. Many of the procedures focus on the protection of federally listed species and their habitats. During live fire, troops must be aware of and adhere to the Fire Danger Rating System (FDRS) restrictions for incendiary ammunition and/or pyrotechnics. The FDRS takes into account the installation's fire history, fuels, fire behavior models, and weather/climatology; and determines a Fire Danger Class by area on the installation. The IWFMP details the minimum staffing requirements, training, equipment and supplies, and helicopter fire bucket support as well as fire suppression actions and post-fire analysis surveys.

Fire access roads, along with fuel monitoring corridors, are part of the fire control system at PTA. Fire access roads are the Army's first defense to fires initiated off the installation. There are firebreaks (6 m/19.7 ft wide to bare soil with edge fuels maintained), fuel breaks (3 m/9.8 ft wide inside and 9 m/29.5 ft wide outside), and fire access roads (no width requirement; navigable by 4WD Type 6 brush engine), and fuel monitoring corridors throughout the installation. Fuel corridors help reduce the chance of a catastrophic wildfire event (USFWS 2003). Each corridor is approximately 100 to 300 m (328 to 984 ft) wide. Canopy cover does not to exceed 20%. Five fuel monitoring corridors will be constructed and are located in areas with little or no existing fuel.

The IWFMP outlines responsibilities, fire prevention (e.g., education, enforcement, engineering, and ignition control), pre-suppression actions (e.g., training, resources), suppression actions (e.g., reporting, initial attack, command and control, and values at risk), post fire actions (e.g., reporting, surveys, and investigations), minimum staffing requirements, equipment and supplies, water sources, and fire- and fuel breaks.

An example of site specific guidance for KMA includes:

- Training is governed by the FDRS, which is updated hourly.
- No live fire.
- All pyrotechnics, simulators, blank ammunition are prohibited.
- Open fires for cooking or warming are prohibited.
- Smoking is prohibited except in approved locations or by exception through a Hot Work Permit (Range Control authorization).
- Training restrictions will be in place by mid-morning, given a very high or extreme fire danger most of the year.
- Fuel breaks protect Puu Nohona o Hae and Puu Papapa.
- Roads should meet firebreak and fuel break standards.
- Firebreaks and fuel breaks can be combined to improve effectiveness.

The goals of Wildland Fire Management are:

- Fight fires with federally listed species and Waikii Ranch properties as a primary priority and outside the installation as a secondary priority.
- Reduce invasive fuels where possible to protect federally listed and rare species.
- Continue environmental awareness through signage, posters, kiosks, and pamphlets to remind troops about using the FDRS and fire prevention.

## 4.8 Training of Natural Resources Personnel

### 4.8.1 Policy and Background

The Army biologist is required to complete various environmental training as required by DoD policy, DA policy, and Army regulations. Normal day-to-day training requirements such as Equal Employment Opportunity, safety in the work place, etc. are not covered in this INRMP. The intent is to maintain an efficient and well-trained environmental staff. To perform the tasks stated in an INRMP, AR 200-1 states that there be “sufficient numbers of trained professional natural resources management personnel.”

DoD Instruction 4715.10 (*Environmental Education, Training, and Career Development*) states DoD policy to:

- Establish a highly qualified group of environmental professionals who can successfully fulfill their environmental duties and responsibilities.
- Promote certification of professionals and technicians in their disciplines and specialties by encouraging continuing educational programs, membership in professional organizations, and as active committee members.
- Ensure appropriate environmental awareness training.
- Fund all mandatory environmental training requirements in federal laws and regulations.
- Federally-mandated training includes Pesticide Applicators Certification (*Federal Insecticide, Fungicide and Rodenticide Act,* 40 CFR Part 171.9)

The Army biologist in charge of contracted projects is required to attend and complete Contract Officer's Representative or Contract Officer's Technical Representative training.

Non-Federal Employees (NFE) training is often similar to that of Army employees and is provided by their employer.

### 4.8.2 Current Policy

All NRO personnel involved in pest management are certified. NRO staff attend natural resources workshops annually. ITAM personnel attend national workshops as available.

Other training is available at the Professional Development Support Center, USFWS National Conservation Training Center, and others (see http://aec.army.mil/usaec/training/index.html).

The goals for the Training of Natural Resources Personnel are to:

- Maintain a professionally trained NRO staff in the latest scientific techniques and theories; knowledge of federal, state and local government laws and policies; DoD policies; and Army policies, directives and regulations.
- Ensure federal employees complete all annual and job related DoD and DA training requirements.

## 4.9 Law Enforcement of Natural Resources Laws and Regulations

### 4.9.1 Policy and Background

Natural resources law enforcement is a combined responsibility of the Department of Defense (DoD) Police and the Conservation Law Enforcement Officer (CLEO). The DA Police control access and physical security at PTA. The DoD Police and the CLEO are in the Directorate of Emergency Services, which provides 24-hour force protection, law enforcement, fire protection and community assistance. The PTA CLEO is a federal employee with a broad range of duties within the law enforcement spectrum, such as ensuring that licensing requirements are met by hunters, fishermen, and trappers. Detailed investigations are common to solve wildlife crimes. Officers in some areas may be responsible for conducting investigations of hunting related violations and accidents. The CLEO generally works out-of-doors, during inclement and sometimes hazardous weather conditions, during natural disasters and under other possibly dangerous conditions. Authority for enforcement comes from DoDI 5525.17, *Conservation Law Enforcement Program* (*CLEP*), 17 October 2013), the SAIA, the various biological opinions, and AR 200.3, *Environmental Quality, Natural Resources – Land, Forest and Wildlife Management* (25 February 1995).

The Pohakuloa boundary is poorly marked, which makes enforcement difficult. Enforcement is difficult in many areas due to remoteness and vehicle inaccessibility.

### 4.9.2 Current Management

Most natural and cultural law enforcement falls under the direction of the DA Police and the Game Warden at Pohakuloa. Hunters are the principal non-military users of the installation. Hunters are required to use iSportsman and secure appropriate validations. Firearms are registered with the installation. The Game Warden works with the DLNR and their law enforcement agency, the Hawaii Division of Conservation and Resource Enforcement, or DLNR Police.

## 4.10 Coastal/Marine Management

The Army owns and operates a landing ramp at Kawaihae Harbor at the coral stockpile area ("Coral Flats") through Governor's EO 1759, which allows the Army to conduct military operations and transfer goods including troops, vehicles, and explosives (HDOT 2013). Kawaihae Harbor is used by the 45th

Army Corps Support Group (Forward) to off-load Logistic Support Vehicles (LSV) to be taken to PTA. Off-loading generally occurs by dropping a ramp from the shipping vessel. The Army was granted access to the ramp area in EO 2142. Together, the two EOs grant the Army approximately 10 acres of land at Kawaihae Harbor. Use of the area occurs three to four times a month (HDOT 2013).

PTA will consult with the National Marine Fisheries Service (NMFS) on resources at Kawaihae Harbor if preliminary determinations indicate a military activity may affect an endangered or threatened species or its critical habitat. Four federally listed species are potentially present and include the Green sea turtle (*Chelonia mydas*, threatened), Hawksbill turtle (*Eretmochelys imricata*, endangered), Humpback whale (*Megaptera novaeangliae*, endangered), and Hawaiian monk seal (*Monachus schauinslandi*, endangered).

Work at Kawaihae Harbor is being evaluated for possible effects to Essential Fish Habitat (EFH) pursuant to The Magnuson-Stevens Fishery Conservation Manage Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), which requires all federal agencies to consult with the NMFS on all actions, or proposed actions, permitted, funded, or undertaken that may adversely affect EFH.

### 4.10.1 Watershed Management

Watershed management is a component of the Clean Water Act. Watershed management cannot be effective unless it includes soil erosion controls, pollution prevention, and storm water pollution prevention best management practices, all being implemented by a partnership of government entities, communities, and private landowners located within a defined watershed.

On the Island of Hawaii, there are few well-defined watersheds due to the young, highly permeable rock and soil deposits that tend to absorb precipitation without forming stream channels. PTA lies in the northwest Mauna Loa and the west Mauna Kea watersheds. There are no perennial surface streams, lakes, or other water bodies within the installation's boundaries due to porous soils and lava substrates. However, there are at least seven intermittent streams that drain surface water off the southwest side of Mauna Kea. None of these streams are listed as Impaired Waters in Hawaii according to 303(d) Clean Water Act (Koch et al. 2004).

## 4.11 Water Quality Management

There are no perennial water sources on PTA. The cantonment and BAAF slope gently to the west, which facilitates runoff. Temporary flooding and localized ponding is possible during heavy rain events; however, the soils in the area are permeable and the underlying lava flows contain sufficient secondary permeability that infiltration is rapid.

Drinking and facilities water is trucked onto PTA. Waste water is processed through septic tanks and underground injection wells and managed in accordance with federal and state regulations. The Army uses septic tanks and has an Underground Injection Control permit issued by the State Department of Health, Safe Drinking Water Branch.

## 4.12 Sustainable Range Program (SRP) and Integrated Training Area Management (ITAM)

### 4.12.1 Policy and Background

SRP works to maximize Army capability, availability, and accessibility of ranges and training lands to support doctrinal requirements, mobilization, and deployment under normal and surge conditions (AR 350-19, *The Sustainable Range Program*). The Range and Training Land Program (RTLP) and ITAM are the two core parts of SRP. RTLP provides central management, programming, policy, modernization of the Army's ranges, and day-to-day range operations. ITAM provides Army Range Officers the capability to manage and maintain training lands and supports training readiness by integrating mission

requirements with environmental requirements and sound land management practices with the intent of establishing policies and procedures that achieve optimum, sustainable use of training and testing lands.

ITAM is the Army's formal strategy to address optimum and sustained use of training lands. This uniform training land management program helps to ensure no net loss of training capability, an SAIA requirement. ITAM inventories and monitors land conditions, integrates training requirements with training land carrying capacity, educates land users to minimize adverse impacts, and provides training land rehabilitation and maintenance. The effective integration of stewardship principles into training land and conservation practices ensures that Army lands support training missions in a sustainable manner. Force readiness depends on the availability of high quality, realistic training lands. Several documents provide policy and procedural guidance for ITAM.

ITAM relies on its four components and integrated management from HQDA, Office of the Director of Environmental Programs, TRADOC Program Integration Office-Live, Army Commands, and the installations to accomplish its mission. The four ITAM components are Training Requirements Integration (TRI), RTLA, LRAM, and Sustainable Range Awareness (SRA).

- **Training Requirements Integration** is the decision support component that integrates training requirements for land use with natural resources conditions and capabilities to support doctrinal requirements.
- **Land Rehabilitation and Maintenance** programs, plans, designs, and executes land rehabilitation and maintenance projects to support and sustain the military mission.
- **Range and Training Land Assessment** inventories and monitors short and long-term effects of military activities on the physical and biological resources of PTA. RTLA also identifies potential LRAM projects and monitors LRAM project success.
- **Sustainable Range Awareness** improves land users' appreciation and understanding of the environment and the potential effects of unnecessary damage to training lands.

The GIS is a foundational support element in SRP that provides location information and assists land managers in making their decisions.

ITAM prepares a plan that describes multi-year ITAM programs and resource requirements for seven sub-installations (on Oahu—Dillingham Military Reservation, Schofield Barracks East Range, Kahuku Training Area, Kawailoa Training Area, Makua Military Reservation, and Schofield Barracks Military Reservation; on Hawaii—PTA). The plan reflects direction and guidance provided by the Range Management Authority, Range Division and the Training Resource Steering Committee. These two sources establish (1) project requirements and prioritization of projects that support current and future training operations, (2) enable coordination and integration of longer-term ITAM plans across the garrison, (3) serve as a driver for other plans (e.g., Range Development Plan), and (4) enable a quality annual work plan. The ITAM staff works closely and coordinates efforts with the NRO staff to ensure project compliance with state and federal regulations and laws as well as to complement work efforts when possible.

### 4.12.2 Scope of ITAM

The ITAM programs focus on training land management. Training lands include the following facility category groups: impact areas, maneuver areas, ordnance ranges, other mission-related training facilities, and roads, bridges, and tank/maneuver trails. ITAM funding supports the ITAM mission, goals, and objectives. ITAM funding is not intended to address or correct statutory compliance or conservation

requirements, perform routine range maintenance or modification, or replace normal base operations activities on training lands normally funded by other avenues.

#### 4.12.2.1 Training Requirements Integration

##### *Policy and Background*

Training Requirements Integration (TRI) is the component of ITAM that incorporates training requirements with land management, training management, and natural and cultural resources management processes. Integration of requirements occurs through continuous consultation between the Range Division-ITAM, Natural and Cultural Resources Managers, and the NRO staff. This activity is managed by the ITAM Coordinator at Schofield Barracks Military Reservation.

Land-use planning and management decisions meet training needs and regulatory compliance through interaction and coordination during the TRI process. Commanders rely on TRI to test the feasibility of new training demands and to recommend new courses of action.

##### *Current Management*

Meetings between Range Division, ITAM, and DPW occur biweekly addressing TRI activities for all Army training lands and ranges in Hawaii including PTA. The ITAM Coordinator and provides TRI assistance on PTA through information obtained from GIS analysis, RTLA assessments, LRAM assessments, and appropriate installation offices. Recommendations consider environmental compliance requirements, range facilities requirements, and landscape condition requirements.

##### *Future Considerations*

- ***Mission Safety***—Assessment and identification of sites requiring LRAM efforts for safety and improved training conditions (e.g., revegetation, application of palliatives, etc.).
- ***Mission Siting***—Assessment and identification of new sites to support future training needs. TRI utilizes ITAM component support to identify areas that physically and environmentally meet training needs. Further discussion and validation with the NRO staff supports subsequent NEPA efforts.
- ***Review and Comment***—The ITAM Coordinator is aware of training restrictions and understands training and environmental needs. The ITAM Coordinator provides trainers with scenarios to complement training restrictions.

The goals of ITAM are:

- Provide information and analysis to assist with range and training land planning, scheduling, and modernization and maintenance.
- Provide military trainers and land managers with the necessary technical and analytical information to support an integrated doctrinal-based training and testing within land constraints and maintain the land's carrying capacity.
- Coordinate and communicate land use needs and land management efforts between the Range and Natural Resources communities.
- Incorporate natural resources considerations (e.g., sensitive areas, federally listed species, etc.) into training scenarios, restrictions, and guidance.

#### 4.12.2.2 Land Rehabilitation and Maintenance

##### *Policy and Background*

Military activities can severely affect lands. In some instances, site conditions permit natural recovery. In other cases, intervention is required. In those situations, LRAM is the Army's first line of defense to

repair and rehabilitate training lands. LRAM is the ITAM component responsible for repair, maintenance, and reconfiguration of training lands to support sustainable and safe training. LRAM is "land stewardship." The program provides preventative and corrective rehabilitation and maintenance procedures for long-term sustainability.

Each installation identifies and executes projects specific to its installation. Projects are programmed, planned, designed, and executed. LRAM projects are designed to sustain military training lands, minimize rehabilitation and repair costs and improve safety. LRAM is an important link between the Training and Natural Resources communities.

### *Current Management*

General Projects/Tasks

- The LRAM Coordinator is responsible for identifying LRAM projects, developing scopes of works, submitting work requests to appropriate authorities, monitoring project execution to ensure compliance with environmental constraints, and verifying all request work was completed satisfactorily.
- Works closely with Range Control; Directorate of Public Works, Real Property; and the Environment Office to address pending concerns and projects, as well as with troop construction to execute projects.
- Installs Siebert stakes and signage for troop safety and to protect sensitive areas in construction areas.

Maintenance

- Uses best management practices and other resources and documents issues, design descriptions, materials, and costs for projects.
- Utilizes troop construction to repair, maintain, and reconfigure training lands
- Repair and maintenance is an ongoing function to include: maneuver trails, firing points, landing zones, training sites, maneuver lands, vegetation maintenance, and land reconfiguration to support emerging requirements.

### *Future Tasks/Considerations*

- Provide documentation to DPW, Real Property and NRO of the locations of base stationing areas, maneuver trails, and the locations of other improvements in KMA.
- Improve and maintain trails, land zones, firing points, bivouac area repair and maintenance.
- Ground softening at the BAX and other areas.

The goals of the Land Rehabilitation and Maintenance are to:

- Provide a safe and useful training environment that complements mission goals.
- Apply best management practices in designing and executing LRAM projects to ensure rehabilitation, repair, and maintenance results are commensurate with the applied resources.
- Maintain maneuver trails, firing points, and lands designated for light maneuver (e.g., facility category code/FCC 17710).
- Sustain the overall condition of training lands for long-term viability.
- Coordinate long-term land maintenance plans with other real property management programs.
- Ensure all relevant requirements cited in the 2003 USFWS biological opinion are executed and maintained.

- Work with NRO staff on projects of common interest (e.g., fugitive dust, revegetation, etc.) and siting new training activities.

#### 4.12.2.3 Range and Training Land Assessment

***Policy and Background***

The focus of Range Training Land Assessment (RTLA) is to provide information in support of land management decision processes for sustained mission use. This includes assessing impacts of mission activities; evaluating the capability of training lands and recommending options that enhance accessibility and capacity; providing land use, condition, and capability information; and monitoring land rehabilitation effectiveness.

***Current Management***

Monitor and Report

- Assess and evaluate training resources and training lands, including trails, lands, firing points, landing zones, and bivouac areas.
- Evaluate and collect data that addresses USFWS 2003 biological opinion requirements.
- Assess LRAM projects.

The goals of Range and Training Land Assessment are to:

- Assess impacts of training and testing activities and recommend options for sustained usage.
- Assess land management activities to maximize the capability, accessible, and availability of PTA lands to meet the training mission.
- Meet data assessments as required by USFWS biological opinions.

#### 4.12.2.4 Sustainable Range Awareness

***Policy and Background***

Warfare, by its very nature, is destructive to humans and their natural environment. Environmental damage is a consequence of combat. However, the U.S. military has historically exercised restraint, limiting damage to churches, monuments, archives, and libraries during times of war. Restraint has been incorporated into the decision-making process, and unnecessary environmental damage protects training areas for future use. Troops are required to prevent environmental problems by caring for those resources entrusted to them. This responsibility includes financial, material, and environmental stewardship. The Army integrates environmental values into its mission to sustain readiness, improve the Soldier's quality of life, strengthen community relationships, and provide sound stewardship.

Sustainable Range Awareness (SRA) is a component of ITAM that develops and distributes educational materials to users of range, training, and testing land assets. SRA is a proactive means of reducing the potential for inflicting avoidable impacts on range and training land assets, natural resources, and cultural resources by informing land users of restrictions, policies, and proactive actions. SRA is integrated into existing command and installation operational awareness activities and events (AR 350-19, *The Sustainable Range Program*, 30 August 2005), thereby applying appropriate environmental protection procedures during all types of operations (FM3-100.4, *Environmental Considerations in Military Operations*, 15 June 2000).

Typical SRA materials include Soldier field cards, posters, news articles, briefings, pamphlets and brochures, website and multi-media presentations, and maps and overlays designed to educate and support troops, leaders, and commanders in understanding their responsibilities to integrate environmental

and natural resources conservation procedures, policies, and requirements into mission training events. Some materials are generic and supplied through the Installation Support Training Division (e.g., playing cards).

### *Current Management*

- PTA has a Soldier field card that provides basic information needs for safe and environmentally responsible training. These cards contain information that is generic to all Hawaii installations, with specifics about PTA.

### *Future Considerations*

- ITAM is developing and providing a training awareness video, an updated Soldier Field Card, a smart phone application, and an online mapping program that will provide troops with an overview of the training requirements on the installation and the measures they need to take into consideration to ensure the long-term quality of the site.

The goals of Sustainable Range Awareness are to:

- Minimize resource damage by educating land users on how their activities impact the environment and to instill Soldier pride and stewardship in PTA lands.
- Meet the education requirements cited in the USFWS 2003 biological opinion.

# 5 IMPLEMENTATION

The SAIA requires not just preparation and update of an INRMP, but "implementation" of the INRMP. The following section discusses the definition and funding implications of implementation.

Implementation anticipates the execution of all "must fund" projects and activities in accordance with specific timeframes identified in the INRMP. A plan is considered to be implemented if an installation:

- Actively requests, receives, and uses funds for "must fund" projects and activities.
- Ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP.
- Coordinates annually with all internal and external cooperating offices.
- Documents specific INRMP action accomplishments undertaken each year.

Natural resource requirements defined by the Office of the Secretary of Defense as environmental "must fund" are those projects and activities required to meet recurring natural resources conservation management requirements or current natural resources compliance needs. The Army equivalent to Office of the Secretary of Defense's "must fund" projects are projects as described in classes 0, 1 and 2 in current Army policy and guidance for identifying Environmental Program requirements.

All projects listed in an INRMP are not necessarily environmental class 0 or 1. Implementation of INRMPs is a shared responsibility among those activities that use the land (e.g., trainers, facility managers, provost marshal) as well as those who ensure compliance and provide overall program oversight. Accordingly, projects necessary to implement INRMPs are not limited to environmental funds. However, INRMP should include all projects.

Projects are contained in Appendix 1, *Funding Classification, List of Projects, and Project Timeframe* and will be reviewed and updated annually upon completion of Army review and validation processes.

## 5.1 Natural Resources Implementation Goals and Objectives

Natural Resources Program management includes all the tasks required to plan, organize, implement, and operate the Natural Resources Program for PTA. The annual goals for the Natural Resources Office (NRO) are:

- Prepare, update, and submit an NRO "must fund" projects list.
- Develop, update, and execute an NRO work plan.
- Obtain and execute 100% of natural resource funding.
- Contribute to Installation Status Report and Army Environmental Database – Environmental Quality Report.
- Execute conservation implementation plans.
- Meet training needs of designated natural resources professionals.
- Recruit and train adequate staff to conduct natural resources tasks.
- Prepare, update, and execute cooperative agreements, Memoranda of Understanding, and Memoranda of Agreement to accomplish natural resources management.

## 5.2 Achieving No Net Loss of Training Lands to Military Mission

The Natural Resources Program through this INRMP (as well as ITAM) provides mitigation support for the military mission. INRMPs are implemented in accordance with the Sikes Act, DoDI 4715.03, and AR 200-1 on U.S. Army Installations. Most of the projects outlined in this document are required by the USFWS through its 2003, 2008, and 2013 biological opinions. The NRO has developed a detailed program and executes projects through its Natural Resources Program Plan (USAG-P 2016). The plan details actions that support the persistence and habitat enhancement of federally listed species on Army lands through the maintenance of fencing, continued efforts to ensure ungulate-free areas, the maintenance of the fuel break system, weed removal, genetic banking, and plant propagation, augmentation, and outplanting. Surveys are being conducted to better understand the Hawaiian hoary bat abundance and occurrence and seabird use of the installation and determine if military actions are having an adverse effect. The Army will work with the USFWS and the HI DLNR to ensure the military mission is sustained.

## 5.3 Supporting Sustainability of Military Mission

This INRMP is written with the intention of supporting military mission sustainability. INRMPs are implemented in accordance with the Sikes act, DoDI 4715.03, and AR 200-1 on U.S. installations.

## 5.4 Implementation Related Plans and Planning

### 5.4.1 Integrated Natural Resource Management Plan

Natural resource planning includes preparing, updating, implementing, and reviewing the INRMP annually.

### 5.4.2 Conservation Program Budget Planning

The Natural Resources and Cultural Resources programs make up the Conservation Branch. The purpose for the PTA Conservation (Natural Resources) Program budget planning is to gain approval and provide programmatic guidance to program managers and coordinators. The SAIA, as amended in 1998, and AR200-1 stipulate that planning level surveys, INRMPs, endangered species management plans (where required), and the implementation of these plans are required on all DoD lands. This INRMP outlines the steps and identifies the resources necessary to comply with the SAIA by supplementing the USAG-HI Conservation Program.

### 5.4.3 Conservation and Integrated Training Area Management Work Plans

The PTA Conservation Annual Work Plan of the Army Environmental Cost Standardization Program, tracks funding, obligations, and the execution of natural resource projects and tasks. Each project contains the following information: project name, priority, project number and name, description, funding required, funding allocated, funding obligated, year funded, agency (in-house or contractor), NEPA requirements, National Historic Preservation Act Section 106 requirements, other permit requirements, primary USAG-HI point of contact, project status, and comments.

The ITAM Plan is section 3.5 of the Range Complex Master Plan (RCMP) and integrates all ITAM component planning into a single cohesive plan. The ITAM Plan is updated annually following issuance of the Senior Commander Training Guidance and is reviewed and approved annually by the Range Management Authority, TSS Director, USARPAC, and final approval from the Senior Commander. The ITAM Workplan is created by the ITAM Coordinator and is located within the RCMP. The Workplan provides activity planning, costing, project management and tracking capabilities. All activities in the Workplan are linked to objectives in the ITAM Plan.

### 5.4.4 USFWS Mandatory Threatened and Endangered Species Management Plans

The biological opinion on *Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army Installations on the Island of Hawaii*, (1-2-2003-F-002) (2003) is used by the PTA NRO staff for planning, budgeting, and implementing for endangered species management. The Pohakuloa Natural Resources Plan (2016) is based off of this and two subsequent biological opinions (USFWS 2008, 2013).

## 5.5 Reporting

USAG-HI is responsible for submitting reports for funding requirements, funding work plans, and environmental quality status. USAG-HI must annually submit the Army's funding program (Environmental Cost Standardization Program), Army Environmental Database – Environmental Quality, the Installation Status Report; Part II, Environmental and Reimbursable Project Tracking System.

## 5.6 Cooperative Agreements

A priority for partnering and accomplishing work to implement this plan is through cooperative agreements. When applicable, an installation should enter into cooperative plans, in accordance with 16 USC 670c-1, with state and federal conservation agencies for the conservation and development of fish and wildlife, soil, outdoor recreation, and other resources.

### 5.6.1 Fish and Wildlife Cooperative Plan

As per the 1997 amendments to the SAIA, INRMPs replaced Fish and Wildlife Cooperative Plans by incorporating the planning, development, maintenance, and coordination of fish, wildlife, and game conservation.

### 5.6.2 Department of Defense Agreements

Memoranda of Understanding between DoD and other resources agencies provide the authority for installations to develop their own cooperative agreements in attainment of mutual conservation objectives with these agencies.

Memoranda of Understanding have been established between DoD and the Departments of Agriculture (March 27, 1963) and the Interior (April 7, 1978). The memoranda authorize execution of cooperative agreements to attain mutual conservation objectives. Installations may develop cooperative agreements with the following:

> In June 1999, the heads of participating federal agencies signed a MOU establishing the Cooperative Ecosystem Studies Unit Network. DoD joined the network in September 2000 and now serves as a council member and technical advisor on one of the Cooperative Ecosystem Studies Units (CESU). CESU provides research, technical assistance, and education to federal land management, environmental, and research agencies, and their partners. The CESU Network has several benefits: a broadened scope of scientific services for federal agencies, increased technical assistance to resource managers, additional scientific resources and opportunities for universities, and increased diversity of research scientists and institutions.

### 5.6.3 Other USAG-Pohakuloa Agreements

PTA works through the USAG-HI that has developed the following cooperative agreements to implement this plan and the Conservation Program.

- Cooperative agreement with The Trust for Public Lands to facilitate ACUB Program land purchases.
- Cooperative agreements with other natural resources agencies include University of Hawaii and Colorado State University.

## 5.7 Organizational Enhancement, Roles, and Responsibilities

### 5.7.1 Organization

The PTA Conservation Branch is a sub-component of the USAG-HI's Environmental Division (Figure 5-1). Under the Environmental Division are two branches, Compliance and Conservation. The Compliance Branch includes Clean Water, Asbestos, Lead, hazardous Waste, Recycling, EMS, and Clean up. The Conservation Branch includes NEPA, Pest Management, Cultural Resources and Natural Resources. Conservation Enforcement reports directly to the Provost Marshal's Office, while ITAM reports directly to the Range Division. Conservation Enforcement, ITAM, and the Conservation Branch share the goal of sustaining military lands for future use.

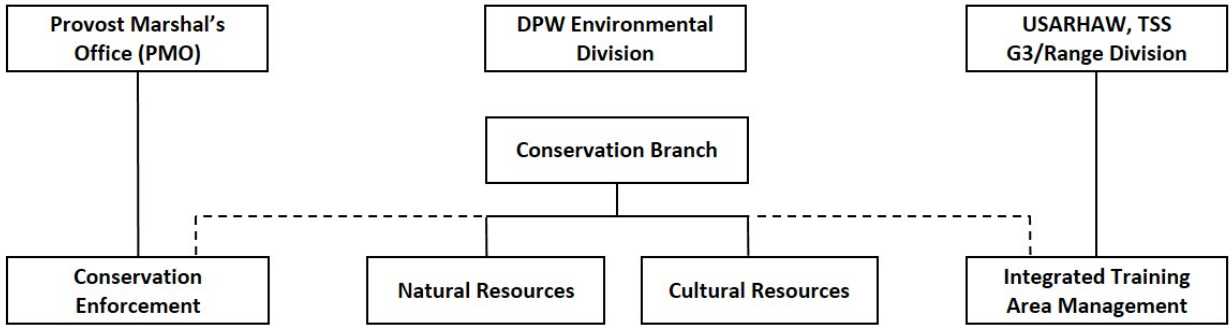


Figure 5-1 Conservation Branch Organizational Chart and Related Offices Sustaining Military Land Assets.

### 5.7.2 Staffing

The management and conservation of natural resources under Army stewardship is a government function. Therefore, the provisions of AR 5-20 (*Competitive Sourcing Program*) does not apply to the planning, implementation, enforcement, or management of Army natural resources management programs. This includes all positions (for example, professional, technical, equipment operators, natural resources law enforcement professionals, laborers, and so on) that have been validated as a requirement to perform natural resources management. However, support to the Natural Resources Program, where it is severable from management, planning, implementation, or enforcement actions of natural resources, may be subject to the provisions of this regulation. Personnel positions associated with activities that support (on an as-needed basis), the Natural Resources Program (e.g., equipment operators or laborers from a pool or another shop) may be subject to the provisions of AR 5-20 (*Competitive Sourcing Program*).

The ideal situation would be for all positions to be full-time, permanent federal positions. The workforce at PTA NRO will remain a blended workforce.

Table 5-1. USAG-Pohakuloa Positions Required to Implement the Integrated Natural Resources Management Plan.

| Department | Position Title | Current Positions | Category |
|---|---|---|---|
| NRO Program | Natural Resources Section Chief | 1 | Federal |
| NRO Program | NRO Biologist | 1 | Federal |
| NRO Program | Administrative Support | 4 | NFE* |
| NRO Program | Biologists | 17 | NFE |
| NRO Program | GIS | 1 | NFE |
| NRO Program | Technicians | 6 | NFE |
| NRO Program Total | | 30 | |
| Range Division Hawaii | ITAM | 2 | NFE |
| Range Division Hawaii | ITAM Technicians | 4 | NFE |
| Range Division Total | | 6 | |
| DA Police | Game Warden | 1 | Federal |
| DA Police Total | | 1 | |

* NFE= Non-federal employee

To ensure the necessary technical guidance in the planning and execution of the Natural Resources Program, natural resources and natural sciences professionals comprise the staffing. PTA will establish positions as needed and fill validated positions in accordance with current DoD/Department of Army policy. Positions required that meet SAIA requirements for the implementation of this INRMP are shown below in Table 5.1.

#### 5.7.2.1 Staffing Requirements

Full implementation of all Class 1, 2, and 3 category projects in this INRMP requires oversight by the NR Section Chief based in Oahu, a full-time federal NRO Biologist at PTA, and assistance from partners and cooperators, both signatory and otherwise. Specific needs from organizations external to PTA are indicated throughout this document. PTA requires expertise support from universities, agencies, and contractors to accomplish some tasks (non-federal employees/NFEs). NFEs do not commit or supply government resources or information in the U.S. Army's name. They are not doing government in nature work. PTA uses appropriate resourcing and authorities to obtain support services and supplies.

### 5.7.3 Federal In-house Capabilities

PTA has very limited in-house federal positions as a result of manpower restrictions. To meet the intent of the SAIA, an additional two to three federal positions are required for the planning, management, and enforcement of natural resources.

### 5.7.4 Federal Agency Support

PTA could utilize personnel support from other federal agencies; however, this option has not been used previously and is not anticipated to be used in the near future. These types of personnel meet SAIA requirements for "government in nature" positions for planning, management, and enforcement of natural resources.

### 5.7.5 State Agency Support

The Intergovernmental Personnel Act of 1972 (IPA) is a means to obtain personnel support. The IPA is a system where a federal or state agency "borrows" other federal or state agency personnel for a limited time for a specific job. Any state or federal agency is authorized to participate. The installation pays the borrowed employee's salary and administrative overhead. Major advantages are that personnel are not considered contractors and can represent and obligate the federal government. Manpower authorizations are not required. An IPA employee would be considered part of the USAG-HI staff and could be directly supervised by a federal employee. IPA employees are bound by ethics rules of both their home state/federal agency as well as federal ethics regulations of the organization they are temporarily assigned. These personnel meet SAIA requirements for "government in nature" positions for planning, management, and enforcement of natural resources.

### 5.7.6 Oak Ridge Institute for Science and Education Support

Another "borrowed personnel" option for securing manpower assistance is through the Oak Ridge Institute for Science and Education. Oak Ridge Associated Universities manage and operate the Oak Ridge Institute for Science and Education research participation program for the U.S. Department of Energy. Oak Ridge Institute for Science and Education is a consortium of 90 doctoral-granting colleges and universities, providing students and post graduates opportunities to gain experience in their respective fields by working on Army installations. Oak Ridge Institute for Science and Education program coordinators at the Army Environmental Command are points of contact for the program. Oak Ridge Institute for Science and Education personnel are appointed research participants who gain hands-on experience by completing multiple tasks for the duration of their employment.

Stipends are equivalent to salaries for employees hired with similar educational backgrounds with a 30% overhead. Oak Ridge Institute for Science and Education personnel can be appointed for a maximum three-year term. Installations may assist in the selection of Oak Ridge Institute for Science and Education personnel. These personnel support positions are not considered "government in nature."

### 5.7.7 University Assistance

Support to the Natural Resources Program, where it is severable from of management, planning, implementation, or enforcement, may be provided by on-site contract personnel. Due to the SAIA preference for other federal and state agencies with natural resource expertise, state universities are a preferred source of contract personnel support. PTA has used several universities in recent years to help with specialized needs. Colorado State University is the current cooperative agreement source at PTA. These on-site support positions are not considered "government in nature."

### 5.7.8 Contractor Support

As a final option for manpower assistance, PTA contracts businesses for tasks that are severable from management, planning, implementation, or enforcement of natural resources. Contractors give PTA access to a wide variety of expertise. Contractors may be used for projects such as plan preparation, NEPA documentation, aerial census and photography, LRAM implementation, and similar activities.

## 5.8 Coordination and Training

Staff coordination and communication can be challenging as Conservation staff reside at various locations on Oahu and Hawaii, hundreds of miles apart. A significant strength of the Conservation Program is the integration with other Army directorates, namely the Provost Marshall's Office and the Directorate of Plans, Training, Mobilization and Security (DPTMS). However, this split chain of command also makes communication and coordination difficult. In some cases, supervisors work in different locations from their staff. A blended workforce consisting of federal employees, IPA staff, university personnel, and contract personnel contributes to chain of command challenges. Therefore, PTA has instituted a framework of natural resource teams, in-progress reviews, and periodic training to meet these challenges.

### 5.8.1 Training

Interdisciplinary training is essential for DoD natural resource managers. Training addresses job disciplines, statutory compliance requirements, applicable DoD/Department of Army regulations, pertinent state and local laws, and current scientific and professional standards as related to the conservation of our nation's natural resources. The natural resource training objective is to identify technical requirements as well as the resources (cooperative agreements, Legacy, ITAM, Memoranda of Understanding, and so forth) available to implement and execute a successful and proactive program. The goal is to maintain and enhance the military mission, biodiversity, conservation stewardship, and management of the total ecosystem from the practical standpoint of day-to-day operations as well as long-term planning.

## 5.9 Decision Support

Decision support system goals and objectives all contribute to one or more of the overall Natural Resources Program goals of stewardship, military training support, compliance, quality of life, and integration. Decision support system goals and objectives are:

- Provide a decision support capability to natural resources, range, and engineer planners and managers.
- Develop and maintain PTA's GIS spatial database and data layers.
- Maintain GIS data in accordance with Federal Geographic Data Committee standards and Tri-Services Spatial Data Standards, including metadata standards.
- Coordinate and synchronize the three decision support systems: GIS, Range Facility Management Support System, and Integrated Facility System.

### 5.9.1 Geographic Information Systems (GIS)

The PTA GIS is a foundational capability of natural resource management. GIS is a computer-based tool capable of assembling, storing, manipulating, and displaying geographically referenced information, (i.e., data identified according to their locations). The system can be used to analyze and model (manipulate, overlay, measure, compute, and retrieve) the digital spatial data and display the new map products and tabular resources information showing the results of the spatial analysis. GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems.

### 5.9.2 Range Facilities Management Support System

The Range Facilities Management Support System (RFMSS) is a multi-user, personal computer, web-based software package that is used for scheduling, firing desk operations, and management functions at an installation Range Control Center. RFMSS was developed to optimize the scheduling, use, and operations and maintenance functions for an installation's live-fire ranges, maneuver training areas, and other related training facilities and assets under AR 210-21. The data from this system allows land managers (i.e., natural resources and ITAM managers) to identify ranges and training areas that may be overly impacted by training use and take appropriate action, such as allowing an area to rest and/or rehabilitate.

### 5.9.3 Integrated Facility System

The Integrated Facility System is a facility engineer automated information evaluation system that encompasses life cycle management of real property resources and is the Army Chief of Staff for Installation Management's official source of real property information. The current version is the Integrated Facility System–Micro or Mini. In addition to real property information, the system performs a

wide variety of other functions, such as work estimating and work-order tracking. The system has two levels; one for installation level and one for Headquarters level (now called Executive Information System). The U.S. Army Corps of Engineers' Center for Public Works manages the Integrated Facility System. The data from this system allows land managers (i.e., natural resources managers, ITAM managers, DPTM Range Division, and DPW personnel) to identify property owners, directorate or office of responsibility, and the appropriate funding mechanisms that is allowed to maintain the identified infrastructure, facility, or land.

### 5.9.4 Outreach

Outreach is another extremely foundational component of natural resources implementation. Each Natural Resources Program conducts outreach activities, and the Natural Resources Program management function integrates these efforts through the Conservation web page, Conservation newsletter, and participates in other outreach events.

## 5.10 Financial Management

A significant component of PTA Natural Resource Program management is financial management. Financial management consists of funding, budgeting, and contracting. These three components all are important to PTA's ability to implement this plan.

### 5.10.1 Funding

This document identifies the natural resources management and conservation requirements necessary for sustaining viable ecosystems, the military mission and compliance with relevant environmental laws (i.e., ESA). All requirements set forth in this INRMP requiring the expenditure of Hawaii funds are expressly subject to the availability of appropriations and requirements of the Anti-Deficiency Act (31 USC Section 1341). No obligation undertaken by Hawaii under the terms of this INRMP will require or be interested to require a commitment to expend funds not obligated for a particular purpose. If funding does not meet the level needed for full implementation, projects and efforts will be prioritized based on importance for mission sustainability and statutory compliance.

Projects classification is described in DoDI 4715.03 *Environmental Conservation Program*, 18 March 2011.

1. Recurring NR conservation management requirements
   A. Administrative
   B. Recurring associated with operation of facilities, day-to-day costs for an effective program as well as annual requirements (e.g., manpower, training, supplies, permits, fees, testing and monitoring, sampling and analysis, reporting, recordkeeping, maintenance of equipment and compliance self-assessments).
2. Non-Recurring NR management requirements
   A. Current compliance
      (1) Remedying compliance requirements (e.g., responding to an enforcement action).
      (2) Signed compliance agreement or consent order.
      (3) Meeting federal or state laws, regulations, standards, EOs, DoD policies.
      (4) Immediate or essential maintenance of operational integrity or military mission sustainment.
      (5) Projects or activities that will be out of compliance if not implemented in current program year.
         (a) Environmental analyses for natural resources conservation projects, and monitoring and studies required to assess and mitigate potential impacts of the military mission on conservation resources.
         (b) Planning documentation, master plans, compatible development planning, and INRMPs.

(c) NR planning level surveys.
(d) Reasonable and prudent measures included in incidental take statements of biological opinions, biological assessments, surveys, monitoring, reporting and assessment results, or habitat protection for listed, at-risk, and candidate species so that proposed or continuing actions can be modified in consultation with the USFWS or NOAA Fisheries Services.
(e) Mitigation to meet existing regulatory permit conditions or written agreements.
(f) Nonpoint source pollution or watershed management studies or actions need to meet compliance dates cited in approved state coastal nonpoint source pollution control plans.
(g) Wetlands delineation critical for prevention of adverse impacts to wetlands.
(h) Compliance with missed deadlines established in DoD executed agreements.

B. Maintenance Requirements—Projects and activities needed to meet an established deadline beyond the current program year and maintain compliance.
(1) Compliance with future deadlines.
(2) Conservation, GIS mapping, and data management to comply with federal, state, and local regulations, EOs, and DoD policy.
(3) Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives.
(4) Wetlands enhancement to minimize wetlands loss and enhance existing degraded wetlands.
(5) Conservation recommendations in biological opinions issued pursuant to the ESA.

C. Enhancement Actions beyond Compliance. Projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required by law, regulation, or EO, and are not of an immediate nature.
(1) Community outreach activities.
(2) Educational and public awareness projects, such as interpretive displays, wildlife checklists, and conservation teaching materials.
(3) Restoration or enhancement of natural resources when no specific compliance requirement dictates.
(4) Management and execution of volunteer and partnership programs.

Funding for INRMP projects are projected five years in advance through the Program Objective Memorandum (POM). Proper planning and management are necessary to set goals and objective years in advance. In general, there are three main focus areas for funding: staffing, compliance activities, and stewardship activities.

1. Staffing of federal employees is considered a “must fund” for budgeting purposes.

2. Activities and projects driven by requirements to comply with federal laws, applicable state laws, and applicable EOs are given the next priority for funding. Compliance is often split into two tiers of “must fund” and “will fund if funds are available” For the purposes of this INRMP, the top tier compliance activities include the ESA, MBTA, and NEPA. The second tier of compliance activities includes the SAIA and Invasive Species EO.

3. Stewardship, the responsibility to manage and conserve natural resources for the future, is essential to ensure sustainability of military lands for the mission and the environment. Oftentimes, stewardship efforts include natural resource projects that are proactive, noncompliance conservation efforts to maintain or enhance an installation’s natural resources that demonstrate environmental leadership and stewardship, conducting baseline surveys, and long-term monitoring. Stewardship projects that are not compliance/mission driven are the

lowest priority and accomplished when funding is available or alternate sources for completion are identified.

Natural resources management relies on a variety of funding mechanisms, some of which are self-generating and all of which have different applications rules. The following sections include general discussions about different sources of funding to implement an INRMP. Additional information on programming and budgeting can be found in DoDI 4715.03, *Environmental Conservation Program* (18 March 2011) Enclosure 4, *Programming and Budgeting Priorities for Conservation Programs*.

### 5.10.2 Environmental Program Funding

The request for environmental funds by an installation begins a minimum of six years out. This budget requests is reviewed by U.S. Army Installation Management Command, forwarded to the Department of the Army, and then to U.S. Congress for review and approval. Projects work their way through the six year review process. Only in extenuating cases are new environmental projects funded sooner, which usually results in the delay of other projects.

The Environmental Program Requirements process was formerly used to govern environmental funding. In 2005, the Army decided to adopt the Environmental Cost Standardization (ECS) model to develop an installation's environmental requirements that are predictable. The ECS model uses three processes: identifying requirements, programming for funds, and allocation of dollars actually received. The ECS model is still in development and each U.S. Army IMCOM Region uses its own methods to identify requirements, programming funds, and fund allocation. Environmental funding requirements are divided into two major areas: conservation and compliance.

Non-recurring projects (one-time projects) are addressed with the IMCOM web-based Status Tool for the Environmental Program. The tool is accessed through the Army Environmental Reporting Online portal. The data entered into STEP facilitates project review, approval, and prioritization process and the allocation and timing of funds. The project narrative and project priority are the two most important sections of STEP from the garrison perspective.

### 5.10.3 Environmental Conservation Funding

The purpose of environmental conservation funding is to enable the Army mission through the characterization, monitoring, compliance, and oversight of installation natural and cultural resources. Conservation funding allows Army managers to exercise stewardship of natural and cultural resources by the facilitation of the planned management via the INRMP and Integrated Cultural Resource Management Plan. Coordinating with facility managers, trainers, and other land users and implementing projects that help preserve, maintain, repair, and improve natural and cultural resources accomplish sustaining mission requirements.

### 5.10.4 Environmental Compliance Funding

The purpose of environmental compliance funding is to enable the Army mission, through the implementation of mandated actions, to protect and enhance environmental media from the negative effects of pollution and human alteration and to allow sustained access to and use of operational ranges to meet doctrinal training requirements. Most of these funding requirements are not covered in this INRMP; however, a few projects are intertwined with natural resources management.

### 5.10.5 Conservation Reimbursable Funding

Reimbursable programs support military readiness and land management, and revenues from these programs supplement base operations and other funding. Agriculture/grazing out-leases are authorized by 10 USC 2667(d), commercial forestry is authorized by 10 USC 2665, and the collection of fees to hunt, trap, or fish is authorized by 16 USC 670a. Reimbursable program may be used to enhance and maintain wildlife habitats. Revenues generated through fees to hunt, trap, or fish may be used for the protection,

conservation, and management of fish and game. The Army has about 800,000 acres of land leased under agriculture/grazing, and 1.4 million acres under some form of commercial forestry. The Army has executive agent responsibilities over the DoD Forestry Reserve Account.

## 5.10.6 Forestry Funds

Forestry funds are generated from sale of forest products on military lands. An installation may be reimbursed for all costs associated with the maintenance and disposition of forest products. Forestry funds must be used only for projects directly related to forest ecosystem management. Such projects include timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment, disease and insect control, planning (including compliance with laws), marking, inspections, sales preparations, personnel training, and sales. No lands on PTA are identified with forestry activities.

## 5.10.7 Agricultural Outlease Funds

The Army Agriculture/Grazing Outlease Program is a reimbursable program. This means that proceeds from outleases on an installation are first used to cover authorized expenses. Proceeds are allocated to the installations and U.S. Army Corps of Engineer Districts based on the Agricultural/Grazing Outlease protocol. The use of revenue from agricultural and grazing outleases are regulated by law. Revenues may be used for reimbursement of the administrative costs of outleasing and the financing of multiple-land use management activities through established budget procedures. Grazing may be used to manage fuel load on PTA. No funds are generated.

## 5.10.8 Fish and Wildlife Funds

DoD Fish and Wildlife Funds are collected through sales of permits for hunting, trapping, or fishing on military controlled lands. They are authorized by the SAIA and regulated by AR 200-1, and explained in DoDI 4715.03 enclosure 3, 6C(1)m DoDM4715.03 enclosure 7(1) All revenue collected from permit fees for hunting are maintained and used at the installation level to support wildlife and habitat management pursuant to section 670a(b)(3) of the Sikes Act. These funds may be used only for fish and wildlife management on the installation where they are collected. They cannot be used for recreational activities. They are exempt from equipment purchase amount limitations, and they do not expire (un-obligated funds carry over on 1 October). PTA has hunting fees.

## 5.10.9 Facilities Program Funding

Army facilities are funded with two types of funding: Base Operating Support and Facilities Sustainment, Restoration, and Modernization.

### *Sustainment, Restoration, and Modernization*

The purpose of sustainment funding is to enable the Army mission by funding the sustainment of range and other facilities in good working order to meet long-term doctrinal training requirements. The purpose of restoration funding is to restore failed or failing facilities, systems, and components damaged by a lack of sustainment, excessive age, fire, storm, flood, freeze, or other natural occurrences, and to improve facilities to current standards. Modernization funding adapts facilities to meet new standards and includes the erection, installation, or assembly of a new real property facility, the addition, expansion, extension, alteration, conversion, or complete replacement of an existing real property facility (*DoD Financial Management Regulation* 7000.14-R Chapter 8, *Facilities Sustainment, Restoration and Modernization*).

### *Real Property Services*

Real Property Services funding provides for those activities of an installation support nature. It includes those support elements and services identified as indirect overhead by Headquarters, Department of Army and grounds maintenance activities. This includes abatement and disposal of building hazardous waste resulting from the performance of real property services.

### *Sustainable Range Program Funding*

There are three types of Range Program funding that affect the management of natural resources: range operations, range modernization, and ITAM funding. Range operations funding provides for the operation and management of training ranges, range modernization funding upgrades range facilities, and ITAM funding rehabilitates and maintains training areas.

### *Integrated Training Area Management*

ITAM funding enables the Army mission by funding the management and maintenance of training lands to sustain and enhance the capability to meet long-term doctrinal requirements.

ITAM Program funding is not driven by regulatory statute, but is an integral component of the Army's land stewardship effort. ITAM projects are grouped into four categories (A-D) as defined in the ITAM Workplan Analysis Module Implementation Guidance, July 2007.

> Category A: Annual recurring requirements to provide baseline program staffing and operation.
>
> Category B: High priority repair and/or reconfiguration projects required to return degraded training area to useable condition.
>
> Category C: Medium priority repair, reconfiguration, and/or maintenance projects having minimal immediate adverse impact on training, but with potential for near-future significant impact.
>
> Category D: Low priority projects with no immediate adverse impact on training, but with potential for eventual impact. Category D projects may eventually elevate to Category C.

As with other programs in this INRMP, ITAM funding is projected five years in advance through the POM. Projects are conceived at the installation, and validated at IMCOM and HQDA levels prior to funds release. The installation submits an obligation report to IMCOM and HQDA at the end of each fiscal year.

### *Range Operations*

Range operations funding enables the Army mission by funding the operation of ranges and training lands to sustain long-term doctrinal training requirement. Range operations funding also provides for record keeping of the number and type of munitions fired, communication and coordination with local public on noise issues, and the design and installation of signage for access controls to ensure safety and security of range facilities.

### *Range Modernization*

Range modernization funding enables the Army mission by funding the design and construction of ranges and the acquisition of training lands that are capable of sustaining long-term doctrinal training requirements.

## 5.10.10 Other DoD Funding Sources

Installations also have the opportunity to apply for alternative funding from DoD programs.

### *Legacy Program*

The DoD Legacy Program funds projects with an emphasis on regional and DoD-wide activities, and not installation-specific projects except for national programs (e.g., National Public Lands Day or demonstration projects). Projects may support the military mission or meet legal or statutory requirements, support or leverage DoD conservation initiatives and programs, or attempt new or innovative conservation management on DoD lands. While PTA may seek Legacy funding, it is not expected to be a viable source for implementing this INRMP. PTA does partner with others on Legacy projects.

### *Strategic Environmental Research and Development Program* (SERDP)

The SERDP is DoD's environmental science and technology program, planned and executed in full partnership with the Department of Energy and the Environmental Protection Agency, with participation by numerous other federal and non-federal organizations. To address the highest priority issues confronting the Army, Navy, Air Force, and Marines, SERDP focuses on cross-service requirements and pursues high-risk/high-payoff solutions to the Department's most intractable environmental problems. The development and application of innovative environmental technologies support the long-term sustainability of DoD's training and testing ranges as well as significantly reduce current and future environmental liabilities. PTA does partner with others on SERDP projects.

### *Environmental Security Technology Certification Program* (ESTCP)

The ESTCP goal is to demonstrate and validate promising, innovative technologies that target the most urgent environmental needs of the DoD. These technologies provide a return on investment through cost savings and improved efficiency. The current cost of environmental remediation and regulatory compliance in the Department is significant. Innovative technology offers the opportunity to reduce costs and environmental risks. ESTCP offers funding in the following four focus areas: environmental restoration, munitions management, sustainable infrastructure, and weapons systems and platforms. PTA does partner with others on ESTCP projects.

### *Readiness and Environmental Protection Initiative*

Under authority of 10 USC 2684a, DoD may partner with state and local governments, and non-governmental organizations to acquire conservation easements on private lands from willing sellers, called Army Compatible Use Buffers (ACUB) by the Army. Readiness and Environmental Protection Initiative (REPI) serves to forestall incompatible land use and protect high-value habitat so that DoD retains the discretion to use military lands free of encroachment-related restrictions and environmental constraints. With REPI agreements and DoD cost-share funding, the acquisition of conservation easements creates "win-win" situations for all partners. Encroachment management is under by the Directorate of Community Affairs within USAG-HI.

## 5.10.11 Budgeting

The Environmental Division works together with the Directorate of Resource Management to manage the environmental budget. PTA uses work plans to communicate funding requirements to higher headquarters and to help manage the annual budget. PTA uses both an Environmental work plan (natural resources and cultural resources) and an ITAM Work Plan.

The Conservation Annual Work Plan is used to develop requirements, plan spending, and track funding, obligations, and execution for natural resource projects and tasks. Each project contains the following information: project name, priority, project number and name, description, funding required, funding allocated, funding obligated, year funded, agency (in-house or contractor), NEPA requirements, National Historic Preservation Act Section 106 requirements, other permit requirements, primary USAG-HI point of contact, project status, and comments. The Conservation Annual Work Plan is included as part of the Environmental Program work plan.

## 5.10.12 Contracting

The contracting process includes two primary components: purchase/acquisition and contract management. Purchase and acquisition is necessary to get a contract in place then contract management is necessary to ensure good communication between the government and contractor to enable good contract performance.

## 5.10.13 Purchase and Acquisition

The first step in the contract process is purchase and acquisition. PTA Environmental starts the process by clearly defining desired services in a statement of work, estimating costs, and initiating a purchase

request. PTA Environmental works together with a contracting agency to develop an acquisition strategy, using the SAIA priority to guide decision-making.

### *Sikes Act Priority for Contracting*

The SAIA Committee Report defined natural resources management and conservation as "inherently governmental." Planning, implementing, enforcing, and managing Army natural resources cannot be contracted. The first priority for implementation of this plan will be to use the PTA in-house workforce. PTA in-house capabilities include permanent natural resources employees, other Public Works organizations (such as roads and grounds, carpentry shop, etc.) and troop projects. These methods are usually the least expensive, but tend to be the least flexible. All funds obligated toward in-house work must be expended in the current fiscal year.

Support to the Natural Resources Program, where it can be separated from management, planning, implementation, or enforcement actions of natural resources, may be contracted. The SAIA outlines priorities for contracting these implementation projects. When entering into contracts for services that implement natural resource management objectives or enforce natural resources laws (i.e., wildlife management and endangered species plans and surveys), priority is given to contracts with federal, state, and local agencies with responsibility for natural resources conservation. In other words, if an installation cannot utilize governmental personnel to do natural resources conservation technical support, then other federal and state natural resources agencies have, by this law, a "right of first refusal" to accept this work. In such cases, competitive bids are not required.

When in-house staff or cooperating federal and state agencies cannot perform work, PTA looks to various contract mechanisms. The Government Services Administration environmental services schedule provides companies that have already gone through an open bid process to be on the Government Services Administration contract. Contracting to one of these companies is relatively simple and fast. The Job Order Contract in place for PTA provides quick and efficient service. However, when none of these other options is available, PTA can use the open bid process through a contracting agency. DoD Directive 5124.09 describes the Total Force management (2014).

### *Documents Required for Acquisition and Purchased*

The Economy Act of 1932, as amended, allows federal agencies to obtain services directly from other federal agencies or utilize contracts already in place by other federal agencies. The Military Interdepartmental Purchase Request is used to acquire natural resource conservation services. Natural resources support services may be obtained non-competitively, through contracts with state and local agencies. In this case, a purchase request must be submitted through the Directorate of Resource Management to a contracting agency. Conservation personnel work together with the contracting agency to develop an acquisition strategy, statement of work, and government estimate. The government must prepare a statement of work and government estimate for each purchase request.

### *Contract Management*

DoDI 4715.03 enclosure 3(1)(k) and DoDM 4715.03 enclosure 7(1) note conventional procurement methods, as well as cooperative agreements (16 USC 670c-1 of Reference (k)), may be used to accomplish work identified in installation INRMPs. According to section 21.210 of title 32, Code of Federal Regulations (Reference (v)), the authority and responsibility for awarding grants and cooperative agreements is vested in the Head of each DoD Component that has such authority. Priority is given for the procurement of INRMP implementation and enforcement services to Federal and State agencies having responsibility for the conservation or management of fish and wildlife in accordance with section 670a(d) of Reference (k).

### 5.10.14 Command Support

Command support is essential to implement this INRMP. Without this support, priority projects for natural resources management will not occur. Failure to execute these projects risks violation of environmental laws, reduced mission readiness, and negative public reaction to a lack of environmental stewardship. The Installation Commander is responsible for compliance with environmental laws and sets the tone for environmental stewardship. Command emphasis on this INRMP ensures a healthy environment, sustainable resources, and quality future training lands.

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# 7 Apendices

## 7.1 Appendix 1. Funding Classification, List of Projects, Project Timeframe

## Appendix 1. – Funding Classification, List of Projects, Project Timeframe

The projects for the Pohakuloa Integrated Natural Resources Management Plan (INRMP) are based on the execution of the Pohakuloa Program Plans that are required for the execution of an installation's natural resources program.

Project classification is described in DoDI 4715.03 *Environmental Conservation Program*, 18 March 2011. This classification system provides more detail parsing of projects than the 1996 version, which is more simplistic. Both systems are used for classification.

**DoDI 4715.3, 18 March 2011** (modified)**:**

1. Recurring NR Conservation Management Requirements

   A. Administrative
   B. Recurring associated with operation of facilities, day-to-day costs for an effective program as well as annual requirements (e.g., manpower, training, supplies, permits, fees, testing and monitoring, sampling and analysis, reporting, recordkeeping, maintenance of equipment and compliance self-assessments.

2. Non-Recurring NR Management Requirements

   A. Current compliance
      (1) Remedying compliance requirements (e.g., responding to an enforcement action)
      (2) Signed compliance agreement or consent order
      (3) Meeting Federal or State laws, regulations, standards, EOs, DoD policies
      (4) Immediate or essential maintenance of operational integrity or military mission sustainment
      (5) Projects or activities that will be out of compliance if not implemented in current program year.
         (a) Environmental analyses for natural resources conservation projects, and monitoring and studies required to assess and mitigate potential impacts of the military mission on conservation resources.
         (b) Planning documentation, master plans, compatible development planning, and INRMPs
         (c) NR planning level surveys
         (d) Reasonable and prudent measures included in incidental take statements of biological opinions, biological assessments, surveys, monitoring, reporting and assessment results, or habitat protection for listed, at-risk, and candidate species so that proposed or continuing actions can be modified in consultation with the USFWS or NOAA Fisheries Services.
         (e) Mitigation to meet existing regulatory permit conditions or written agreements.
         (f) Nonpoint source pollution or watershed management studies or actions need to meet compliance dates cited in approved State coastal nonpoint source pollution control plans.
         (g) Wetlands delineation critical for prevention of adverse impacts to wetlands
         (h) Compliance with missed deadlines established in DoD executed agreements.
   B. Maintenance Requirements—Projects and activities needed to meet an established deadline beyond the current program year and maintain compliance.
      (1) Compliance with future deadlines
      (2) Conservation, GIS mapping, and data management to comply with Federal, State, and local regulations, EOs, and DoD policy.

(3) Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives
(4) Wetlands enhancement to minimize wetlands loss and enhance existing degraded wetlands
(5) Conservation recommendations in biological opinions issued pursuant to the ESA.

C. Enhancement Actions beyond Compliance. Projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required by law, regulation, or EO, and are not of an immediate nature.
(1) Community outreach activities
(2) Educational and public awareness projects, such as interpretive displays, wildlife checklists, and conservation teaching materials
(3) Restoration or enhancement of natural resources when no specific compliance requirement dictates
(4) Management and execution of volunteer and partnership programs.

**DoDI 4715.3, 3 May 1996:**

- Class 0: Recurring Natural and Cultural Resources Conservation Management Requirements. Class 0 shall contain any INRMP action necessary to rehabilitate or prevent resource degradation that may affect military readiness. (This includes the staffing of federal employees)

- Class 1: Current Compliance Requirements. Class 1 contains requirements to manage species and habitats of concern to prevent listing of species that could affect military readiness. (Compliance activities, which includes ESA, MBTA, and NEPA actions.)

Class 2 and 3 projects and actions enhance an installation's natural resources.

- Class 2: Maintenance Requirements

- Class 3: Enhancement Actions beyond Compliance. (Stewardship—management and conservation of natural resources for the future. Actions that are proactive, non-compliance conservation efforts that demonstrate leadership and stewardship)

Those programs and related projects outside of the control of the USAG-Pohakuloa Natural Resources Office are noted as not applicable (NA) under Funding Class.

Class 0 and 1 projects for Pohakuloa are estimated at (times a $1,000):

| | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| 4.1 Species Management | $ - | $ - | $ - | $ - | $ - |
| 4.2 Soil Surveys and Erosion | $ - | $ - | $ - | $ - | $ - |
| 4.3 Climate Change | $ - | $ - | $ - | $ - | $ - |
| 4.4 Pest Management | $ - | $ - | $ - | $ - | $ - |
| 4.5 Community Involvement and Education | $ - | $ - | $ - | $ - | $ - |
| 4.6 Bird/Wildlife Aircraft Strike Hazard | $ - | $ - | $ - | $ - | $ - |
| 4.7 Wildland Fire Management | $ - | $ - | $ - | $ - | $ - |
| 4.8 Training of Natural Resources Personnel | $ - | $ - | $ - | $ - | $ - |

| | | | | | |
|---|---|---|---|---|---|
| 4.9 Law Enforcement of Natural Resources Laws and Regulations | $ - | $ - | $ - | $ - | $ - |
| 4.10 Coastal/Marine Management | $ - | $ - | $ - | $ - | $ - |
| 4.11 Water Quality Management | $ - | $ - | $ - | $ - | $ - |
| 4.12 Sustainable Range Program and Integrated Training Area Management | $ - | $ - | $ - | $ - | $ - |
| | $4,704 | $4,800 | $4,896 | $4,994 | $5,094 |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| **4.1 Threatened and Endangered Species Management** | | | | | | | | |
| **Natural Resources Program Plan Implementation** | | | | | | | | |
| PTA Natural Resources Office Program Plan Costs. | NR Program | 1 | 1.A. | $4,704 | $4,800 | $4,896 | $4,994 | $5,094 |
| Document projects with goals, objectives methods, equipment, timing, staff, data analysis, and reporting. | NR Program | 0 | 1.A. | x | x | x | x | x |
| Plan and implement avoidance, minimization, and conservation measures and terms and conditions from biological opinions (2003, 2008, 2013). | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |
| Update as needed the PTA NRO Program Plans. | NR Program | 0 | 2.A.(5)(b) | x | x | x | x | x |
| **Botanical Program** | | | | | | | | |
| Develop Botanical Program plan to address regulatory requirements for federally listed plants. | NR Program | 0 | 2.A.(5)(b) | x | x | x | x | x |
| Various actions as required for 15 federally listed plants by USFWS. | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |
| Maintain database, analyze, and report data. | NR Program | 0 | 2.B.(2) | x | x | x | x | x |
| **Plant Survey and Monitoring** | | | | | | | | |
| Survey large-scale fence units on a five-year cycle (i.e., Planning Level Surveys) to locate and document listed plant species. | NR Program | 0 | 2.A.(5)(c) | x | x | x | x | x |
| Annually evaluate listed plant priority rankings and adjust management initiatives. | NR Program | 0 | 2.A.(4) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| Evaluate existing Areas of Species Recovery, establish new ASRs as needed. | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |
| Document by voucher all plant species present on Pohakuloa. | NR Program | 2 | 2.B.(2) | x | x | x | x | x |
| Monitor listed plants for status trends and emergent threats. | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |
| Monitor tree land vegetation trends for bat roosting habitat. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Monitor vegetation response to applied management actions. | NR Program | 3 | 2.A.(5)(a) | x | x | x | x | x |
| Monitor vegetation within large-scale fence units to document recovery after feral ungulate removal. | NR Program | 3 | 2.A.(5)(a) | x | x | x | x | x |
| **Plant Genetic Conservation, Propagation, and Outplanting** | | | | | | | | |
| Collect and store genetic propagules of listed and native plant species. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Database/catalog seed inventory. | NR Program | 0 | 2.B.(2) | x | x | x | x | x |
| Develop/document germination and planting protocols. Document lessons learned. | NR Program | 0 | 2.A.(5)(b) | x | x | x | x | x |
| Establish mechanism for long-term storage at seed lab facility (e.g., National Seed Storage Lab) and with other agencies. | NR Program | 0 | 1.B. | x | x | x | x | x |
| Propagate and outplant rare species, assess success rate, and report. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2019 | 2020 | 2021 | 2022 | 2023 |
| Propagate and outplant common native to improve listed species habitat. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Maintain and operate the Rare Plant Propagation Facility | NR Program | 0 | 1.B. | x | x | x | x | x |
| Establish and maintain an MOU and/or access permits with off-site outplanting land owners, as needed. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| **Invasive Plants Program** | | | | | | | | |
| Develop Invasive Plants Program Plan to address regulatory requirements for federally listed plants. | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |
| Various actions as required for 15 federally listed plants by USFWS. | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |
| Document numerical and spatial data of invasive plants. | NR Program | 1 | 2.B.(2) | x | x | x | x | x |
| Maintain database, analyze, and report data. | NR Program | 0 | 2.B.(2) | x | x | x | x | x |
| Examine the literature for new controls of primary and secondary target weeds such as: fireweed (*Senecio madagascariensis*), fountain grass (*Cenchrus setaceus*), and chandelier plant (*Kalanchöe tubiflora*). | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Work with outside agencies on bio-controls of non-native invasive species. | NR Program | 2 | 2.A.(5)(d) | x | x | x | x | x |
| **Vegetation Control** | | | | | | | | |
| Control invasive plant species around federally listed and rare plants. | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| Manage weed species within ASRs to 90% weed-free cover around listed plants. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| **Invasive Plants Survey and Monitoring** | | | | | | | | |
| Control secondary target weeds that are reducing habitat quality for listed species, such as bat roosting habitat. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Monitor and control prioritized and targeted invasive species occurring on Pohakuloa. | NR Program | 1 | 2.A.(5)(a) | x | x | x | x | x |
| Survey along roads and near the airfield for new introductions of plants. | NR Program | 1 | 2.A.(5)(a) | x | x | x | x | x |
| Control invasive species within and adjacent to landing zones, trails, and roadsides. | NR Program | 1 | 2.A.(5)(a) | x | x | x | x | x |
| Treat/eradicate all newly introduced plants. | NR Program | 1 | 2.A.(5)(a) | x | x | x | x | x |
| **Fuels Control** | | | | | | | | |
| Survey prior to the construction and improvement of fire access roads and fuel breaks. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Keep fire access roads and fuel breaks clear of vegetation and dense fuels and keep maintained. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Survey Fuel Monitoring Corridors every 5 years. | NR Program | 0 | 2.A.(5)(c) | - | - | - | x | - |
| **Wildlife Program** | | | | | | | | |
| Develop Wildlife Program Plan to address regulatory requirements for federally listed animals and the control of wildlife threats to federally listed species. | NR Program | 0 | 2.A.(5)(b) | x | x | x | x | x |
| Various actions as required for federally listed animals by USFWS. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2019 | 2020 | 2021 | 2022 | 2023 |
| Maintain database, analyze, and report data. | NR Program | 0 | 2.B.(2) | x | x | x | x | x |
| Monitor and report to USFWS all incidental take for listed animals, including hazing events for geese.** | NR Program | 0 | 2.A.(5)(e) | x | x | x | x | x |
| Educate military units and installation personnel to avoid and/or minimize incidental take and/or negative impacts listed animals. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Provide annual reports to the FWS summarizing incidental take and other required information per the take statement for each federally listed animal. ** | NR Program | 0 | 2.A.(3) | x | x | x | x | x |
| Support other agency studies. | NR Program | 3 | 2.B.(3) | x | x | x | x | x |
| **Hawaiian Goose Management** | | | | | | | | |
| Support military training by hazing geese when required and applicable. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Monitor Hawaiian Goose (*Branta sandvicensis*) presence, breeding activity, and habitat use at PTA. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Work with Federal and State partners to limit impacts to military training from nesting geese at PTA. | NR Program | 0 | 2.A.(5)(a) | x | x | x | x | x |
| Control predators for and/or protect nests, eggs, goslings, and molting geese in management areas as deemed necessary. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Work in partnership to enhance goose breeding conditions outside PTA to meet BO terms and conditions. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| **Hawaiian Hoary Bat Management** | | | | | | | | |
| Develop and implement a Hawaiian hoary bat (*Lasiurus cinereus semotus*) species conservation plan per 2003 BO terms and conditions | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Monitor Hawaiian hoary bat occupancy for spatial and temporal trends. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Monitor hectares of treeland vegetation destroyed outside the Impact Area as an indirect measure of incidental take and report annually to USFWS. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Notify the USFWS within 24 hours of a training-related fire that burns treeland vegetation outside the Impact Area.** | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Inspect all barbed wire security fences monthly for bat entanglements. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Address shrubland and woodland habitat enhancement and restoration to offset bat habitat degradation. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Identify minimization measures needed to offset impacts to the bat at PTA. | NR Program | 0 | 2.A.(5)(d) | x | - | - | - | - |
| **Seabird Management** | | | | | | | | |
| Determine a methodology to investigate listed seabird flyways at PTA | NR Program | 0 | 2.A.(5)(d) | x | x | - | - | - |
| Survey the Band-rumped storm petrel (*Oceanodroma castro*) breeding colony. | NR Program | 0 | 2.A.(5)(d) | x | x | - | - | - |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2019 | 2020 | 2021 | 2022 | 2023 |
| Manage the Band-rumped storm petrel colony as required by regulatory documents. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Provide predator control in known areas with storm petrels. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Determine if a predator control plan needs to be developed and develop if appropriate | NR Program | 0 | 2.A.(5)(d) | | x | x | | |
| **Avian Monitoring and Migratory Bird Management** | | | | | | | | |
| Annually monitor for Palila (*Loxiodies bailleui*). | NR Program | 0 | 1.B. | x | x | x | x | x |
| Implement actions consistent with DoD Partners in Flight strategic plan. | NR Program | 3 | 2.A.(5)(d) | x | x | x | x | x |
| Develop a Migratory Bird Management Plan. | NR Program | 1 | 2.A.(5)(b) | x | $20K | x | x | x |
| Survey for migratory species. | NR Program | 1 | 2.A.(5)(c) | x | x | x | x | x |
| Make migratory bird information available for NEPA documentation and installation plans.** | NR Program | 1 | 2.A.(3) | x | x | x | x | x |
| Analyze impacts form proposed “Military Readiness Activities” and non-readiness activities to develop NEPA documents. ** | NR Program | 1 | 2.A.(5)(a) | x | x | x | x | x |
| Implement minimization measures that result from NEPA decisions. | NR Program | 1 | 2.A.(5)(a) | x | x | x | x | x |
| Determine if military activities are “taking” or “harming” migratory species and report to USFWS as required.** | NR Program | 1 | 2.A.(3) | x | x | x | x | x |
| Identify habitats and enhancement actions for migratory bird species. | NR Program | 3 | 2.A.(3) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| Determine if feral animals affect migratory bird species. | NR Program | 3 | 2.A.(3) | x | x | x | x | - |
| **Native Invertebrate Species Management** | | | | | | | | |
| Survey for federally listed Anthracinus yellow-faced bee (*Hylaeus anthracinus*). | NR Program | 0 | 2.A.(3) | x | - | - | - | - |
| Implement management for *H. anthracinus* as required by regulatory documents. | NR Program | 0 | 2.a.(3) | - | x | - | - | - |
| Survey and inventory rare, environmentally-sensitive, and keystone arthropod tax. Design monitoring plans as needed. | NR Program | 3 | 2.A.(3) | x | x | - | - | - |
| Survey for the wingless weevil, *Rhyncogonus stellaris*. | NR Program | 3 | 2.A.(3) | - | - | x | - | - |
| Survey for the Hawaiian helicoverpa moth (*Helicoverpa confusa*). | NR Program | 3 | 2.A.(3) | - | - | x | - | - |
| Determine insect pollinators for rare native plants. | NR Program | 2 | 2.B.(3) | x | x | x | x | x |
| Identify taxa and distribution of rare land snails. | NR Program | 3 | 2.A.(3) | - | - | - | x | x |
| Implement recommendations of previous invertebrate studies and monitoring results. | NR Program | 3 | 2.A.(3)<br>2.B.(3) | - | - | x | x | x |
| Use contracted hunters to remove and maintain ungulate-free fence units | | | | | | | | |
| Use contracted hunters to remove introduce ungulates for large-scale conservation fence units and maintain the units ungulate-free. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Use radio-collared ungulates to track other ungulates. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2019 | 2020 | 2021 | 2022 | 2023 |
| Monitor fences for ungulate damage and repair as necessary. | NR Program | 0 | 1.B. | x | x | x | x | x |
| Use and maintain emergency fencing as necessary. | NR Program | 0 | 1.B. | x | x | x | x | x |
| Control newly introduced invasive species within and adjacent to landing zones, trails, and roadsides. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Document reports of snakes and lizards, and eradicate, when possible, new animal introductions. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Inventory and manage pest ants and wasps. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Assess effects of alien insects on native plants and native pollinators. | NR Program | 3 | 2.B.(3) | x | x | x | x | x |
| Control aphids and fungus on *Haplostachys haplostachya.* | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Work to institute broad- scale application of rodenticide. | NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Control rodents within ASRs for plants as needed. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Trap in areas requiring feral cat and mongoose control. | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| **Game Management** | | | | | | | | |
| Survey game mammal populations to establish population trends and to guide decisions for allowing hunting in specific units. | NR Program | 3 | 2.C.(3) | x | x | x | x | x |
| Install and maintain minimal infrastructure, such as game bird watering units, to support game populations to sustainably meet public hunting pressure. | NR Program | 3 | 2.C.(3) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| Coordinate hunting access with Range Division and Emergency Management Services Law Enforcement personnel. | NR Program | 3 | 2.C.(3) | x | x | x | x | x |
| Liaison with the public to address access and other hunting-related concerns.** | DA Police | NA | NA | x | x | x | x | x |
| Maintain hunting in Unit F under the control of the Commander.** | NR Program | 3 | 2.C.(3) | x | x | x | x | x |
| Continue to provide access for bird dog training.** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |
| Coordinate with and provide access to DOFAW as the manager of hunting and associated game management.** | NR Program | 3 | 2.C.(3) | x | x | x | x | x |
| **Ecological Data Program** | | | | | | | | |
| Develop and maintain data management systems including databases and geodatabases for federally listed species. | NR Program | 1 | 2.B.(2) | x | x | x | x | x |
| Provide technical documentation and writing support for the NR staff. | NR Program | 1 | 2.B.(2) | x | x | x | x | x |
| Provide technical advice on experimental design, sampling methodology, and statistical analysis including data modeling. | NR Program | 1 | 2.B.(2) | x | x | x | x | x |
| **AR200-1 Requirement for Natural Resources Management** | | | | | | | | |
| Maintain a fully trained GIS technician on the NR staff. | NR Program | 0 | 2.B.(2) | x | x | x | | x |
| Provide accurate and timely GIS support to the NR staff. | NR Program | 0 | 2.B.(2) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| Create an NR management action tracking database. | NR Program | 0 | 2.B.(2) | x | x | x | x | x |
| **Technical Assistance to the Army** | | | | | | | | |
| Provide NRO expertise and support to the Army through data acquisition, evaluation, and synthesis; mapping and graphics support; and document preparation.** | NR Program | 1 | 2.B.(2) | x | x | x | x | x |
| **4.2 Soil Surveys and Erosion** | | | | | | | | |
| Develop a map that ranks soil erosion potential based on changes in vegetation cover. | ITAM | NA | 2.B.(2) | x | - | - | - | - |
| Address soil erosion and resiliency in the KMA via work executed by USGS. | ITAM | NA | 2.A.(5)(d) | x | - | - | - | - |
| **4.4 Pest Management** | | | | | | | | |
| **USFWS (2003) Biological Opinion Support** | | | | | | | | |
| Transport of clean vehicles off of the Island of Hawaii. | Range Control/G3 | NA | 2.A.(5)(d) | x | x | x | x | x |
| **Invasive Species Management** | | | | | | | | |
| Monitor prioritized and targeted invasive species occurring on Pohakuloa.* | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| Prepare Environmental Awareness materials to help land users (e.g., military, contractors, visitors, etc.) understand the effect of introducing non-native plants and animals.* | NR Program | 1 | 2.A.(5)(d) | x | x | x | x | x |
| **4.5 Community Involvement and Education** | | | | | | | | |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| **Public Outreach/Community Planning** | | | | | | | | |
| Provide materials to support environmental impact statements and assessments.** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |
| Hire an outreach coordinator for the NR Program.* | NR Program | 3 | 2.C. | x | x | x | x | x |
| Provide materials to support information needs at public meetings and other groups.** | NR Program | 1 | 2.C.(2) | x | x | x | x | x |
| Develop an active volunteer program where volunteers help complete required natural resource management actions.* | NR Program | 3 | 2.C.(4) | x | x | x | x | x |
| **Outdoor Recreation** | | | | | | | | |
| Explore new outdoor recreational opportunities and community activities. | USAG-HI | 2 | 2.C.(1) | x | x | x | x | x |
| Support public hunting for feral ungulate and game birds. ** | USAG-HI | 2 | 2.C.(1) | x | x | x | x | x |
| **Educational Initiatives** | | | | | | | | |
| School outreach programs.** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |
| Promote Earth Day and continue installation tours. ** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |
| Develop educational materials (posters, pamphlets, kiosk, etc.).** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |
| Encourage employee participation at local and national meetings.** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| Work to make information available about Pohakuloa resources to the public (e.g., website).** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |
| Continue to provide articles to the installation newsletter, to Hawaii Army Weekly, and other sources.** | NR Program | 3 | 2.C.(2) | x | x | x | x | x |
| **4.6 Bird/Wildlife Aircraft Strike Hazard** | | | | | | | | |
| Actively implement a BASH program to protect aircrews, aircraft, and protected species. | Engineering Branch-DPW | 1 | 2.A.(3) | x | x | x | x | x |
| Manage wildlife and the area surround Bradshaw Army Airfield to prevent strike hazards. | Engineering Branch-DPW | 1 | 2.A.(3) | x | x | x | x | x |
| Educate military units, PTA personnel to report all bird/wildlife strikes to Natural Resources.** | NR Program | 1 | 2.A.(3) | x | x | x | x | x |
| **4.7 Wildland Fire Management** | | | | | | | | |
| Refine Fire Danger Rating System. | Directorate of Emergency Services/ NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Address fire related issues associated with the location of Saddle Road through KMA. ** | Directorate of Emergency Services/ NR Program | 0 | 2.A.(5)(d) | x | x | x | x | x |
| Update Integrated Wildland Fire Management Plan.** | Directorate of Emergency Services/ NR | 0 | 2.A.(5)(b) | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| Develop Environmental Awareness materials with ITAM on fire prevention, Fire Danger Rating System, non-native species and their contribution to increased fire, rules on smoking, cars with catalytic converters, etc.** | Directorate of Emergency Services/ ITAM | 0 | 2.A.(5)(d) | x | x | x | x | x |
| **4.8 Training of Natural Resources Personnel** | | | | | | | | |
| Federal employees complete all annual and job related DoD and DA training requirements. | NR Program | 0 | 1.B. | x | x | x | x | x |
| **4.9 Law Enforcement of Natural Resources Laws and Regulations** | | | | | | | | |
| Provide access control and other physical security to Pohakuloa | Pohakuloa DA Police | NA | NA | x | x | x | x | X |
| Utilize signage, pamphlets, and internet to explain access information | Pohakuloa DA Police | NA | NA | x | x | x | x | x |
| **4.10 Costal/Marine Management** | | | | | | | | |
| Review proposed activities at Kawaihae harbor for potential effects to threatened and endangered species and/or Essential Fish Habitat.** | NR Program | 0 | 1.A.(5)(b) | x | x | x | x | x |
| Initiate consultations with the National Maine Fisheries Service (NMFS) as needed.** | NR Program | 0 | 2.A.(3) | x | x | x | x | x |
| **4.11. Water Quality Management** | | | | | | | | |
| Review activities that may effect intermittent streams.** | NR Program | NA | NA | x | x | x | x | x |
| *Covered in PTA Natural Resources Program Plan costs. | | | | | | | | |
| **Costs are inherent in funding for government positions within the installation. | | | | | | | | |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|
| **4.12 Sustainable Range Program and Integrated Training Area Management** | | | | | | | | |
| **SRP Geographical Information Systems (GIS)** | | | | | | | | |
| Implement fiscal year projects consistent with the ITAM Work Plan. | ITAM | NA | NA | x | x | x | x | x |
| Coordinate and share GIS data between SRP and NR staff. | ITAM/NR Program | NA | NA | x | x | x | x | x |
| Work to identify and maintain data quality standards between working groups. | ITAM/NR Program | NA | NA | x | x | x | x | x |
| **Training Requirement Integration** | | | | | | | | |
| Implement fiscal year projects consistent with the ITAM Work Plan. | ITAM | NA | NA | x | x | x | x | x |
| Conduct site surveys (e.g., bivouac). | ITAM | NA | NA | x | x | x | x | x |
| Use training restrictions to protect sensitive species and sites. | ITAM | NA | NA | x | x | x | x | x |
| Incorporate training restrictions into training scenarios. | ITAM | NA | NA | x | x | x | x | x |
| **Land Rehabilitation and Maintenance** | | | | | | | | |
| Implement projects consistent with the ITAM Work Plan. | ITAM | NA | NA | x | x | x | x | x |
| Use Siebert Stakes and signage to demark sensitive areas as required by USFWS Biological Opinions (2003, 2008, 2013). | ITAM | NA | NA | x | x | x | x | x |
| Ensure that revegetation projects are compatible with USFWS Biological Opinions (2003, 2008, 2013) (i.e., the use of native and/or non-invasive plants). | ITAM | NA | NA | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2019 | 2020 | 2021 | 2022 | 2023 |
| Monitor seed mixes to ensure they are invasive species free (USFWS Biological Opinion, 2003). | ITAM | NA | NA | x | x | x | x | x |
| Ensure that a minimum of 12% cover is maintained in off-road maneuver areas (USFWS Biological Opinion, 2003). | ITAM | NA | NA | x | x | x | x | x |
| Evaluate roads and trails on Pohakuloa. | ITAM | NA | NA | x | x | x | x | x |
| Coordinate with NR staff on potential effects of LRAM projects on listed and rare species. | ITAM | NA | NA | x | x | x | x | x |
| Provide natural resources information on improvements and construction in the KMA. | ITAM | NA | NA | x | x | x | x | x |
| Consult with NRO on Go-NoGo maps. | ITAM | NA | NA | x | x | x | x | x |
| Provide NRO staff with locations where noxious species prevent training use or access. | ITAM | NA | NA | x | x | x | x | x |
| **Range and Training Land Assessment** | | | | | | | | |
| Implement projects consistent with the ITAM Work Plan. | ITAM | NA | NA | x | x | x | x | x |
| Establish monitoring projects in the KMA. | ITAM | NA | NA | x | x | x | x | x |
| Coordinate with NR staff on potential effects of LRAM projects on listed and rare species. | ITAM | NA | NA | x | x | x | x | x |
| **Sustainable Range Awareness** | | | | | | | | |
| Implement projects consistent with the ITAM Work Plan. | ITAM | NA | NA | x | x | x | x | x |
| Provide briefings for troops that include Environmental Office issues. | ITAM | NA | NA | x | x | x | x | x |

| OBJECTIVE | RESPONSIBLE FOR IMPLEMENTATION | FUNDING CLASS 1996 | FUNDING CLASS 2011 | IMPLEMENTATION | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2019 | 2020 | 2021 | 2022 | 2023 |
| Provide in-processing NRO briefing materials to Pohakuloa and Oahu. | ITAM | NA | NA | x | x | x | x | x |
| Provide in-field signage to remind troops of natural resources issues and restrictions. | ITAM | NA | NA | x | x | x | x | x |
| Use SRA materials developed by the Army. | ITAM | NA | NA | x | x | x | x | x |

## 7.2 Appendix 2. Species Lists

Appendix 2-1. Animal Species Lists.

| Class | Scientific Name | Common Name | Origin[1] | Status[2] | MBTA | Rank[3] | Keystone[4] |
|---|---|---|---|---|---|---|---|
| **Aves[5]** | | | | | | | |
| | *Acridotheres tristis* | Common Myna | NAT | | | G5 | |
| | *Alauda arvensis* | Skylark | NAT | | x | G5 | |
| | *Alectoris chukar* | Chukar | NAT | | | G5 | |
| | *Amandava amandava* | red avadavat | NAT | | | G5 | |
| | *Arenaria interpres* | ruby turnstone | IND | | x | G5 | |
| | *Asio flammeus sandwichensis* | Hawaiian Short-eared Owl, | END | | x | G5T2 | x |
| | *Branta sandvicensis* | Hawaiian Goose, nēnē | END | FE | x | G1 | x |
| | *Buteo solitarius* | Hawaiian Hawk, ʻio | END | FT | x | G2 | x |
| | *Calidris alba* | sanderling | NAT | | x | G5 | |
| | *Callipepla californica* | California Quail | NAT | | | G5 | |
| | *Cardinalis cardinalis* | Northern Cardinal | NAT | | x | G5 | |
| | *Carpodacus mexicanus* Syn. *Haemorhous mexicanus* | House Finch | NAT | | x | G5 | |
| | *Chasiempis sandwichensis sandwichensis* (2008) | Elepaio | END | | | G3T2 | x |
| | *Columba livia* | Rock Dove | NAT | | | G5 | |
| | *Coturnix japonica* | Japanese Quail | NAT | | | G5 | |
| | *Corvus hawaiiensis* (1978) | Hawaiian Crow | END | FE | x | GXC | |
| | *Estrilda caerulescens* | Lavender Waxbill | NAT | | | G5 | |
| | *Francolinus erckelli* | Erckel's Francolin | NAT | | | G5 | |
| | *Francolinus francolinus* | Black Francolin | NAT | | | G5 | |
| | *Francolinus pondicerianus* | Grey Francolin | NAT | | | G5 | |
| | *Gallus lafayetii* | CeylonJunglefowl | NAT | | | | |
| | *Garrulax canorus* | Melodious Laughing-Thrush | NAT | | | G4G5 | |
| | *Geopelia striata* | Barred (Zebra) Dove | NAT | | | G4G5 | |
| | *Hemignathus wilsoni* | Akiapolaau | END | FE | x | G1 | |
| | *Hemignathus virens* | Amakihi | END | | x | G3 | x |
| | *Himatione sanguinea* | Apapane | IND? | | x | G3 | x |
| | *Leiothrix lutea* | Red-billed Leiothrix | NAT | | | G4G5 | |
| | *Euodice cantans* | African silverbill | NAT | | | G5 | |
| | *Euodice malabarica* | Warbling Silverbill | NAT | | | G5 | |
| | *Lonchura punctulata* | Nutmeg Mannikin | NAT | | | G5 | |
| | *Lophura leucomelanos* | Kalij Pheasant | NAT | | | G5 | |
| | *Loxioides bailleui* (1983) | Palila | END | FE | x | G1 | |

[1] Origin: NAT=Naturalized, END=Endemic, IND=Indigenous

[2] Status: FE=Federally Listed Endangered, FT=Federally Listed Threatened, NI= considered for listing, but not listed, SOC=Species of Concern, UR = Under Federal review for listing

[3] Global Conservation Status (NatureServe http://explorer.natureserve.org/granks.htm). GX=Presumed Extinct, GH=Possibly Extinct, G1=Critically Imperiled, G2=Imperiled, G3=Vulnerable, G4=Apparently Secure, G5=Secure, G#G#=Range Rank (range of uncertainty), GU=Unrankable, GNR=Unranked, GNA=Not Applicable

[4] Mitchell, C, C Ogura, DW Meadows, A Kane, L Strommer, S Fretz, D Leonard, and A McClung. 2005. *Hawaii's Comprehensive Wildlife Conservation Strategy*. Department of Land and Natural Resources. Honolulu, Hawaii.

[5] Dates following scientific names indicate the last observation of the taxon.

| Class | Scientific Name | Common Name | Origin[1] | Status[2] | MBTA | Rank[3] | Keystone[4] |
|---|---|---|---|---|---|---|---|
| | *Loxops coccineus* | Hawaii akepa | | FE | x | G1 | x |
| | *Meleagris gallopavo* | Wild Turkey | NAT | | | G5 | |
| | *Mimus polyglottos* | Northern Mockingbird | NAT | | x | G5 | |
| | *Myadestes obscurus* | Omao | END | | x | G3 | x |
| | *Oceanodroma castro* | Band-rumped Storm Petrel | IND | FE | x | G3 | |
| | *Passer domesticus* | House Sparrow | NAT | | | G5 | |
| | *Phasianus colchicus* | Ring-Necked Pheasant | NAT | | | G5 | |
| | *Pluvialis fulva* | Pacific Golden Plover, kolea | IND | | x | G5 | |
| | *Pterocles exustus* | Sandgrouse | NAT | | | G5 | |
| | *Pterodroma sandwichensis* | Hawaiian Petrel, uau | IND | FE | x | G2 | |
| | *Serinus mozambicus* | Yellow-Fronted Canary | NAT | | | G5 | |
| | *Sicalis flaveola* | Saffron Finch | NAT | | | G5 | |
| | *Streptopelia chinensis* | Spotted Dove | NAT | | | G5 | |
| | *Tyto alba* | Barn Owl | NAT | | x | G5 | |
| | *Vestiaria coccinea* | Iiwi | END | FT | x | G4 | underreview |
| | *Zenaida macroura* | Mourning Dove | NAT | | x | G5 | |
| | *Zosterops japonicus* | Japanese White-Eye | NAT | | | G5 | |
| **Gastropoda[6]** | | | | | | | |
| | *Euconulus gaetanoi* | | | | | GNR | |
| | *Nesopupa subcentrailis* | | | | | GNR | |
| | *Nesovitrea hawaiiensis* | | | | | GNR | |
| | *Leptachatina* spp. | | | | | GNR | |
| | *Leptactina lepida* | Amastrid land snail | END | | | GS1 | |
| | *Striatura* ssp. | | | | | GNR | |
| | *Succinea konaensis* | | | | | GNR | |
| | *Philonesia* sp. | Zonitid land snail | | | | GNR | |
| | *Vitrina tenella* | | | | | GNR | |
| **Insecta[7]** | | | | | | | |
| | *Agrotis melanoneura* | Black-veined Agrotis | END | | | GH | |
| | *Agrotis microreas* | Microreas Agrotis noctuid | END | | | GH | |
| | *Cardiocondyla venustula* | ant | NAT | | | | |
| | *Coleotichus blackburniae* | Koa shield bug | END | | | GNR | |
| | *Helicoverpa confusa* | Confused Helicoverpan | NAT | | | G1 | |
| | *Hylaeus albonitens* | Hawaiian yellow-faced | NAT | | | | |
| | *Hylaeus anthracinus* | Anthricinan yellow-faced | END | FE | | GNR | |
| | *Hylaeus difficilis* | Difficult yellow-faced bee | END | | | GNR | |
| | *Hylaeus dimidiatus* | Dimidiatan yellow-faced | END | | | GNR | |
| | *Hylaeus flavipes* | Yellow-foot yellow-faced | END | | | GNR | |
| | *Hylaeus kona* | Kona yellow-faced bee | END | | | GNR | |
| | *Hylaeus laetus* | Laetan yellow-faced bee | END | | | GNR | |
| | *Hylaeus ombrias* | Ombrias yellow-faced | END | | | GNR | |
| | *Hylaeus paradoxicus* | Hawaiian yellow-faced | END | | | GNR | |

[6] Cowie, R. H. and G.M. Nishida. 1993. Malacological Inventory Survey in the Multi-Purpose Range Complex Study Area of the Pohakuloa Training Area, Island of Hawaii. Bernice Pauahi Bishop Museum, Honolulu, Hawaii.
[7] Oboyski, P. 1998. Arthropod Survey at Pohakuloa Training Area, Island of Hawaii, Hawaii. The Nature Conservancy of Hawaii, Honolulu, Hawaii; Oboyski, P. T., A.J. Gregor, L.B. Passerello, J.P. Weber, J. E Hines, and P.C. Banko. 2001. Kipuka Alala Terrestrial Arthropod Survey, Pohakuloa Training Area, Hawaii. Biological Resources Division of the U.S. Geological Survey, Pacific Islands Ecosystems Research Center, Volcanoes, Hawaii.

| Class | Scientific Name | Common Name | Origin[1] | Status[2] | MBTA | Rank[3] | Keystone[4] |
|---|---|---|---|---|---|---|---|
| | *Hylaeus pele* | Pele yellow-faced bee | END | | | GNR | |
| | *Hylaeus specodoides* | Sphecodoid yellow-faced | END | | | GNR | |
| | *Hypoponera opaciceps* | ant | NAT | | | | |
| | *Deinomimesa punae* | Puna Deniomimesan | END | | | G2 | |
| | *Linepithema humile* | Argentine ant | NAT | | | GNR | |
| | *Monomorium latinode* | ant | NAT | | | | |
| | *Pheidole megacephala* | Big-headed ant | NAT | | | | |
| | *Rhyncogonus giffardi* | Giffard's rhyncogonus | END | | | G1 | |
| | *Schrankia sp.* | Schrankia moth | END? | | | GU | |
| | *Tapinoma melanocephalum* | Ghost ant | NAT | | | GNR | |
| | *Technomyrmex albipes* | ant | NAT | | | | |
| | *Udara blackburni* | Hawaiian blue butterfly | END | | | G4 | |
| | *Thaumatogryllus cavicola* | Volcanoes cave cricket | END | | | G1 | |
| **Mammalia** | | | | | | | |
| | *Canus familiaris familiaris* | Feral Domestic Dog | NAT | | | | |
| | *Capra hircus hircus* | Feral Domestic Goat | NAT | | | GNA | |
| | *Felis catus* | Feral Domestic Cat | NAT | | | GNA | |
| | *Herpestes auropunctatus* | Mongoose | NAT | | | | |
| | *Lasiurus cinereus semotus* | Hawaiian hoary bat, | END | FE | | T2 | x |
| | *Mus musculus* | House Mouse | NAT | | | G5 | |
| | *Ovis aries* | Feral Red Sheep | NAT | | | G5 | |
| | *Ovis musimon* | Muflon Sheep | NAT | | | | |
| | *Ovis musimon X O. aries* | hybrid muflon x feral sheep | NAT | | | | |
| | *Rattus* ssp. | Rat | NAT | | | G5 | |
| | *Sus scrofa* | Feral Pig | NAT | | | | |

Appendix 2-2. Plant Species documented on Pohakuloa Training Area.

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| Adoxaceae | | | | | | | | |
| | *Sambucus nigra* ssp. *Canadensis* | elderberry | S/T | NAT | P | | | |
| Agavaceae | | | | | | | | |
| | *Cordyline fruticosa* | kī, ti plant | S | NAT | P | | | |
| Amaranthaceae | | | | | | | | |
| | Nototrichium sandwicense | kulu` | S/T | END | P | | | |
| Anachardiaceae | | | | | | | | |
| | Schinus molle | American pepper | T | NAT | P | | | |
| Annonaceae | | | | | | | | |
| | Annona cherimola | cherimoya | T | NAT | P | | | |
| Apiaceae | | | | | | | | |
| | Cyclospermum leptophyllum | fir-leaved celery | H | NAT | A | | | |
| | Daucus pusillus | American carrot | H | NAT | A | | | |
| | Foeniculum vulgare | fennel | H | NAT | P | | | |
| | Petroselinum crispum | parsley | H | NAT | P | | | |
| | Spermolepis hawaiiensis | Hawaii parsley | H | END | A | G2 | FE | x |
| Apocynaceae | | | | | | | | |
| | Alyxia stellate | maile | S/V | END | P | | | x |
| Araucariaceae | | | | | | | | |
| | Araucaria heterophylla | Norfolk Island pine | T | NAT | P | | | |
| Asclepiadaceae | | | | | | | | |
| | Asclepias curassavica | lauhele,bloodflower | H | NAT | P | | | |
| | *Asclepias physocarpa* | butterfly flower | H | NAT | P | | | |
| Asparagaceae | | | | | | | | |
| | *Agave sisalana* | century plant | S | NAT | P | | | |
| Aspleniaceae | | | | | | | | |
| | *Asplenium adiantum-nigrum* | `iwa`iwa | F | IND | P | | | |
| | *Asplenium aethiopicum* | ‘iwa ‘iwa | F | END | P | | | |
| | *Asplenium peruvianum* var. *insulare* | fragile fern | F | END | P | G5T1 | FE | |
| | *Asplenium trichomanes* | ‘oali‘i, maidenhair spleenwort | F | END | P | | | |
| Asteraceae | | | | | | | | |
| | *Achillea millefolium* | common yarrow | H | NAT | P | | | |
| | *Ageratina adenophora* | crofton weed | H/S | NAT | P | | | |
| | *Ageratina riparia* | Hāmākua pāmakani | S | NAT | P | | | |
| | *Ageratum conyzoides* | maile hohono | H | NAT | A/P | | | |
| | *Ageratum houstonianum* | bluemink | F | NAT | A | | | |
| | *Ambrosia artemisiifolia* | common ragweed | H | NAT | P | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| | *Ambrosia psilostachya* | common ragweed | H | NAT | A/P | | | |
| | *Anthemis cotula* | chamomile | H | NAT | A | | | |
| | *Bidens menziesii* ssp. *filiformis* | Mauna Loa beggarticks | S | END | P | | | |
| | *Bidens pilosa* | kī nehe | H | NAT | A | | | |
| | *Centaurea melitensis* | Napa thistle, tocalote | H | NAT | A | | | |
| | *Cirsium vulgare* | pua kala, bull thistle | H | NAT | P | | | |
| | *Conyza bonariensis* | lani wela, hairy horseweed | H | NAT | A | | | |
| | *Conyza canadensis* var. *canadensis* | lani wela, hairy horseweed | H | NAT | A | | | |
| | *Conyza canadensis* var. *pusilla* | lani wela, hairy horseweed | H | NAT | A | | | |
| | *Crassocephalum crepidioides* | redflower ragleaf | H | NAT | A | | | |
| | *Crepis capillaris* | smooth hawksbeard | H | NAT | A/P | | | |
| | *Delairea odorata* | cape ivy | V | NAT | P | | | |
| | *Dubautia arborea* | na`ena`e | S | END | P | G1 | SOC | x |
| | *Dubautia ciliolata* ssp. *ciliolata* | lava dubautia | S | END | P | | | |
| | *Dubautia linearis* | genus = kūpaoa | S | END | P | | | |
| | *Dubautia linearis* ssp. *hillebrandii* | Hillebrand's dubautia | S | END | P | | | |
| | *Dubautia scabra* | rough dubautia | S | END | P | | | |
| | *Emilia fosbergii* | pualele | H | NAT | A | | | |
| | *Euchiton japonicus* | father-and-child plant | H | NAT | A | | | |
| | *Euchiton sphaericus* | tropical creeping cudweed | H | NAT | A | | | |
| | *Galinsoga parviflora* | gallant soldier | H | NAT | A | | | |
| | *Galinsoga quadriradiata* | Peruvian daisy | H | NAT | A | | | |
| | *Gamochaeta purpurea* | Purple cudeweed | H | NAT | A/B | | | |
| | *Helichrysum foetidum* | stinking everlasting | H | NAT | P | | | |
| | *Heterotheca grandiflora* | telegraphweed | H | NAT | A/P | | | |
| | *Hypochaeris radicata* | cat's ear | H | NAT | P | | | |
| | *Lactuca sativa* | prickly lettuce | H | NAT | P | | | |
| | *Lactuca serriola* | China lettuce | H | NAT | | | | |
| | *Melanthera subcordata* | nehe | H | END | P | | | |
| | *Melanthera venosa* | spreading nehe | H | END | P | G1 | FE | x |
| | *Picris hieracioides* | hawkweed | H | NAT | P | | | |
| | *Pluchea carolinensis* | sourbrush | S | NAT | P | | | |
| | *Pseudognaphalium sandwicensium* var. *hawaiiense* | `ena`ena | H | END | P | | | |
| | *Pseudognaphalium sandwicensium* var. *kilaueanum* | `ena`ena | H | END | P | | | |
| | *Pseudognaphalium sandwicensium* var. *sandwicensium* | `ena`ena | H | END | P | | | |
| | *Reichardia tingitana* | false sowthistle | H | NAT | A/P | | | |
| | *Senecio madagascariensis* | Madagascar fireweed | H | NAT | A | | | |
| | *Senecio sylvaticus* | wood groundsel | H | NAT | A | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| | *Senecio vulgaris* | common groundsel | H | NAT | A | | | |
| | *Sigesbeckia orientalis* | small yellow crown-beard | H | NAT | A | | | |
| | *Sonchus asper* | sow thistle | H | NAT | A | | | |
| | *Sonchus oleraceus* | pualele | H | NAT | A | | | |
| | *Tagetes minuta* | 'okole'oi'oi | H | NAT | A | | | |
| | *Tetramolopium arenarium* ssp. *arenarium* var. *arenarium* | Maui tetramolopium | S | END | P | G1T1 | FE | x |
| | *Tetramolopium consanguineum* ssp. *leptophyllum* var. *leptophyllum* | forest tetramolopium | S | END | P | G1T1 | SOC | |
| | *Tetramolopium humile* var. *humile* | alpine tetramolopium | S | END | P | | | |
| | *Tetramolopium humile* var. *sublaeve* | subalpine pamakan | S | END | P | G3T1 | SOC | |
| | *Tetramolopium sp. 1* | | S | END | P | G1 | SOC | x |
| | *Verbesina encelioides* | golden crown-beard | H | NAT | A | | | |
| | *Xanthium strumarium* | kīkānia | H | NAT | A | | | |
| | *Youngia japonica* | Oriental hawksbeard | H | NAT | A | | | |
| | *Zinnia peruviana* | Peruvian zinnia | H | NAT | A | | | |
| Bignoniaceae | | | | | | | | |
| | *Jacaranda mimosifolia* | black poui | T | NAT | P | | | |
| Blechnaceae | | | | | | | | |
| | *Sadleria cyatheoides* | `ama`u | F | END | P | | | x |
| Boraginaceae | | | | | | | | |
| | *Heliotropium procumbens* var. *depressum* | fourspike heliotrope | H/S | NAT | A/P | | | |
| Brassicaceae | | | | | | | | |
| | *Brassica juncea* | kai choy, Chinese mustard | H | NAT | A | | | |
| | *Brassica nigra* | makeke | H | NAT | A | | | |
| | *Brassica rapa* | field mustard | H | NAT | A/B | | | |
| | *Capsella bursa-pastoris* | shepherd's purse | H | NAT | A | | | |
| | *Cardamine flexuosa* | woodland bittercress | H | NAT | A/P | | | |
| | *Coronopus didymus* | swinecress | H | NAT | A | | | |
| | *Lepidium africanum* | African pepperwort | H | NAT | P | | | |
| | *Lepidium bonariense* | Argentine pepperweed | | | | | | |
| | *Lepidium virginicum* | Virginia pepperweed | H | NAT | A/P | | | |
| | *Raphanus sativus* | wild radish | H | NAT | A/B | | | |
| | *Sisymbrium altissimum* | tumble mustard | H | NAT | A | | | |
| | *Sisymbrium irio* | London rocket | H | NAT | A | | | |
| | *Sisymbrium officinale* | hedge mustard | H | NAT | A | | | |
| Cactaceae | | | | | | | | |
| | *Opuntia ficus-indica* | pānini | T | NAT | P | | | |
| Campanulaceae | | | | | | | | |
| | *Triodanis biflora* | Venus' looking-glass | H | NAT | A | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| | *Wahlenbergia gracilis* | southern rockbell | H | NAT | P | | | |
| Caryophyllaceae | | | | | | | | |
| | *Arenaria serpyllifolia* | thyme-leaved sandwort | H | NAT | A | | | |
| | *Cerastium fontanum* ssp. *vulgare* | mouse-ear chickweed | H | NAT | P | | | |
| | *Petrorhagia velutina* | childing pink | H | NAT | A | | | |
| | *Polycarpon tetraphyllum* | fourleaf manyseed | H | NAT | A | | | |
| | *Schiedea hawaiiensis* | ma`oli`oli | V | END | P | G1 | FE | x |
| | *Silene gallica* | small-flowered catchfly | H | NAT | A/P | | | |
| | *Silene hawaiiensis* | Hawaii catchfly | S | END | P | G2 | FT | |
| | *Silene lanceolata* | Kauai catchfly | S | END | P | G1 | FE | |
| | *Silene struthioloides* | Alpine catchfly | S | END | P | | | |
| | *Stellaria media* | chickweed | H | NAT | A/P | | | |
| Chenopodiaceae | | | | | | | | |
| | *Atriplex semibaccata* | Australian saltbush | H | NAT | P | | | |
| | *Atriplex suberecta* | peregrine saltbush | H | NAT | A | | | |
| | *Chenopodium album* | lambsquarters | H | NAT | A | | | |
| | *Chenopodium ambrosioides* | Mexican tea, wormseed | H | NAT | A/P | | | |
| | *Chenopodium carinatum* | clammy goosefoot | H | NAT | A | | | |
| | *Chenopodium murale* | 'āheahea | H | NAT | A | | | |
| | *Chenopodium oahuense* | 'āheahea | S | END | P | | | x |
| | *Salsola tragus* | Russian thistle | H | NAT | A | | | |
| Convolvulaceae | | | | | | | | |
| | *Ipomoea indica* | morning glory | V | NAT | A/P | | | |
| | *Ipomoea tuboides* | Hawaiian moon flower | V | END | P | G2 | | x |
| | *Ipomoea violacea* | heavenlyblue morning-glory | V | NAT | P | | | ? |
| Crassulaceae | | | | | | | | |
| | *Crassula sieberiana* | Siberian pygmyweed | H | NAT | A | | | |
| | *Kalanchöe tubiflora* | chandelier plant | H | NAT | P | | | |
| Cucurbitaceae | | | | | | | | |
| | *Sicyos anunu* | anunu | V | END | A | | | |
| | *Sicyos lasiocephalus* | anunu | V | END | A | | | |
| | *Sicyos macrophyllus* | anunu | V | END | A | G1 | FE | |
| Cyperaceae | | | | | | | | |
| | *Bulbostylis capillaris* | densetuft hairsedge | H | NAT | A | | | |
| | *Carex inversa* | knob sedge | H | NAT | P | | | |
| | *Carex wahuensis* ssp. *rubiginosa* | Oahu sedge | H | END | P | | | |
| | *Carex wahuensis* ssp. *wahuensis* | Oahu sedge | H | END | P | | | |
| | *Cyperus hillebrandii* var. *decipiens* | Hillebrand's flatsedge | GL | IND | P | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| | *Cyperus hillebrandii* var. *hillebrandii* | Hillebrand's flatsedge | GL | END | P | | | |
| | *Morelotia gahniiformis* | Gaudichaud's sawsedge | GL | IND | P | | | |
| Dennstaedtiaceae | | | | | | | | |
| | *Lindsaea repens* var. *macaraena* | creeping necklace fern | F | END | P | G5T2 | | |
| | *Pteridium aquilinum* var. *decompositum* | bracken fern | F | END | P | | | |
| Dryopteridaceae | | | | | | | | |
| | *Cyrtomium falcatum* | holly fern | F | NAT | P | | | |
| | *Cystopteris douglasii* | Douglas' bladderfern | F | END | P | | | |
| | *Dryopteris wallichiana* | laukahi | F | IND | P | | | |
| | *Nephrolepis cordifolia* | Narrow swordfern | F | NAT | P | | | |
| | *Nephrolepis exaltata* ssp. *hawaiiensis* | 'okupukupu | F | END | P | | | |
| Ericaceae | | | | | | | | |
| | *Leptocophylla tameiameiae* | pūkiawe | S/T | IND | P | | | |
| | *Vaccinium reticulatum* | 'ohelo 'ai | S | END | P | | | x |
| Euphorbiaceae | | | | | | | | |
| | *Chamaesyce albomarginata* | rattlesnakeweed | H | NAT | P | | | |
| | *Euphorbia multiformis* var. *microphylla* | 'akoko | S | END | P | | | |
| | *Euphoriba olowaluana* | 'akoko | T | END | P | G2 | SOC | x |
| | *Euphorbia peplus* | petty spurge | H | NAT | A | | | |
| | *Ricinus communis* | pā'aila | S | NAT | P | | | |
| Fabaceae | | | | | | | | |
| | *Acacia meamsii* | black wattle | T | NAT | P | | | |
| | *Chamaecrista nictitans* var. *glabrata* | partridge pea | H | NAT | A/P | | | |
| | *Crotalaria pallida* | smooth rattlepod | H | NAT | P | | | |
| | *Desmodium sandwicense* | Spanish clover | S | NAT | P | | | |
| | *Indigofera suffruticosa* | 'iniko | S | NAT | P | | | |
| | *Leucaena leucocephala* | koa haole | S/T | END | P | | | |
| | *Lupinus arboreus* | yellow bush lupine | S | NAT | P | | | |
| | *Macroptilium lathyroides* | Wild bushbean | H | NAT | | | | |
| | *Medicago lupulina* | black medick | H | NAT | A/P | | | |
| | *Medicago polymorpha* | bur clover | H | NAT | A | | | |
| | *Medicago sativa* | alfalfa | H | NAT | A | | | |
| | *Melilotus alus* | white sweet clover | H | NAT | A/B/P | | | |
| | *Melilotus indica* | sourclover | H | NAT | A | | | |
| | *Neonotonia wightii* | Tinarro glycine | V | NAT | A/B/P | | | |
| | *Prosopis pallida* | kiawe | T | NAT | P | | | |
| | *Sophora chrysophylla* | mamane | S/T | END | P | | | x |
| | *Trifolium arvense* | rabbit-foot clover | H | NAT | A | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| | *Trifolium hybridum* | alsike clover | H | NAT | P | | | |
| | *Trifolium pratense* | red clover | H | NAT | P | | | |
| | *Trifolium repens* | white clover | H | NAT | P | | | |
| | *Vicia sativa* ssp. *nigra* | common vetch | H | NAT | A | | | |
| | *Vicia villosa* | hairy vetch | H | NAT | A/P | | | |
| | *Vigna o-wahuensis* | Oahu cowpea | H | END | A | G1 | FE | x |
| Fagaceae | | | | | | | | |
| | *Quercus suber* | cork oak | T | NAT | P | | | |
| Gentianaceae | | | | | | | | |
| | *Centaurium erythraea* ssp. *erythraea* | European centaury | H | NAT | P | | | |
| Geraniaceae | | | | | | | | |
| | *Erodium cicutarium* | Alfilariea, filaree | H | NAT | A | | | |
| | *Geranium cuneatum* ssp. *hololeucum* | nohoanu | S | END | P | | | |
| | *Geranium homeanum* | cranesbill | H | NAT | P | | | |
| | *Geranium retrorsum* | cranesbill | H | NAT | P | | | |
| Juncaceae | | | | | | | | |
| | *Luzula hawaiiensis* var. *hawaiiensis* | wood rush | H | END | P | | | |
| Lamiaceae | | | | | | | | |
| | *Haplostachys haplostachya* | honohono | H | END | P | G1 | FE | x |
| | *Marrubium vulgare* | common horehound | H | NAT | P | | | |
| | *Plectranthus parviflorus* | 'ala'ala wai nui | H | IND | P | | | |
| | *Salvia coccinea* | scarlet sage | S | NAT | A | | | |
| | *Stenogyne angustifolia* | creeping mint | V | END | P | G2 | FE | x |
| | *Stenogyne microphylla* | native mint | V | END | P | G2 | | |
| | *Stenogyne rugosa* | mā'ohi'ohi | V | END | P | | | x |
| Liliaceae | | | | | | | | |
| | *Dianella sandwicensis* | 'uki'uki | H | IND | P | | | |
| Lycopodiaceae | | | | | | | | |
| | *Lycopodium venustulum* | wawae-iole | H/S | END | P | | | |
| Lythraceae | | | | | | | | |
| | *Lythrum maritimum* | pūkāmole | S | NAT | P | | | |
| Malvaceae | | | | | | | | |
| | *Abutilon grandifolium* | hairy abutilon | | | | | | |
| | *Malva parviflora* | cheese weed | H | NAT | A/P | | | |
| | *Sida fallax* | 'ilima | S | IND | P | | | x |
| | *Waltheria indica* | `uhaloa | H/S | IND | P | | | |
| Menispermaceae | | | | | | | | |
| | *Cocculus orbiculatus* | huehue | V | IND | P | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| Myoporaceae | | | | | | | | |
| | *Myoporum sandwicense* | naio | S/T | IND | P | | | x |
| Myrsinaceae | | | | | | | | |
| | *Myrsine lanaiensis* | kolea | T | END | P | | | |
| Myrtaceae | | | | | | | | |
| | *Corymbia citriodora* | lemon-scented gum | T | NAT | P | | | |
| | *Eucalyptus saligna* | `eukalikia, sydney blue gum | T | NAT | P | | | |
| | *Metrosideros polymorpha* var. *glaberrima* | 'öhi'a | S/T | END | P | | | |
| | *Metrosideros polymorpha* var. *polymorpha* | 'öhi'a | S/T | END | P | | | x |
| | *Psidium guajava* | guava | T | NAT | P | | | |
| Oleaceae | | | | | | | | |
| | *Ligustrum lucidum* | glossy privet | S | NAT | P | | | |
| | *Olea europaea* ssp. *cuspidata* | African olive | T | NAT | P | | | |
| | *Olea europaea* ssp. *europaea* | 'oliwa, European olive | T | NAT | P | | | |
| Onagraceae | | | | | | | | |
| | *Epilobium billardierianum* ssp. *cinereum* | willow herb | H | NAT | P | | | |
| | *Oenothera stricta* | evening primrose | H | NAT | A/P | | | |
| Oxalidaceae | | | | | | | | |
| | *Oxalis corniculata* | 'ihi | H | NAT | P | | | |
| Papaveraceae | | | | | | | | |
| | *Argemone glauca* var. *decipiens* | pua kala | H | END | P | | | |
| Passifloraceae | | | | | | | | |
| | *Passiflora tarminiana* | banana poka | V | NAT | P | G? | | |
| Phytolaccaceae | | | | | | | | |
| | *Phytolaca sandwicense* | Hawaii pokeweed | H | END | P | | | |
| Pinaceae | | | | | | | | |
| | *Pinus coulteri* | Coulter pine | T | NAT | P | | | |
| | *Pinus radiata* | Monterey pine | T | NAT | P | | | |
| Piperaceae | | | | | | | | |
| | *Peperomia tetraphylla* | alaala wai nui | H | IND | P | | | |
| Pittosporaceae | | | | | | | | |
| | *Pittosporum confertiflorum* | ho`awa | S/T | END | P | | | |
| | *Pittosporum terminalioides* | ho`awa | T | END | P | | | x |
| Plantaginaceae | | | | | | | | |
| | *Plantago lanceolata* | narrow-leaved plantain | H | NAT | P | | | |
| Poaceae | | | | | | | | |
| | *Agrostis sandwicensis* | bentgrass | G | IND | P | | | |
| | *Anthoxanthum odoratum* | sweet vernalgrass | G | NAT | P | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| | *Avena fatua* | wild oat | G | NAT | A | | | |
| | *Briza minor* | little quaking grass | G | NAT | A | | | |
| | *Bromus catharticus* | rescue brome | G | NAT | A/P | | | |
| | *Bromus diandrus* | ripgut brome | G | NAT | A | | | |
| | *Cenchrus ciliaris* | buffelgrass | G | NAT | P | | | |
| | *Cenchrus clandestinus* | kikuyu grass | G | NAT | P | | | |
| | *Cenchrus setaceus* | fountain grass | G | NAT | P | | | |
| | *Chloris barbata* | swollen fingergrass | G | NAT | P | | | |
| | *Chloris gayana* | Rhodes grass | G | NAT | P | | | |
| | *Chloris radiata* | radiate fingergrass | G | NAT | A | | | |
| | *Cymbopogon refractus* | barbwire grass | G | NAT | P | | | |
| | *Cynodon dactylon* | mānienie, Bermuda grass | G | NAT | P | | | |
| | *Cynodon nlemfuensis* | African Bermudagrass | G | NAT | P | | | |
| | *Dactylis glomerata* | orchard grass | G | NAT | P | | | |
| | *Deschampsia nubigena* | hairgrass | G | END | P | | | x |
| | *Ehrharta calycina* | perennial veldtgrass | G | NAT | P | | | |
| | *Ehrharta stipoides* | meadow ricegrass | G | NAT | P | | | |
| | *Eragrostis atropioides* | hardstem lovegrass | G | END | P | | | |
| | *Eragrostis brownei* | sheepgrass | G | NAT | P | | | |
| | *Eragrostis deflexa* | Pacific lovegrass | G | END | P | G2 | SOC | |
| | *Eragrostis leptophylla* | mountain lovegrass | G | END | P | | | |
| | *Eragrostis monticola* | kalamālō | G | END | P | | | x |
| | *Festuca hawaiiensis* | Hawai'i fescue | G | END | P | G1 | FE | |
| | *Gastridium ventricosum* | nitgrass | G | NAT | A | | | |
| | *Holcus lanatus* | velvet grass | G | NAT | P | | | |
| | *Hordeum leporinum* | leporinum barley | G | NAT | A | | | |
| | *Koeleria nitida* | prairie Junegrass | G | NAT | P | | | |
| | *Lachnagrostis filiformis* | Pacific bentgrass | G | IND | P | | | |
| | *Lolium perenne* | perennial ryegrass | G | NAT | P | | | |
| | *Melinis minutiflora* | molasses grass | G | NAT | P | | | |
| | *Panicum konaense* | Kona panicgrass | G | END | A | | | |
| | *Panicum pellitum* | kai'oi'o | G | END | A | | | |
| | *Panicum tenuifolium* | mountain pili | G | END | P | | | |
| | *Paspalum dilatatum* | dallis grass | G | NAT | P | | | |
| | *Paspalum notatum* | bahiagrass | G | NAT | P | | | |
| | *Piptatherum miliaceum* | smilo grass | G | NAT | P | | | |
| | *Poa annua* | annual bluegrass | G | NAT | A | | | |
| | *Poa pratensis* | Kentucky bluegrass | G | NAT | P | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| | *Polypogon interruptus* | ditch polypogon | G | NAT | P | | | |
| | *Polypogon monspeliensis* | rabbitfoot grass | G | NAT | A | | | |
| | *Rytidosperma pilosum* | hairy wallaby grass | G | NAT | P | | | |
| | *Rytidosperma semiannulare* | Tasmanian wallaby grass | G | NAT | P | | | |
| | *Schedonorus arundinaceus* | tall fescue | G | NAT | P | | | |
| | *Sporobolus africanus* | African dropseed | G | NAT | P | | | |
| | *Sporobolus indicus* | West Indian dropseed | G | NAT | P | | | |
| | *Trisetum glomeratum* | pili uka | G | END | P | | | |
| | *Urochloa maxima* | Guinea grass | G | END | P | | | |
| | *Vulpia bromoides* | brome fescue | G | NAT | A | | | |
| | *Vulpia myuros* | rat tail fescue | G | NAT | A | | | |
| Polygonaceae | | | | | | | | |
| | *Emex spinosa* | spiny emex | H | NAT | A | | | |
| | *Persicaria capitata* | pinkhead smartweed | H | NAT | P | | | |
| | *Rumex acetosella* | sheep sorrel | H | NAT | P | | | |
| | *Rumex brownei* | slender dock | H | NAT | P | | | |
| | *Rumex giganteus* | pāwale | S/V | END | P | | | |
| | *Rumex skottsbergii* | pāwale | S | END | P | | | |
| Polypodiaceae | | | | | | | | |
| | *Lepisorus thunbergianus* | pakahakaha | F | IND | P | | | |
| | *Polypodium pellucidum* var. *vulcanicum* | dotted polypody | F | END | P | | | |
| Portulacaceae | | | | | | | | |
| | *Portulaca oleracea* | pigweed, 'akulikuli kula | H | NAT | A | | | |
| | *Portulaca pilosa* | kiss me quick | H | NAT | A | | | |
| | *Portulaca sclerocarpa* | po`e | H | END | P | G2 | FE | x |
| | *Portulaca villosa* | `ihi | H | END | P | G1 | FE | |
| Primulaceae | | | | | | | | |
| | *Anagallis arvensis* | scarlet pimpernel | H | NAT | A/P | | | |
| Proteaceae | | | | | | | | |
| | *Grevillea robusta* | silkoak, 'oaka kilika | T | NAT | P | | | |
| Psilotaceae | | | | | | | | |
| | *Psilotum nudum* | moa | F | IND | P | | | |
| Pteridaceae | | | | | | | | |
| | *Adiantum hispidulum* | rough maidenhair fern | F | NAT | P | | | |
| | *Adiantum raddianum* | maidenhair fern | F | NAT | P | | | |
| | *Doryopteris decora* | lance fern | F | END | P | | | |
| | *Pellaea ternifolia* | kalamoho | F | NAT | P | | | |
| | *Pteris cretica* | cretan brake | F | NAT | P | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| Rhamnaceae | | | | | | | | |
| | *Alphitonia ponderosa* | kauila | T | END | P | | | |
| | *Rhamnus californica* ssp. *californica* | coffeeberry | S | NAT | P | | | |
| Rosaceae | | | | | | | | |
| | *Heteromeles arbutifolia* | heteromeles, toyon | S | NAT | P | | | |
| | *Osteomeles anthyllidifolia* | 'ulei | S | IND | P | | | x |
| | *Rubus niveus* | Hill raspberry | S | NAT | P | | | |
| | *Rubus rosifolius* | ōla'a, thimbleberry | S | NAT | P | | | |
| Rubiaceae | | | | | | | | |
| | *Coffea arabica* | Arabian coffee | S/T | NAT | P | | | |
| | *Coprosma cymosa* | pilo | S | END | P | | | |
| | *Coprosma ernodeoides* | aiakanēnē | S | END | P | | | x |
| | *Coprosma montana* | mountain pilo | S/T | END | P | | | x |
| | *Coprosma ochracea* | Maui mirrorplant | S/T | END | P | | | x |
| | *Galium divaricatum* | Lamarck's bedstraw | H | NAT | A | | | |
| | *Kadua affinis* | variable starviolet | S | END | P | | | |
| | *Kadua coriacea* | Leather-leaf sweet ear, kioele | S | END | P | GI | FE | x |
| | *Psydrax ordorata* | kio`ele | S | END | P | | | |
| Rutaceae | | | | | | | | |
| | Melicope hawaiiensis | mokihana | S/T | END | P | G2 | SOC | |
| | *Zanthoxylum hawaiiense* | ae | T | END | P | G1 | FE | x |
| Santalaceae | | | | | | | | |
| | *Exocarpos gaudichaudii* | hulumoa | S/T | END | P | GI | SOC | |
| | *Exocarpos menziesii* | heau | S | END | P | G2 | FE | |
| | *Santalum ellipticum* | 'ilihi | S/T | END | P | | | |
| | *Santalum paniculatum* var. paniculatum | mountain sandlwood | S/T | END | P | | | |
| | *Santalum paniculatum* var. *pilgeri* | `iliahi | S/T | END | P | | | |
| Sapindaceae | | | | | | | | |
| | *Dodonaea viscosa* | 'a'ali'i | S/T | IND | P | | | x |
| Scrophulariaceae | | | | | | | | |
| | *Lophospermum erubescens* | creeping gloxinia | V | NAT | P | | | |
| | *Verbascum thapsus* | woolly mullein | H | NAT | P | | | |
| | *Verbascum virgatum* | wand mullein | H | NAT | P | | | |
| | *Veronica plebia* | trailing speedwell | H | NAT | A/P | | | |
| | *Veronica serpyllifolia* | thmye-leaved speedwell | H | NAT | P | | | |
| Smilacaceae | | | | | | | | |
| | *Smilax melastomifolia* | hoi kuahiwi | V | END | P | | | |

| Family | Scientific Name | Common Name | Life form[1] | Origin[2] | Duration[3] | Global Rank[4] | Federal Listing[5] | Keystone (2005)[6] |
|---|---|---|---|---|---|---|---|---|
| Solanaceae | | | | | | | | |
| | *Datura stramonium* | Jimson weed, 'lā'au | H | NAT | A | | | |
| | *Nicotiana glauca* | Tree tobacco | S/T | NAT | P | | | |
| | *Nicotiana tabacum* | tobacco, paka | H | NAT | A | | | |
| | *Physalis peruviana* | pohā | S | NAT | P | | | |
| | *Solanum americanum* | glossy nightshade, pōpolo | H/S | IND | A/P | | | x |
| | *Solanum incompletum* | pōpolo kū mai | S | END | P | G1 | FE | x |
| | *Solanum nigrescens* | nightshade | H/S | NAT | P | | | |
| | *Solanum pseudocapsicum* | Jerusalem cherry | S | NAT | P | | | |
| Thelypteridaceae | | | | | | | | |
| | *Cyclosorus parasiticus* | parasitic maiden fern | F | NAT | P | | | |
| | *Macrothelypteris torresiana* | swordfern | F | NAT | P | | | |
| Thymelaeaceae | | | | | | | | |
| | *Wikstroemia phillyreifolia* | Hawai'i false ohelo | S/T | END | P | | | x |
| Urticaceae | | | | | | | | |
| | *Hesperocnide sandwicensis* | Hawai'i stingingnettle | H | END | A | | | |
| | *Neraudia ovata* | maaloa | S | END | P | G1 | FE | x |
| | *Urtica urens* | burning nettle | H | NAT | A | | | |
| Verbenaceae | | | | | | | | |
| | *Lanatana camara* | lantana | S | NAT | P | | | |
| | *Verbena litoralis* | ōwī | H | NAT | P | | | |
| Violaceae | | | | | | | | |
| | *Isodendrion hosakae* | aupaka | S | END | P | G1 | FE | x |
| Viscaceae | | | | | | | | |
| | *Korthalsella complanata* | hulumoa | P | IND | P | | | |
| Zygophyllaceae | | | | | | | | |
| | *Tribulus terrestris* | puncture vine | H | NAT | A | | | |

[1] Life Form: F=Fern, G=Grass, GL=Grass Like, H=Herb, P=Parasite, S=Shrub, T=Tree, V=Vine

[2] Origin: END=Endemic, IND=Indegenous, NAT=Naturalized

[3] Duration: A=Annual, B=Biennial, P=Perennial

[4] Global Rank/Gobal Conservation Status: (NatureServe http://explorer.natureserve.org/granks.htm). GX=Presumed Extinct, GH=Possibly Extinct, G1=Critically Imperiled, G2=Imperiled, G3=Vulnerable, G4=Apparently Secure, G5=Secure, G#G#=Range Rank (range of uncertainty), GU=Unrankable, GNR=Unranked, GNA=Not Applicable, T#="T-rank," indicates the status of infraspecific taxa (subspecies or varieties)

[5] Federal Listing: FE=Federally Listed Endangered, FT=Federally Listed Threatened, NI= considered for listing, but not listed, SOC=Species of Concern, UR = Under Federal review for listing

[6] Keystone (2005): Mitchell, C, C Ogura, DW Meadows, A Kane, L Strommer, S Fretz, D Leonard, and A McClung. 2005. *Hawaii's Comprehensive Wildlife Conservation Strategy*. Department of Land and Natural Resources. Honolulu, Hawaii.