# UNITED STATES SPACE FORCE

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

# KA'ENA POINT SPACE FORCE STATION


*(See INRMP signature pages for plan approval date)*



SUBMIT PUBLIC REVIEW COMMENTS TO THE CENTER FOR ENVIRONMENTAL MANAGEMENT OF MILITARY LANDS (CEMML) AT:
CEMML inrmpcomments@colostate.edu

## ABOUT THIS PLAN

This installation-specific Environmental Management Plan (EMP) is based on the United States Air Force's (USAF) standardized Integrated Natural Resources Management Plan (INRMP) template. This INRMP has been developed in cooperation with applicable stakeholders, which includes Sikes Act cooperating agencies and/or local equivalents, to document how natural resources will be managed. Where applicable, external resources, including Air Force Instructions (AFIs); Air Force Manuals (AFMAN); Department of Defense Instructions (DoDIs); USAF Playbooks; federal, state, and local requirements; Biological Opinions; and permits are referenced.

Certain sections of this INRMP begin with standardized, USAF-wide "common text" language to address USAF and Department of Defense (DoD) policy and federal requirements. This common text language is restricted from editing to ensure that it remains standard throughout all plans. Immediately following the USAF-wide common text sections are installation sections. The installation sections contain installation-specific content to address local and/or installation-specific requirements. Installation sections are unrestricted and are maintained and updated by the approved plan owner.

*NOTE: The terms "Natural Resources Manager," "NRM," and "NRM/Point of Contact (POC)" are used throughout this document to refer to the installation person responsible for the natural resources program, regardless of whether this person meets the qualifications within the definition of a natural resources management professional in DoDI 4715.03,* Natural Resources Conservation Program.

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# DOCUMENT CONTROL

## *Standardized INRMP Template*

In accordance with (IAW) the Air Force Civil Engineer Center (AFCEC) Environmental Directorate (CZ) Business Rule 08, *EMP Review, Update, and Maintenance*, the standard content in this INRMP template is reviewed periodically, updated as appropriate, and approved by the Natural Resources Subject Matter Expert. This version of the template is current as of 26 June 2020 and supersedes the 2018 version.

*NOTE:* Installations are not required to update their INRMPs every time this template is updated. When it is time for installations to update their INRMPs, they should refer to the eDASH EMP Repository to ensure they have the most current version.

## *Installation INRMP*

**Record of Review**—The INRMP is updated no less than annually, or as changes to natural resource management and conservation practices occur, including those driven by changes in applicable regulations. IAW the Sikes Act and AFMAN 32-7003, *Environmental Conservation*, the INRMP must be reviewed for operation and effect no less than every five years. An INRMP is considered compliant with the Sikes Act if it has been approved in writing by the appropriate representative from each cooperating agency within the past five years. Approval of a new or revised INRMP is documented by signature on a signature page signed by the Installation Commander (or designee), and a designated representative of the United States Fish and Wildlife Service (USFWS), the state fish and wildlife agency, and the, when applicable, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) (AFMAN 32-7003).

Annual reviews and updates are accomplished by the installation NRM, and/or a Section Natural Resources Media Manager. The installation shall establish and maintain regular communications with the appropriate federal and state agencies. At a minimum, the installation NRM (with assistance as appropriate from the Section Natural Resources Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of USFWS, state fish and wildlife agency, and NOAA Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signing the Annual INRMP Review Summary, the collaborating agency representative asserts concurrence with the findings. Any updates agreed to are then made to the document, at a minimum updating the work plans.

## INRMP APPROVAL/SIGNATURE PAGES

The Integrated Natural Resources Management Plan for the Ka'ena Point Space Force Station is hereby approved by the undersigned.

_____ _____

Brandon C. Hammond, Major Date
60th Air Mobility Wing
United States Space Force

_____ _____

Earl Campbell, Field Supervisor Date
Pacific Islands Fish and Wildlife Office
United States Fish and Wildlife Service, Region 1

_____ _____

Suzanne D. Case, Chairperson Date
Hawai'i Department of Land and Natural Resources

## EXECUTIVE SUMMARY

This INRMP has been developed for Ka'ena Point Space Force Station (KPSFS), Detachment 3 (Det 3), 21st Space Operations Squadron (21 SOPS), Peterson-Schriever Garrison, and the Air Force Civil Engineering Center (AFCEC). It was prepared IAW Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*; Air Force Policy Directive (AFPD) 32-70, *Environmental Considerations in Air Force Programs and Activities*; and the provisions of the Sikes Act, as amended (16 United States Code [U.S.C.] 670a *et seq*.; hereafter Sikes Act). This INRMP provides KPSFS with a description of the installation and its surrounding environment, and it presents management practices designed to mitigate negative impacts and enhance the positive effects of the installation's mission on local and regional ecosystems. These recommendations have been balanced against the requirements of KPSFS to accomplish its mission at the highest possible level of efficiency.

This INRMP is a practical guide for the management and stewardship of all natural resources present on KPSFS, while also ensuring successful accomplishment of the military mission. Det 3, 21 SOPS prepared this INRMP in cooperation with key installation personnel and federal, state, and local agencies and groups. This included representatives from the USFWS and the Hawai'i Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW). These varying perspectives allowed for an accurate portrayal of the status and management needs of local ecosystems that balances the installation's requirement to accomplish its mission at the highest possible level of efficiency. As a result, the INRMP considers probable effects of installation operations on the surrounding natural resources and allows for the development of possible operational alternatives that could reduce impacts on the environment.

Participation on this update by USFWS and DOFAW representatives satisfies the provisions of the Sikes Act, which requires cooperation with the USFWS and the appropriate state fish and wildlife agency (e.g., the DOFAW) as the INRMP is prepared and updated or revised. The INRMP must reflect mutual agreement among the parties with regard to the conservation, protection, and management of fish and wildlife resources.

The maintenance and enhancement of regional biological diversity and ecosystem function is particularly important for natural resources management and will be accomplished through the implementation of specific management practices identified in this INRMP. By protecting the riparian corridors and their associated habitats—areas which not only protect and support regional biodiversity, but also provide and protect important ecosystem functions—this INRMP will help to perpetuate the form and function of native communities and natural processes, thus enhancing the long-term viability of KPSFS and ensuring its sustainability for military operations.

The INRMP presents practicable alternatives and recommendations that would minimize impacts to KPSFS missions while providing for natural resources management and stewardship that would conserve and enhance the regional ecosystems in which the installation is embedded.

Det 3, 21 SOPS seeks to be a leader in facility and natural resources management within the United States Space Force (USSF) and the USAF. The overarching aim of this INRMP is to achieve the following goals.

- Manage for no net loss in KPSFS's capability to support its military mission.
- Minimize habitat fragmentation and promote the natural connectivity of habitats.
- Protect native species and discourage nonnative or invasive species.
- Protect rare and ecologically important species and unique or sensitive environments.
- Maintain or mimic natural processes.
- Protect genetic diversity.

- Conserve and enhance species, communities, and ecosystems on a regional basis.
- Monitor impacts on biodiversity.

Effects of each management strategy described in this INRMP should be monitored so that modifications can be implemented as conditions change. During the 2023 review, the existing goals, objectives, and projects presented in Section 8.0 of this INRMP were updated to conform to the United States Air Force INRMP template issued in 2020. During this process, the goals were consolidated into four topics: (1) mission support and natural resources program sustainment; (2) grounds, habitat, and biodiversity management; (3) threatened, endangered, and rare species conservation; and (4) community and outreach. Within these topics, the existing objectives and projects were retained with modifications to be more realistic, to better conform to the structure of the template, and to update them for current natural resource program needs.

During the 2023 update, information from recent invasive species surveys, the Invasive Species Management Plan (ISMP; Tab 3), and the Wildland Fire Management Plan (WFMP; Tab 1) were incorporated; climate change information was added per the 2020 template; and formatting, including table and figure captions and references, were updated or proofed as needed for clarity, accuracy, and consistency.

One of the key purposes of the INRMP is to identify areas where natural resources management may conflict with the KPSFS mission or future planning operations. The natural resources constraints on planning and mission operations on the Installation include land use/open space, soils, and vegetation cover (Figure ES 1-1). One purpose of this INRMP is to identify goals and objectives for the installation and to obtain workable and useful solutions for each topic of concern and potential constraints on the mission.

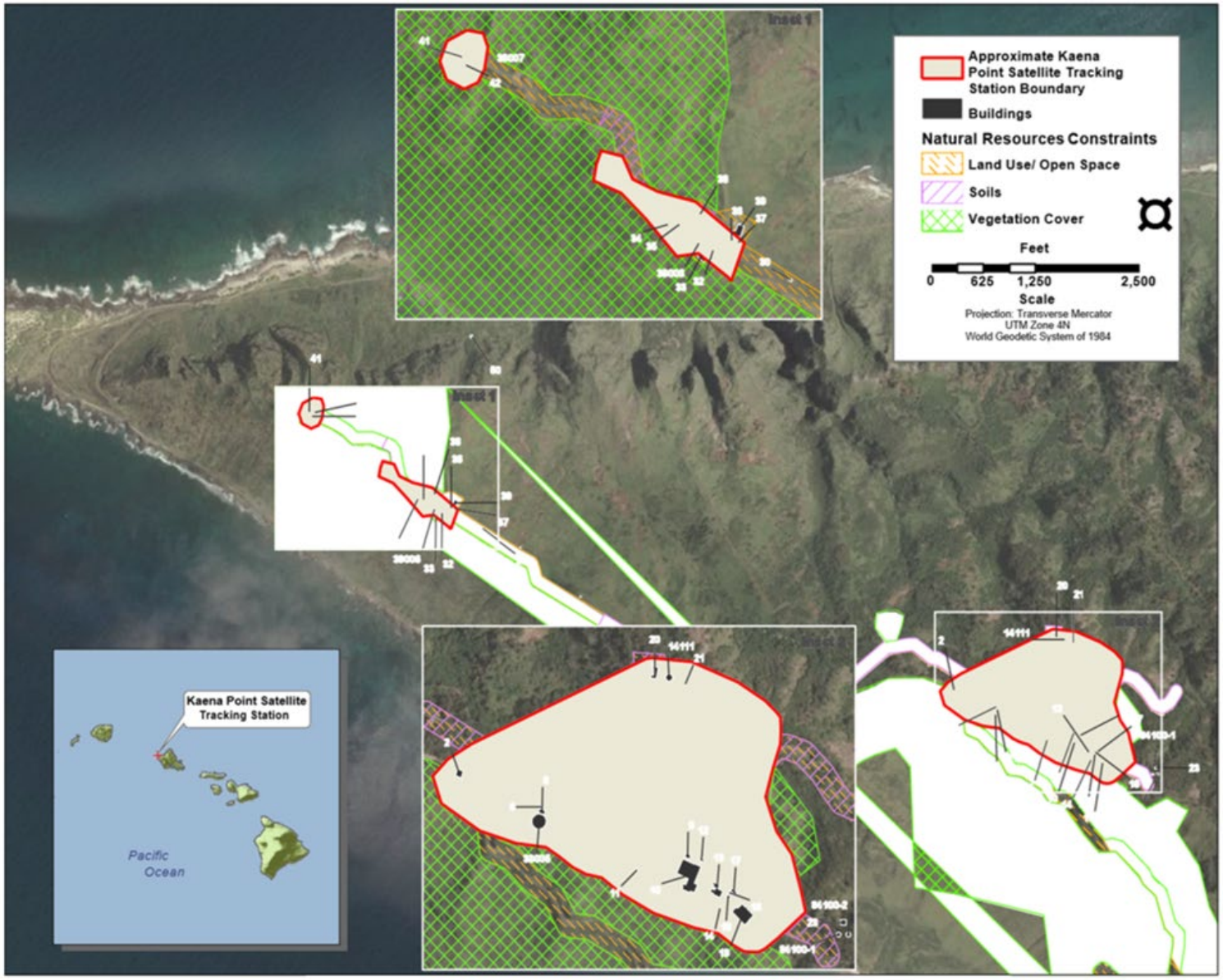


Figure ES 1-1. Composite natural resource constraints at KPSFS.

# 1.0 OVERVIEW AND SCOPE

This INRMP was developed to provide for effective management and protection of natural resources. It summarizes the natural resources present on the installation and outlines strategies to adequately manage those resources. Natural resources are valuable assets of the USAF. They provide the natural infrastructure needed for testing weapons and technology, as well as for training military personnel for deployment. Sound management of natural resources increases the effectiveness of USAF adaptability in all environments. The USAF has stewardship responsibility for the physical lands on which installations are located to ensure that all natural resources are properly conserved, protected, and used in sustainable ways. The primary objective of the USAF natural resources program is to sustain, restore, and modernize natural infrastructure to ensure operational capability and no net loss in the capability of USAF lands to support the installation's military mission. The plan outlines and assigns responsibilities for natural resources management, discusses related concerns, and provides program management elements that will help to maintain or improve the natural resources within the context of the installation's mission. The INRMP is intended for use by all installation personnel. The Sikes Act is the legal driver for the INRMP.

## *1.1 Purpose and Scope*

This INRMP has been developed IAW AFMAN 32-7003, *Environmental Conservation*; AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities*; and the provisions of the Sikes Act.

This INRMP provides a description of the KPSFS installation (e.g., location, history, and mission), information about the surrounding physical and biotic environment, and an assessment of the impacts on natural resources resulting from mission activities. The INRMP also recommends various management practices, in compliance with federal, state, and local standards, that are designed to mitigate negative impacts and to enhance the positive effects of the installation's mission on local ecosystems.

This INRMP integrates all aspects of natural resources management with the KPSFS mission. It is the primary tool for managing the installation's ecosystems while ensuring the successful accomplishment of the military mission at the highest possible levels of efficiency. The INRMP also guides the management and stewardship of all natural resources present on the installation. The natural resources program will implement a multiple-use approach to allow for the presence of mission-oriented activities while supporting ecosystem management on the installation.

Specific management practices identified in this INRMP have been developed to maintain biological diversity and ecosystem function within the installation. Specifically, management should adhere to the following practices.

- Minimize habitat fragmentation and promote the natural pattern and connectivity of habitats.
- Protect native species and discourage nonnative, invasive species.
- Protect rare and ecologically important species.
- Protect unique or sensitive environments.
- Maintain or mimic natural processes.
- Protect genetic diversity.
- Restore species, communities, and ecosystems.
- Monitor impacts on biodiversity.

Each of the management strategies described in this INRMP should be monitored so that modifications can implemented as conditions change.

Biodiversity is defined as variation occurring at the genetic, species, ecosystem, and landscape levels. Genetic diversity refers to the variation of genotypes (genetic makeup) within a species that influences different characteristics among individuals or populations. Species diversity refers to the number and relative proportions of different species within a given area. Ecosystem diversity refers to the number, relative proportions, and interactions among communities within an ecosystem. Landscape diversity can be defined as the composition of and interactions among ecosystems across a defined landscape.

Human communities are entirely and completely dependent on the goods and services provided by diverse ecosystems. Degradation of these ecosystems and the biodiversity within them is one of the foremost limitations to human prosperity. Ecosystem sustainability is the key to both biological diversity and human existence. The overall INRMP goal is to successfully integrate ecological sustainability with goals and objectives that will sustain human communities and the operational mission of KPSFS. By protecting a corridor of sensitive habitat that supports a variety of species, this INRMP helps to perpetuate—on a local and regional basis—viable, sustainable populations of native species and the communities they comprise. In turn, protecting these species and communities promotes the sustainability of functional ecosystems across the landscape.

The information presented in this INRMP will be incorporated into the KPSFS General Plan. The installation's comprehensive management planning process should incorporate the concerns presented in this INRMP so that the installation's growth can progress in a manner consistent with, and complementary to, USAF objectives with respect to protecting natural resources. Note that the cultural resources present on KPSFS are fully addressed in a separate Integrated Cultural Resource Management Plan (ICRMP; Tab 2); thus, they are discussed only briefly in the Cultural Resources Protection Section of this INRMP (Section 7.14).

### *1.2 Management Philosophy*

This INRMP was developed using an interdisciplinary approach and information gathered from a variety of organizations. Information and guidance also were solicited from a variety of federal, state, and local agencies and groups. This INRMP was developed in cooperation with key installation personnel, individuals from various agencies, and groups that have an interest in KPSFS and the management of its resources. This collaboration included representatives from the USFWS and the DOFAW. Correspondence with these agencies was documented and satisfies the requirements of 32 Code of Federal Regulations (CFR) 989, as amended, *The Environmental Impact Analysis Process* (EIAP).

The collaboration ensured that information concerning the natural resources on or in the vicinity of the installation was accurate and presented in acknowledgment with local and regional management strategies. As a result, the probable effects of installation operations on the surrounding natural and cultural resources can be projected. This approach also allowed for insight regarding possible operational alternatives, which could result in reduced impacts on the natural resources on the installation and in surrounding areas.

Participation on this update by representatives from the USFWS and the DOFAW satisfies the provisions of the Sikes Act, which requires the preparation of an INRMP in cooperation with the USFWS and the appropriate state fish and wildlife agency *(*e.g., the DOFAW). In addition, the resulting INRMP must reflect mutual agreement of the parties with respect to conservation, protection, and management of fish and wildlife resources. The Sikes Act also requires public comment on the INRMP at its inception, as well as after five-year revisions.

This INRMP presents practicable alternatives and recommendations that allow for protecting and enhancing natural resources and conserving existing ecosystems, while also minimizing impacts on the installation's

missions. Consequently, implementing some of the recommendations will sacrifice improvement of the installation's natural resources in deference to the safety and efficiency of the support missions.

### *1.2.1 Ecosystem Management*

The guiding philosophy of the natural resources program is to take an ecosystem-level approach to managing the natural resources present on KPSFS. In this approach, which is discussed in section 3.10 of AFMAN 32-7003, all appropriate components are integrated by their functions. Ecosystem management is emphasized because it is recognizes that the USAF and USSF mission is inextricably linked to local, regional, and global ecological integrity. Sustaining ecosystem integrity is also the best way to protect biodiversity, ensure sustainable use, and minimize the effort and costs of management. Native and natural communities, and the processes that sustain them, are unique expressions of the evolutionary and geological histories that are essential to sustaining current system function and resilience. Although habitats on KPSFS that have the potential to influence ecosystem form and function are limited, it is still a priority of this base to manage IAW this paradigm.

Ecosystem-based management also must consider human functions and needs within the foundation of establishing natural resources management actions. To incorporate both ecological and societal needs into this INRMP, it is useful to apply an ecological economics (EE) perspective. EE is not traditional natural resources and environmental economics (Costanza et al. 1997); rather, ecologists, land managers, and economists consider both the economic and the ecological needs of a particular system by taking into consideration theory from both disciplines to form an interdisciplinary perspective. For the USSF, the EE perspective can be applied to better understand the operational, societal, and ecological requirements at unit locations. This INRMP, therefore, brings together some of the insight from economic thought and operational necessity with ecological insight to present a clearer perspective on the relationship between USSF operations, crew morale, community responsibilities, and ecological functions and the interactions that bind them.

The EE perspective can be applied to merge the needs of the operational mission and the social environment of KPSFS with the ecological functions of the base and the region. From this perspective, six central themes have been developed to guide the ecological management perspective used in formulating the goals and objectives and in developing the natural resources management actions in this INRMP: (1) sustainability, (2) broad ecological values, (3) uncertainty, (4) multiple methodologies, (5) cooperative efforts, and (6) a land ethic (Table 1-1).

Ecosystems provide services that are of utility to wildlife, plants, and humans. Healthy ecosystem functions are often viewed separately from human communities; however, human society is inextricably linked to ecosystem structure and function. For example, regulation of hydrological flow is beneficial to human communities to provide drinking water, irrigation, or industrial applications that drive our society. A list of ecosystem services and the functions they provide is provided in Table 1-2.

The overarching goal of ecosystem management at KPSFS is to conserve regional biodiversity by managing the base's natural resources as a functional component of the surrounding regional ecosystem while supporting efficient conduct of the base's operational missions. Ecosystem management goals established in this INRMP will provide the context within which the goals and objectives of the other INRMP subject areas (e.g., fish and wildlife management, grounds management) are defined.

Table 1-1. Ecological themes used to integrate operational and social requirements.

| Ecological Theme | Description |
|---|---|
| **Sustainability** | Traditional economic analysis focuses on the goals of efficiency and growth. The integrity and sustainability of the ecosystem are essential for future operational success. The criterion of sustainability should be built into all USAF instructions and policies. |
| **Broad Ecological Values** | Economic value is limited to two narrow types: Value in exchange (market price) and value in use (willingness to pay or willingness to accept compensation). These types of values have often been applied when considering ecological functions. Instead, a much broader set of values, including social, aesthetic, life support, intrinsic, and operational values, must be associated with ecological functions. This valuation provides a more comprehensive understanding of the value of various ecosystem services that the DoD benefits from, including stable soils, clean air, clean water, consistent fire regimes, and reduced the financial burden that can result from a more biodiverse and resilient environment. |
| **Uncertainty** | There are fundamental uncertainties and high levels of risk surrounding large-scale or irreversible changes in the environment. |
| **Multiple Methodologies** | Sole reliance on any one analytical framework or method would provide an incomplete picture of the relationships between ecosystems and requirements of the operational mission. |
| **Cooperative Efforts** | Cooperation among various stakeholders in an ecosystem is necessary due to the fragmented ownership patterns throughout an ecosystem. Partnerships with landowners outside of the base boundary are necessary for management of the ecosystem that incorporates the requirements of the goals and missions of the various landowners or communities. |
| **Land Ethic** | Traditional economics and natural resources planning relied heavily on utilitarian approaches in the analyses. This INRMP uses a land ethic as one of the fundamental underpinnings of the management prescribed.<br>"All ethics rest upon a single premise: that the individual is a member of a community of interdependent parts… the land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively, the land." (Leopold 1949). |

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Table 1-2. Ecosystem services and function (source: Costanza et al. 1997).

| Ecosystem Service | Ecosystem Functions | Examples of Benefits |
|---|---|---|
| **Gas Regulation** | Regulation of atmospheric chemical composition | Carbon dioxide/oxygen balance, ozone for ultraviolet light protection and sulfur oxide levels |
| **Climate Regulation** | Regulation of global temperature, precipitation, and other biologically mediated climatic processes at global or local levels | Greenhouse gas regulation, dimethyl sulfide production affecting cloud formation |

Table 1-2. Ecosystem services and function (source: Costanza et al. 1997).

| Ecosystem Service | Ecosystem Functions | Examples of Benefits |
|---|---|---|
| **Disturbance Regulation** | Capacitance, damping, and integrity of ecosystem response to environmental fluctuations | Storm protection, flood control, drought recovery, and other aspects of habitat response to environmental variability mainly controlled by vegetation structure |
| **Water Regulation** | Regulation of hydrological flows | Providing water for agricultural (e.g., irrigation) or industrial (e.g., milling) processes or transportation |
| **Water Supply** | Storage and retention of water | Providing water via watersheds, reservoirs, and aquifers |
| **Erosion Control And Sediment Retention** | Retention of soil within an ecosystem | Preventing soil loss by wind, runoff, or other removal processes, storage of silt in lakes and wetlands |
| **Soil Formation** | Soil formation processes: weathering of rock and the accumulation of organic material | Providing soil for agricultural production and to support development of habitat for wildlife |
| **Nutrient Cycling** | Storage, internal cycling, processing, and acquisition of nutrients | Nitrogen fixation and other elemental or nutrient cycles; potential sequestering of soil carbon to reduce greenhouse gas effects |
| **Waste Treatment** | Recovery of mobile nutrients and removal or breakdown of excess nutrients and compounds | Waste treatment, pollution control, and detoxification |
| **Pollination** | Movement of floral gametes | Providing for pollinators and reproduction of plant populations |
| **Biological Control** | Trophic-dynamic regulation of populations | Keystone predators control prey species and reduce herbivory; competitive exclusion of nonnative species |
| **Refugia** | Habitat for resident and transient populations. | Nurseries, habitat for migratory species, or regional habitats for locally harvested species or overwintering grounds |
| **Food Production** | The portion of gross primary production that is extractable as food | Production of fish, game, crops, nuts, and fruits by hunting, gathering, subsistence farming, or fishing |
| **Raw Materials** | The portion of gross primary production that is extractable as raw materials | Production of lumber, fuel, and fodder |
| **Genetic Resources** | Sources of unique biological materials and products | Medicine, products for materials science, genes for resistance to plant pathogens and crop pests, and ornamental species |
| **Recreation** | Providing opportunities for recreational activities | Ecotourism, sport fishing, and other outdoor recreational activities |
| **Cultural** | Providing opportunities for noncommercial use | Aesthetic, artistic, educational, spiritual, and scientific values of ecosystems |

## *1.3 Authority*

This INRMP is developed under, and proposes actions IAW, applicable DoD and USAF policies, directives, and instructions. AFMAN 32-7003, *Environmental Conservation*, provides the necessary direction and instructions for preparing an INRMP. Issues are addressed in this INRMP using guidance provided under legislation, Executive Orders (EOs), Directives, and Instructions, including DoD Directive 4715.03, *Natural Resources Conservation Program*; AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities*; and AFMAN 32-7003 *Environmental Conservation*. DoD Instruction 4715.03 provides DoD installations the procedural direction for establishing an integrated program of multiple-use management of natural resources. AFPD 32-70 discusses general issues concerning environmental quality, including proper cleanup of polluted sites, compliance with applicable regulations, conservation of natural resources, and pollution prevention. Finally, AFMAN 32-7003 provides guidance on the preservation of cultural resources at USAF installations.

The 2016 Memorandum of Understanding between the DoD, USFWS, and Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resource Management Program on Military Installations (DoD, USFWS, and AFWA 2016; known as the 'Sikes Tripartite MOU') facilitates optimum management of natural resources on Installations. It states the responsibility of the DoD, USFWS, and state fish and wildlife agencies to cooperatively develop, review, and implement INRMPs and mutually agreed-upon fish and wildlife conservation objectives to satisfy Sikes Act goals.

Policies and regulations specific to Ka'ena Point are listed in Table 1-3.

Table 1-3. Policies and regulations specific to Ka'ena Point Space Force Station.

| **Installation-Specific Policies (including State and/or Local Laws and Regulations)** | |
|---|---|
| Memorandum for KPSTS Personnel and Tenants from Detachment 3, 21 SOPS/CC, Feeding of Feral Domesticated Species | AFMAN 32-7003 prohibits feeding or harboring feral domesticated species on Air Force lands. This memorandum specifies that feeding feral domesticated species on KPSFS is prohibited. |

## *1.4 Integration with Other Plans*

The INRMP supports the natural resources component by integrating all aspects of natural resources management and the site's military mission, and by establishing goals and objectives. Figure 1-1 depicts the relationship among the various management plans on KPSFS and how they jointly support the INRMP.


Figure 1-1. Relationship among management plans at Ka'ena Point Space Force Station.

The INRMP directly supports and is integral to the other resource management plans. For example, the primary programs of the INRMP are the Invasive Species Management Plan (ISMP; Tab 3) and the Wildland Fire Management Plan (WFMP; Tab 1).

# 2.0 INSTALLATION PROFILE

Table 2-1. Installation profile.

| | |
|---|---|
| **Office of Primary Responsibility** | Detachment 3, 21st Space Operations Squadron Civil Engineer has overall responsibility for implementing the natural resources management program and is the lead organization for monitoring compliance with applicable federal, state, and local regulations. |
| **Natural Resources Manager/Point of Contact (POC)** | Name: Lance H. Hayashi<br>Phone: 808-697-4312<br>Email: lance.hayashi@spaceforce.mil |
| **State and/or Local Regulatory POCs** (Include agency name for Sikes Act cooperating agencies) | Hawai'i DLNR DOFAW<br>Name: Myrna Girald Pérez<br>Email: myrna.girald-perez@hawaii.gov<br><br>USFWS<br>Name: James Kwon<br>Email: james_kwon@fws.gov |
| **Total Acreage Managed by Installation** | 153 acres |
| **Total Acreage of Wetlands** | N/A |
| **Total Acreage of Forested Land** | 24 acres |
| **Does installation have any Biological Opinions?** (If yes, list title and date, and identify where they are maintained) | No |
| **Natural Resources Program Applicability**<br>(Place a checkmark next to each program that must be implemented at the installation. Document applicability and current management practices in Section 7.0) | ☒ Fish and Wildlife Management<br>☒ Outdoor Recreation and Access to Natural Resources<br>☐ Conservation Law Enforcement<br>☒ Management of Threatened, Endangered, and Host Nation-Protected Species<br>☒ Water Resource Protection<br>☒ Wetland Protection<br>☒ Grounds Maintenance<br>☐ Forest Management<br>☒ Wildland Fire Management<br>☐ Agricultural Outleasing<br>☒ Integrated Pest Management Program<br>☐ Bird/Wildlife Aircraft Strike Hazard (BASH)<br>☒ Coastal Zone and Marine Resources Management<br>☒ Cultural Resources Protection<br>☒ Public Outreach |

| | |
|---|---|
| | ☒ Geographic Information Systems (GIS) |

## *2.1 Installation Overview*

### *2.1.1 Location and Area*

KPSFS (Table 2-2) is situated approximately 40 miles west of Honolulu in the westernmost portion of the Island of O'ahu. The installation sits on the Kuaokala Ridge at the northwestern end of the Waianae Mountain Range (USAF 2008b) at 21.57° N latitude and 158.25° W longitude in an unincorporated area of O'ahu (USAF 2008b). The area surrounding the installation is primarily state-owned land composed of two Natural Area Reserves (NARs), a State Park, and a State of Hawai'i Game Management Area, all of which mostly consist of unimproved forests and shrublands (Figure 2-1). The installation is relatively isolated and buffered from most public land activity by virtue of its location near the top of a steep ridge system (USAF 1996). There is no resident population within one mile of the station (USAF 2007b), and the population of the encompassing census track is approximately 8,000 (USAF 2008a). Makaha, seven miles south of KPSFS, and Waialua, seven miles east of KPSFS, are the nearest population centers (USAF 2007b).

Table 2-2. Installation/geographically separated units (GSU) locations and area descriptions.

| Installation/ GSU | Main Use/ Mission | Acreage | Addressed in INRMP? | Describe Natural Resource Implications |
|---|---|---|---|---|
| KPSFS (Main Base) | Detachment 3, 21st Space Operations Squadron (Det 3, 21 SOPS) executes on-demand, real-time command and control sorties for launch and operation of over 192 Department of Defense, allied, and civil space systems as part of the Satellite Control Network. Det 3, 21 SOPS also provides facilities maintenance, communications, utilities, and other base support services to various tenants on the installation. | 153 | Yes, throughout | Sensitive species management, invasive species management, wildland fire |

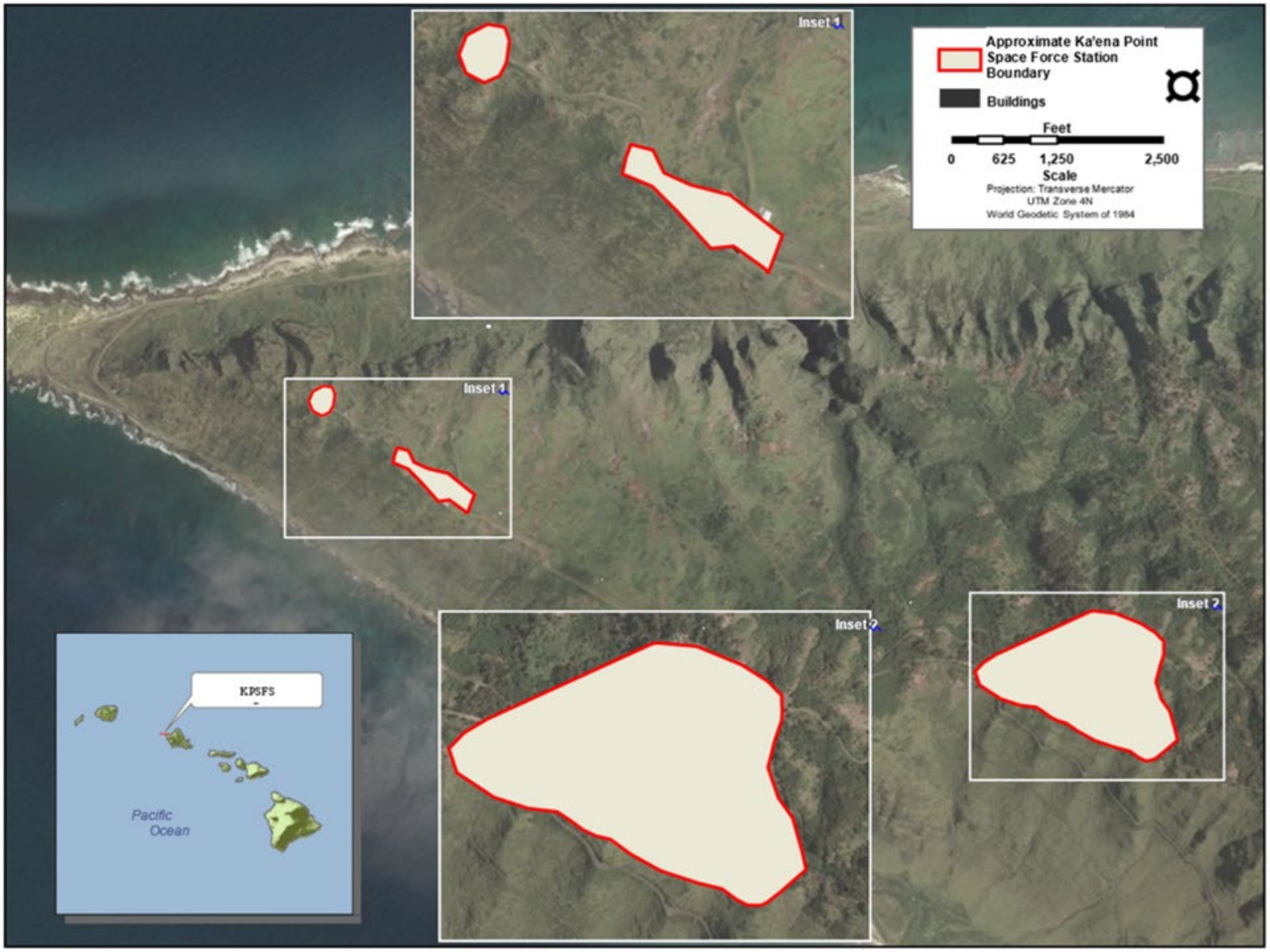


Figure 2-1. Ka'ena Point Space Force Station and the surrounding region.

### *2.1.2 Installation History*

The original KPSFS site consisted of 106 acres that were leased in 1958 from the Territory of Hawai'i and private landowners (USAF 2008a). The installation was originally designed to provide a radio receiving and radio transmitting area separated by sufficient distance to eliminate interference in the radio bands of interest. USAF activity at the installation has increased continuously since its establishment (USAF 1996).

Activity at the installation began when Lockheed Missile and Space Company hired the first support personnel in June 1958 and installed the initial systems, including acquisition, telemetry receiver, and vehicle-commanding antennas. At that time, the 6593rd Instrumentation Squadron was activated and assumed responsibility for the tracking station. These systems were installed as part of a five-station network to support the Discoverer Satellite Program, launched on 28 February 1959, which utilized low-flying vehicles to photograph foreign assets. The KPSFS mission during this time was to command the orbiting vehicle, track the re-entering film canister, and coordinate retrieval operations (USAF 2008a).

As the station's mission changed during the 1960s and 1970s, equipment became more automated and compact and existing facilities were modified to support mission changes. The installation began participating in several other DoD space programs, including a satellite communications network (Advent), the Missile Detection and Alarm System, and the Missile Observation System. During the late 1960s and early 1970s, the two Space Ground Link Subsystem antennas and AN/FPQ-14 fixed radar were constructed at KPSFS. Until 2007, the FPQ-14 facility was part of the Western Range, and it provided support to the North American Aerospace Defense Command. In 2010, the Air Force Weather Agency became a tenant of the Det 3, 21 SOPS at KPSFS.

In 1968, a civilian contractor assumed full operations and maintenance functions at KPSFS, with the USAF retaining overall management responsibility for the site. In 1973, following contract competition, the operations and maintenance functions at all of the remote tracking stations were consolidated under a single civilian contractor. In 1978, the TLM-18 antenna was taken out of service and dismantled and a new commercial uplink antenna was installed to provide weather satellite data relay. In 1979, the 6593rd Instrumentation Squadron was redesignated as Detachment 6, Air Force Satellite Control Facility (USAF 2008a). Between 1987 and 1992, the station saw a gradual reduction in military staffing and several redesignations and reorganizations. In October 1987, Air Force Space Command assumed responsibility for satellite operations. Detachment 6, Air Force Satellite Control Facility was again redesignated as Detachment 6, 2nd Satellite Tracking Group under the 2nd Space Wing. In January 1992, the 2nd Satellite Tracking Group was redesignated as Detachment 6, 750th Space Group (USAF 2008a).

Until 2003, KPSFS was under the stewardship of the 15th Airlift Wing (formerly the 15th Air Base Wing) at Hickam Air Force Base.

In 1994, a new lease was executed to respond to growing mission needs, increasing the total leased area to approximately 200 acres. Some of the leased land has since been returned to the State of Hawai'i, and KPSFS now occupies approximately 153 acres (Table 2-2). State land is not re-leased to other entities by KPSFS.

In June 1997, Detachment 6, 750th Space Group was redesignated as Detachment 4, 22nd Space Operations Squadron of the 50th Space Wing, USAF due to the realignment of the 750th Space Group (USAF 2008a). In October 2011, Detachment 4 was redesignated as Det 3, 21 SOPS due to a realignment of the network operating group structure (50th Network Operations Group).

In December 2019, the USSF was established and the USAF Space Command and other units were realigned under the USSF. As part of the new organizational structure of the USSF, the 50th Network

Operations Group was redesignated Space Delta 6, and Schriever Air Force Base became part of the Peterson-Schriever Garrison. On 16 June 2021, the Ka'ena Point Satellite Tracking Station was renamed the Ka'ena Point Space Force Station (KPSFS).

### *2.1.3 Military Missions*

The current mission of KPSFS is to provide uninterrupted support, including telemetry, tracking, command, and data-retrieval functions, for DoD space vehicles, including weather, early warning, navigation, communications, and other high-priority space programs supported by the Satellite Control Network (SCN). KPSFS is one of eight satellite tracking stations that make up the common user segment of the SCN and provides launch and on-orbit operational support to more than 192+ satellites. The installation also provides support to a monitoring station for the global positioning system. These DoD space systems provide prevailing weather and precise navigation data to operational users (USAF 2008a). Table 2-3 includes a description of KPSFS's tenant responsibilities towards natural resources on the installation.

Table 2-3. Listing of tenants and natural resources responsibility.

| Tenant Organization | Natural Resources Responsibility |
|---|---|
| Detachment 5, 2nd Weather Squadron (Ka'ena Point Solar Observatory) | Detachment 3, 21st Space Operations Squadron is responsible for managing the tenant's impact to natural resources and vice versa. This is executed through the AF813 process or the independent work order program. |

### *2.1.4 Natural Resources Needed to Support the Military Mission*

Natural resources needed to support the military mission at KPSFS include areas that maintain flexibility for future mission requirements; water-quality functions; stable soils for future development and mission support; and habitat and species that provide positive aesthetic, social, and recreational attributes, which contribute substantially to the overall quality of life. Their management is addressed in this INRMP and its associated operational component plans.

### *2.1.5 Surrounding Communities*

KPSFS is situated on a high ridge overlooking the Pacific Ocean. The areas surrounding KPSFS are mostly unimproved (see Section 13.2 for "unimproved grounds") forest and shrublands. Because facilities at KPSFS are spread out, there is much interface between the installation and the surrounding land managed by the State of Hawai'i (USAF 1997). The community areas neighboring KPSFS are in contact with KPSFS primarily through recreational use of Ka'ena Point public beach areas, approximately one mile from KPSFS, and the natural areas that surround Ka'ena Point. Ka'ena Point is a popular area for hiking, biking, hunting, and other recreational activities (USAF 1997). KPSFS is not included in this recreational activities area, but it serves as a corridor for access to the Kuaokala trail and lands to the north and east of KPSFS.

The DOFAW manages most of the land north of KPSFS and the Division of State Parks manages the lands to the south (USFWS 2020). The two state NARs in the vicinity of KPSFS are Ka'ena Point NAR and Pahole NAR. Ka'ena Point State Park, a recreational facility used year-round for hiking, shore fishing, surfing, picnicking, and wildlife watching, is directly below KPSFS along the southwestern shore of Ka'ena

Point. Directly adjacent to KPSFS is Kuaokala Game Management Area, a State of Hawai'i Game Management Area used by recreational hunters and hikers.

Other land uses within five miles of KPSFS include a few scattered residences, small farms, and military training grounds (USAF 1996). Previously, much of the land to the north and east of KPSFS had been under grazing leases operated by the Hawai'i DLNR, Division of Land Management (USAF 1996).

### *2.1.6 Local and Regional Natural Areas*

KPSFS is adjacent to the Kuaokala Game Management Area and Mokuleia Forest Reserve, both owned by the State of Hawai'i and used by recreational hunters and hikers who are allowed to cross installation property to access state lands. Those areas are periodically stocked with game species for hunting.

The Ka'ena Point NAR is at the shoreline of Ka'ena Point, approximately one mile west of the westernmost KPSFS antenna. Ka'ena Point NAR, a significant and sensitive habitat, protects one of the last wild stretches of coastline on O'ahu. It protects coastal dunes and is designated as critical habitat for seven endangered plant species: O'ahu riverhemp or ohai (*Sesbania tomentosa*), ʻāwiwi (*Schenkia sebaeoides*), ʻakoko (*Chamaesyce celastroides* var. *kaenana*), O'ahu cowpea (*Vigna owahuensis*), sticky flatsedge or pu'uka'a (*Cyperus trachysanthos*), Brackenridge's rosemallow or ma'o hau hele (*Hibiscus brackenridgei*), and Waianae Range schiedea (*Schiedea kealiae*). Ka'ena Point NAR also provides important habitat for nesting seabirds, the Laysan albatross or ka'upu (*Phoebastria immutabilis*) in particular, and is commonly used by the endangered Hawaiian monk seal (*Monachus schauinslandi*) (Hawai'i DOFAW 2007).

Pahole NAR is four miles southeast of KPSFS and consists of native forest plant communities and valuable habitat for native birds. The entire Pahole NAR is considered a sensitive habitat, particularly for the endangered Hawaiian ʻelepaio (*Chasiempis sandwichensis ibidis*), one species of the endangered O'ahu tree snail or kāhuli (*Achatinella mustelina*), three snail species of concern, and many rare, native plant species. Additionally, the USFWS has designated Pahole NAR as critical habitat for the ʻelepaio and 25 threatened and endangered (T&E) plants on O'ahu. Pahole NAR also includes lowland native mesic and dry forests, which are becoming increasingly rare in Hawai'i (Hawai'i DOFAW 2003).

Ka'ena Point State Park, an 853-acre strip of land that wraps nine miles around the western point of O'ahu between Dillingham Airfield and Makua Military Reservation, is located directly below KPSFS along the shore of Ka'ena Point. This undeveloped park is home to numerous seabirds and rare native plants (Hawai'iWeb, Inc. 2008, Hawai'i State Parks 2008).

## ***2.2 Physical Environment***

### *2.2.1 Climate*

KPSFS has a lowland climate that remains mild and relatively consistent throughout the year. Precipitation and temperature records from the Waialua climate station (No. 847) approximately six miles east of KPSFS, were used to characterize climatic conditions at the installation. August is the warmest month of the year at Ka'ena Point with mean daily highs of 86.9 degrees Fahrenheit (°F) and mean daily lows of 67.1 °F. February is the coolest month of the year with mean daily highs and lows ranging from 79.9 °F to 59.3 °F, respectively (WRCC 2010). Slightly cooler temperatures prevail at KPSFS than in surrounding areas because the installation is at a higher elevation (USAF 2007b).

The Ka'ena Point region receives an average of 30 inches of precipitation per year. Monthly averages range from 1.1 inches in June to 6 inches in January. The months with greatest rainfall are November and

December (WRCC 2010). Table 2-4 provides a summary of temperature and precipitation data for Waialua, Hawai'i, near KPSFS.

Constant trade winds, which generally blow from a northeasterly direction, buffet the ridgetops along Ka'ena Point (Hawai'i DLNR 1978). Annual average wind speeds range from approximately 17–20 miles per hour at Ka'ena Point (Hawai'i Department of Business, Economic Development, and Tourism 2004). During summer, trade winds generally prevail in the Hawaiian Islands more than 90 percent of the time, sometimes persisting for an entire month; however, in winter (January through March), trade winds occur only 40–60% of the time (Pacific Disaster Center 2008).

Table 2-4. Climate summary for Waialua, Hawai'i, from 1981 to 2010 (source: Western Regional Climate Center 2010).

| Month | Normal Temperature (°F)—Mean Daily | | | Normal Precipitation (Inches) Mean Monthly |
|---|---|---|---|---|
| | Maximum | Minimum | Mean | |
| January | 80.5 | 59.8 | 70.2 | 6.0 |
| February | 79.9 | 59.3 | 69.6 | 3.7 |
| March | 80.5 | 60.6 | 70.6 | 3.1 |
| April | 81.6 | 61.7 | 71.7 | 2.3 |
| May | 82.6 | 63.3 | 73.0 | 1.7 |
| June | 84.6 | 65.2 | 75.0 | 1.1 |
| July | 85.8 | 66.9 | 76.4 | 1.7 |
| August | 86.9 | 67.1 | 77.0 | 1.2 |
| September | 87.2 | 66.8 | 77.0 | 1.6 |
| October | 85.2 | 65.9 | 76.6 | 3.3 |
| November | 79.5 | 63.0 | 71.3 | 5.2 |
| December | 80.8 | 63.3 | 72.1 | 5.9 |
| **Mean** | **82.9** | **63.6** | **73.3** | **3.1** |
| | | | **Total** | **36.8** |

#### 2.2.1.1 Climate Projections

Colorado State University's Center for Environmental Management of Military Lands (CSU CEMML) generated site-specific climate projections for KPSFS under two future carbon-emission scenarios: Representative Concentration Pathway (RCP) 4.5 (moderate-level emissions) and RCP 8.5 (high-level emissions). They then used these projections to assess potential impacts of climate change on natural resources at the installation. Models used historical daily climate data recorded from 1980 through 2009 to represent average historical (also called baseline) conditions. The historical daily climate data represent the 30-year historical reference point used by the Intergovernmental Panel on Climate Change (IPCC) to define climate change scenarios. Future climate conditions, assessed under both RCP 4.5 and RCP 8.5, were projected to produce two decadal time series of daily climate values for 2026–2035 and 2046–2055, represented hereafter as 2030 and 2050, respectively (CEMML 2019).

Historical data included average daily temperature, maximum and minimum daily temperatures, and daily precipitation. For each of these variables, researchers calculated a daily anomaly (the difference between a future climate and the historical climate) under each emissions scenario (RCP 4.5 and RCP 8.5). Daily data were then averaged within both 10-year periods for each variable and emission scenario to produce an annual average temperature (TAVE), annual average maximum (TMAX) and annual average minimum (TMIN) temperatures, and annual average precipitation (PRECIP).

The climate assessment was based primarily on publicly available data and data provided by AFCEC (CEMML 2019). Climate projections were based on recent global climate model simulations developed for the IPCC Fifth Assessment Report, the IPCC Coupled Model Intercomparison Project Phase 5, and the U.S. National Center for Atmospheric Research Community Climate System Model (Hibbard et al. 2007; Moss et al. 2008, 2010; Gent et al. 2011; Hurrell et al. 2013).

#### 2.2.1.2 Climate Model Results

Table 2-5 summarizes climate projections for the two emissions scenarios and both timeframes. Within each of those scenarios and for each variable projected are various sources of uncertainty relating to our knowledge of the processes involved. For instance, there is a range of possibilities for precipitation levels that depends on how the ocean and atmosphere interact as conditions change, something that is not yet fully understood but known to be highly important. the two emissions pathways and two timeframes are depicted to demonstrate the differences that could result from changing emissions levels.

For the decade centered around 2030, both of the scenarios project an increase of 0.7–1.6 °F in TAVE over the historical average. The two emissions scenario projections show greater warming by 2050, with both scenarios expressing a warming of approximately 3.5 °F for this period. Both TMIN and TMAX are projected to increase relative to the historical average for both emissions scenarios and timeframes. Notably, the number of days per year with maximum temperature reaching over 90 °F is projected to increase from the historical average of 22 up to 96 days by 2050 under the RCP 4.5 scenario.

Average annual precipitation varies between emission scenarios and over time due to larger interconnected ocean-atmosphere dynamics associated with the National Center for Atmospheric Research Community Climate System Model, but decreases in precipitation are projected for every scenario. For 2030, the RCP 4.5 scenario projects a moderate decrease in PRECIP of 20% relative to the historical baseline, and RCP 8.5 shows a larger decrease of 22%. For 2050, RCP 4.5 projects that PRECIP will remain close to the historical baseline, whereas RCP 8.5 shows a nearly 28% decrease.

Table 2-5. Summary of historical and projected climate data at Ka'ena Point Space Force Station.

| Variable[1] | Historical | RCP 4.5 | | RCP 8.5 | |
|---|---|---|---|---|---|
| | | 2030 | 2050 | 2030 | 2050 |
| PRECIP (inches) | 55.8 | 44.6 | 55.2 | 43.3 | 40.2 |
| TMIN (°F) | 68.9 | 69.7 | 72.2 | 70.5 | 72.2 |
| TMAX (°F) | 83.4 | 83.9 | 87.0 | 85.0 | 86.9 |
| TAVE (°F) | 76.1 | 76.8 | 79.5 | 77.7 | 79.5 |
| GDD | 9,516 | 9,758 | 10,673 | 10,077 | 10,668 |
| HOTDAYS | 22.0 | 27.8 | 96.0 | 43.5 | 90.6 |
| WETDAYS | 3.2 | 3.0 | 3.3 | 2.6 | 1.1 |

[1] TAVE = annual average temperature (ºF); TMAX = annual average maximum temperature (ºF); TMIN = annual average minimum temperatures (°F); PRECIP = average annual precipitation (inches); GDD = average annual accumulated growing degree days with

682 a base temperature of 50 ºF; HOTDAYS = average number of days per year exceeding 90 °F; WETDAYS = average number of
683 days per year with precipitation exceeding two inches in a day.
684

685 *2.2.2 Landforms*

686 Elevations at KPSFS range from approximately 800 feet above mean sea level (AMSL) at its western extent
687 to more than 1,400 feet AMSL further inland. KPSFS is situated on Kuaokala Ridge, a plateau that drops
688 sharply along the western and southern sides of the installation approximately 1,000 feet to the Pacific
689 Ocean (USAF 2008b). Toward the north, the plateau extends beyond KPSFS and is dissected by several
690 short, steep gulches (small canyons). To the east of KPSFS, Kuaokala Ridge merges with the western end
691 of the Waianae Mountain Range (Figure 2-2; Tab 5).

692 *2.2.3 Geology and Soils*

693 The geology of the Ka'ena Point area is dominated by basalts of the Waianae Volcanic Series. The unit
694 consists of more than 6,000 feet of andesite flows (dense, blocky lava) in the upper section and thin-bedded
695 pahoehoe (basaltic lava with smooth surface) in the older members. Surface rocks have weathered in place,
696 forming saprolitic soils with rock outcrops in the steeper gully walls and escarpment faces (USAF 1996).

697 Although the quality of surface water and groundwater with respect to soil characteristics (e.g., erosion
698 potential) do not currently pose a problem for existing or proposed development, protection of soil and
699 water resources is required under the laws, regulations, and policies listed below.

700 • Clean Water Act (CWA) of 1977, as amended
701 • EO 11514, Protection and Enhancement of Environmental Quality
702 • Federal Land Policy and Management Act of 1976
703 • Federal Water Pollution Control Act of 1977
704 • Soil and Water Conservation Act
705 • Food Security Act of 1975

706 Figure 2-3 shows the locations of soils mapped on the installation (NRCS 2008b). The following text
707 provides general descriptions of the soil series mapped on KPSFS.

708 Soils in the vicinity of KPSFS are primarily in the Mahana series and also include rocky areas mapped as
709 rock outcrop, rock land, and stony steep land. The Mahana soil series consists of very deep, well-drained
710 soils that formed in material weathered from volcanic ash. Mahana soils are on dissected uplands at
711 elevations of 1,000 to 3,000 feet AMSL and on slopes ranging from about 6–35%. The annual rainfall is
712 30–45 inches, and Mahana soils have slow to very rapid runoff, depending on slope, and moderately rapid
713 permeability (NRCS 2008a).

714 The most prevalent map unit near the installation is Mahana-Badland complex, which consists of 40–70%
715 Mahana soils and 30–60% Badland soils. Badland soils are found on steep to very steep, nearly barren land
716 where the soil-forming material is generally soft or hard saprolite. Mahana soils in this complex have a silty
717 clay loam texture and are similar to Mahana silt loam. Runoff is rapid and the erosion hazard is moderate
718 to very severe (USAF 1996).

719 There are scattered areas of Mahana silty clay loam with 6–12% slopes and 12–20% slopes. These soils are
720 well-drained and largely eroded (NRCS 2008a, 2008b). Runoff in these areas is rapid and the erosion hazard
721 is severe where slopes are greater than 12% (USAF 1996).

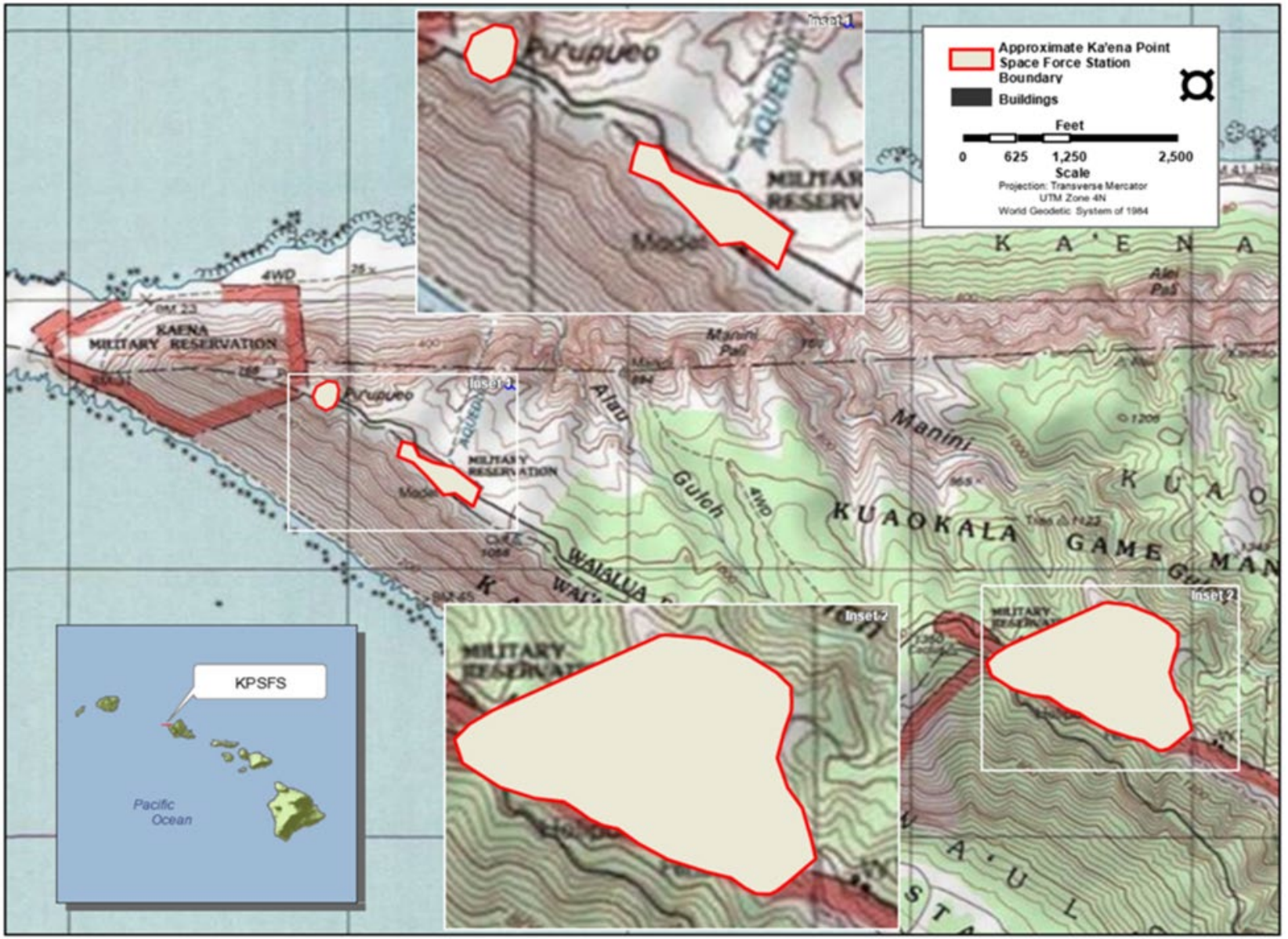


Figure 2-2. Topography of Ka'ena Point Space Force Station and surrounding region.

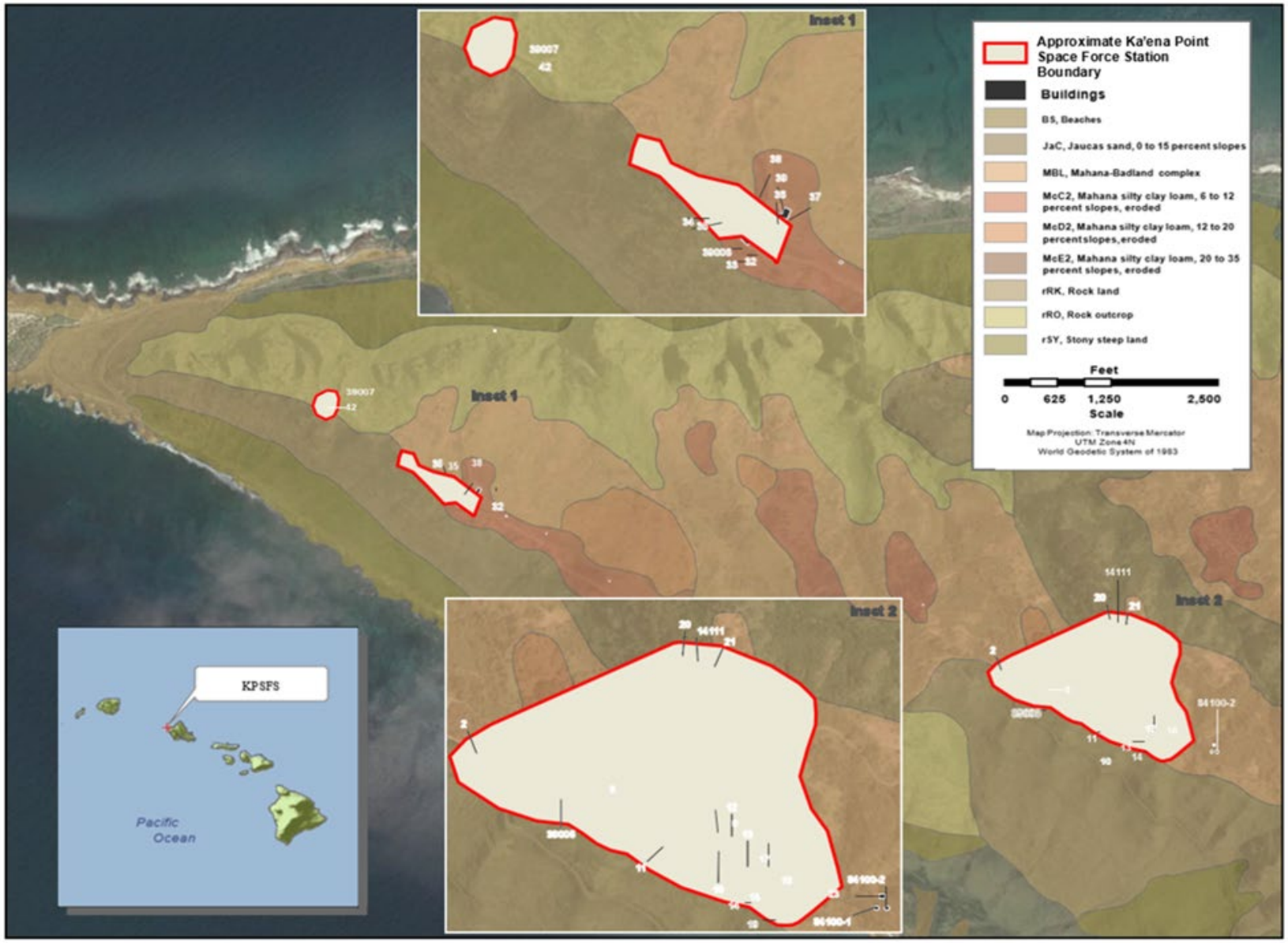


Figure 2-3. Location of soils mapped on Ka'ena Point Space Force Station.

Areas mapped as rock outcrop and rock land are primarily along the western-facing escarpment of KPSFS. Rock outcrop occurs on steeper slopes, where exposed rock covers more than 90% of the land area. Rock land occurs on nearly level to steep land types and has exposed rock covering 25–90% of the surface. Stony, steep land occurs along the northern and southern slopes of Ka'ena Point, alongside slopes of drainage ways where boulders and rocks are deposited by water and gravity (Figure 2-3) (NRCS 2008a, USAF 1996).

### *2.2.4 Hydrology*

#### 2.2.4.1 Watersheds and Installation Drainage Pattern

Much of KPSFS lies within the Manini watershed and Alau Gulch watersheds, which drain north into the Pacific Ocean, and it may partially lie within the Kaluakauila watershed, which drains west/southwest into the Pacific Ocean (Coral Reef Assessment and Monitoring Program 2008). Surface drainage from KPSFS closely follows topography, flowing downslope to the north, west, and south to the Pacific Ocean (USAF 1996). There are no water courses within the installation's boundaries (USAF 1997).

Areas that generate storm water runoff at KPSFS are generally paved areas that produce sheet flow runoff. Some locations have gutters, drop inlets, culverts, and outfalls to direct runoff away from buildings and other facilities. During typical rainfall events, storm water drains to, accumulates in, and ultimately passes through low-lying areas (swales and gulches) and does not discharge directly into the Pacific Ocean. There is no formal storm sewer at KPSFS that connects to a municipal separate storm sewer system (MS4) (USAF 2007b). On 14 May 2021, the State of Hawai'i Department of Health, Clean Water Branch issued a decision on a recently conducted MS4 audit that KPSFS is not required to be regulated as a small MS4; therefore, a MS4 permit is no longer required.

KPSFS discharges storm water to 11 receiving waters, all classified as Inland Class 2, under its National Pollutant Discharge Elimination System (NPDES) general permit (USAF 2007b). The objective of Class 2 waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation. The uses to be protected in Class 2 waters are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters (Figure 2-4) (Hawai'i DOH 2004). Although the 2021 audit determined that discharges from KPSFS are unlikely to affect surrounding waters. KPSFS will continue to monitor, manage, and comply with best management practices (BMPs) as part of the installation's stormwater management plan (SWMP).

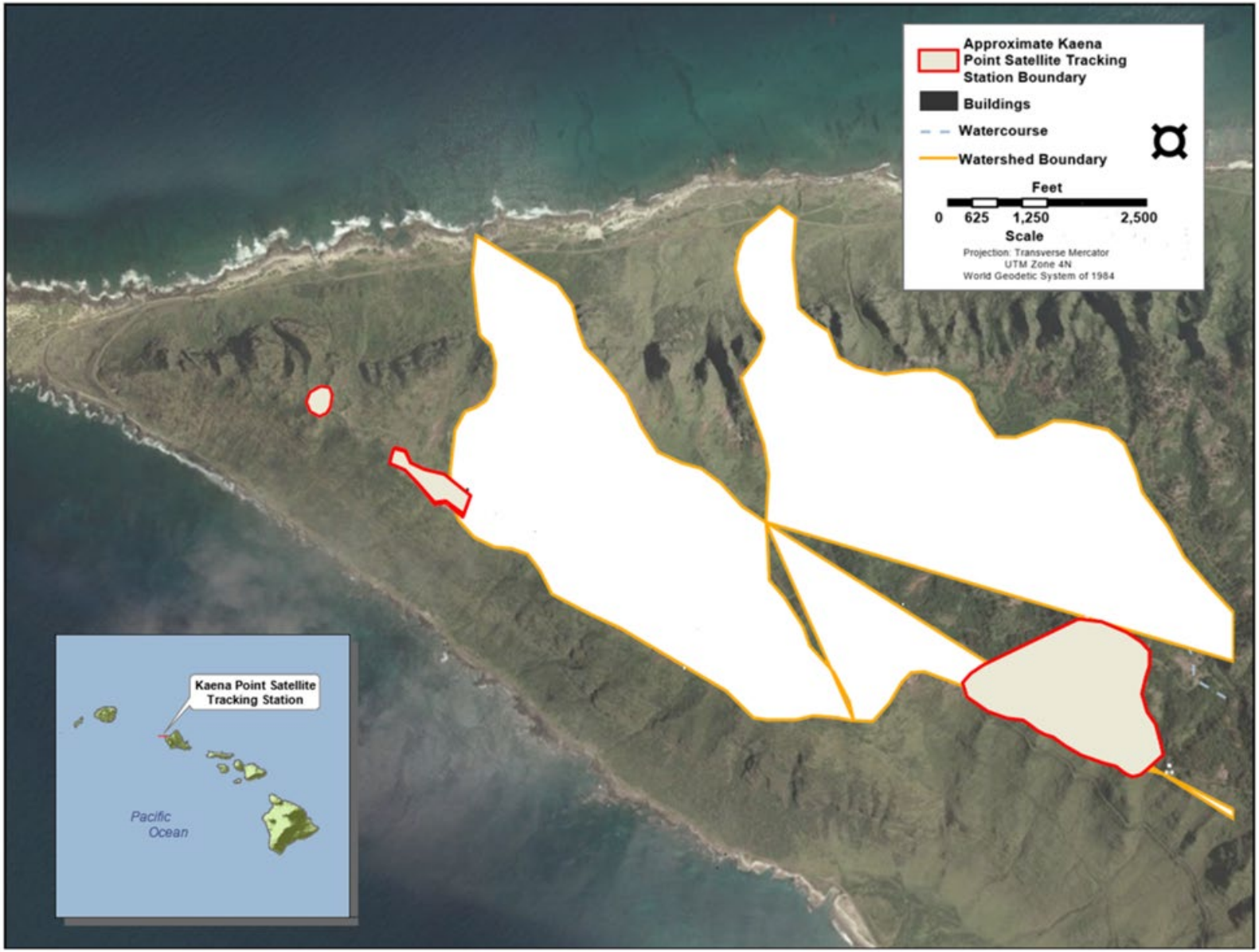


Figure 2-4. Watersheds in the regions surrounding Ka'ena Point Space Force Station.

#### 2.2.4.2 Water Quality

The Federal Government has granted the authority to implement the NPDES program to state governments. The Hawai'i Department of Health (DOH) has assumed that role and tailored its control programs for storm water discharge to address the state's water-quality needs and objectives. Under the DOH program, sites may discharge storm water under a general or individual NPDES permit. If a general permit is applicable to the discharge, the owner must submit a Notice of Intent to seek coverage under the general permit. In May 2021, Hawai'i DOH determined that KPSFS should no longer be regulated as a small MS4. KPSFS withdrew their MS4 permit renewal as directed by the Hawai'i DOH. KPSFS has developed and implemented a SWMP and enforces its SWMP to reduce the discharge of pollutants to the maximum extent practicable. The SWMP describes the BMPs and minimum control measures that will be implemented to protect water quality (USAF 2007b). 40 CFR §122.34(b) stipulates and the KPSFS SWMP requires the following minimum control measures: (1) public education and outreach on storm-water impacts, (2) public involvement and participation, (3) illicit discharge detection and elimination (4) storm water runoff control at construction sites, (5) post-construction storm water management in new development and redevelopment, and (6) pollution prevention and good housekeeping for operations.

No industrial wastewater is generated at KPSFS, but the following authorized potential discharges of non-storm water are known to occur at KPSFS.

- Flushing of water lines is conducted infrequently and presents an insignificant source of runoff and contributor of pollution.
- Irrigation of lawns and landscaping is minimal and presents an insignificant source of runoff and contributor of pollution. No fertilizers are used.
- Condensate from air conditioners represents an insignificant source of runoff and contributor of pollution.
- KPSFS facilities are occasionally used by firefighters for staging equipment and personnel when needed in the area. Examples of firefighting water that could be exposed to storm water include flow testing of hydrants, spillage from filling tanker trucks, and helicopter operations from portable basins.
- Sanitation facilities handling wastewater from each building at KPSFS are located underground and include cesspools, septic tanks, and leach fields. These are used under capacity due to the relatively small installation population.
- Floor drains that serve areas (e.g., lavatories and condensate floor sinks) are known to flow to the septic tank systems. Floor drains that receive incidental storm water or that serve water heater vents drain into vegetated swales.
- Uncontaminated groundwater (e.g., well flushing).

It is important to maintain good surface water quality at KPSFS to protect and preserve off-installation surface water resources. Off-installation surface waters include Alau Gulch and Manini Gulch, which are found on the coast to the north of KPSFS; two ephemeral coastal streams that drain toward the north coast of Ka'ena Point; several short, steep streams to the north; and the Pacific Ocean (USAF 1996). Each of these waterways supports diverse wildlife and aquatic populations that could be affected detrimentally by contaminated surface water.

KPSFS has several BMPs in place to provide pollution prevention from point sources and sheet flow runoff. These BMPs include covering outdoor garbage containers; the use of soil retaining walls for erosion prevention; secondary containment for petroleum, oil, and lubricants (POLs) and other hazardous chemicals; and the use of alarms, visual indicators, and a kill-switch to prevent overfilling and spills from

gasoline and diesel storage tanks at the onsite fueling station (USAF 2007b). The BMPs reduce the likelihood of impacts to off-installation surface water resources.

#### 2.2.4.3 Streamflow and Channel Inundation Modeling

Understanding changes in daily intensity and total precipitation for multi-day precipitation events is helpful for evaluating precipitation patterns in addition to assessing annual averages (Section 2.2.1.2). Three-day storm events (design storms) were generated from projected precipitation data based on RCP 4.5 and 8.5 emissions scenarios for the 2030 and 2050 timeframes (Table 2-6; CEMML 2019). For comparison, historical precipitation data were used to calculate a baseline storm event for the year 2000. These analyses focus on the total amount of precipitation accumulating for a given frequency and duration of event. They do not model possible changes between the baseline event and future scenarios for storm intensity of less than 24 hours. More intense precipitation events can exceed the infiltration capacity of the soil, leading to an increased potential for flash flooding, which also was not analyzed here.

Table 2-6. Design storm precipitation projections for Ka'ena Point Space Force Station.

| Design Storm | | Baseline | RCP 4.5 | | RCP 8.5 | |
|---|---|---|---|---|---|---|
| | | 2000 | 2030 | 2050 | 2030 | 2050 |
| Precipitation (inches) | Day 1 | 4.17 | 3.50 | 6.07 | 4.66 | 2.35 |
| | Day 2 | 8.96 | 7.81 | 7.98 | 6.05 | 4.09 |
| | Day 3 | 3.55 | 2.64 | 3.54 | 2.26 | 2.32 |
| | Total | 16.68 | 13.95 | 17.59 | 12.97 | 8.76 |
| Percent change from baseline | | | -16 | 5 | -22 | -47 |

Design storms for KPSFS project decreases in three-day storm event precipitation for most timeframes and scenarios. These decreases range from 16% (RCP 4.5, 2030) to 47% (RCP 8.5, 2050) relative to the historical baseline. The exception is the RCP 4.5 2050 scenario, for which a small increase in precipitation is projected.

These analyses focus on the total amount of precipitation accumulating for a given frequency and event duration. The projected design storms do not represent extreme weather events (e.g., hurricanes, extraordinary storm fronts), although these events have already become more common and are likely to continue increasing in frequency due to climate change (Center for Climate and Security 2019).

## *2.3 Ecosystems and the Biotic Environment*

### *2.3.1 Ecosystem Classification*

KPSFS lies within the Trade Winds Division of the Tropical Domain (Bailey 2014). Historically, precipitation at KPSFS averaged about 55.8 inches per year and the average annual temperature was about 76.1 ºF.

The Hierarchical Framework of Ecological Units is an established classification and mapping system that identifies land and water areas at different levels of resolution with similar capabilities and potentials for management. Depending on scale, ecological units are designed to exhibit similar patterns in potential natural communities, soils, hydrologic function, landform and topography, lithology, climate, and natural

processes, such as nutrient cycling, productivity, succession, and natural disturbance regimes associated with flooding, wind, or fire. Maps of these units may be used to delineate ecosystems, assess resources, conduct environmental analyses, and manage and monitor natural resources (Cleland et al. 1997).

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources (Bailey 1995). At this scale, ecological units are recognized by differences in global, continental, and regional climatic regimes and gross physiography (Cleland et al. 1997). Four levels of ecoregions, adapted from Bailey (1995), are identified in the hierarchy: domains, divisions, provinces, and sections. The descriptions for KPSFS adapted from Baily (1995) are as follows.

The humid tropical domain is characterized by equatorial and tropical air masses. Every month of the year has an average temperature above 64 °F and there is no winter season. In these tropical systems, the primary periodic energy flux is diurnal: temperature variation from day to night is greater than from season to season. Average annual rainfall is heavy and exceeds annual evaporation but varies in the amount and seasonal and areal distribution. Two climate types are differentiated by seasonal distribution of precipitation. The tropical wet (or rainforest) climate has ample rainfall through 10 or more months of the year and the tropical wet-and-dry (or savanna) climate has a dry season more than two months long. KPSFS would be classified further as a tropical wet (or rainforest) climate.

The rainforest regime mountains division is a region classified as wet equatorial or rainforest climate. Average annual temperatures are close to 80 °F; seasonal variation is virtually imperceptible. Rainfall is heavy throughout the year, but monthly averages vary considerably due to seasonal shifts in equatorial convergence zone and consequent variation in air mass characteristics. The forest is evergreen, but individual species have various leaf-shedding cycles. It is a home to small forest animals able to live and travel in the continuous forest canopy, bird species are numerous and spectacularly plumaged. Not all equatorial rainforest areas have low topographic relief. Hilly or mountainous belts have very steep slopes; frequent flows, slides, and avalanches of soil and rock strip away surfaces down to the bedrock.

The Hawaiian Islands province is the classification for the Hawaiian Islands, which occupy a tropical oceanic position south of the Tropic of Cancer. The five principal islands and four smaller ones are all volcanoes in various stages of erosion. The islands are hilly and mountainous; KPSFS is located on the island of O'ahu, which has more of a coastal plain then the other islands. Like all the islands, O'ahu has a tropical climate. At any given location, temperature and precipitation remain nearly constant year round. The Hawaiian Islands are isolated and their flora are unique; there were many endemic species before human settlement. Native plants occur in a variety of community types, including shrubland, forest, and areas of bog and moss-lichen.

These areas are critical for structuring and implementing ecosystem management strategies across federal and state agencies and nongovernmental organizations that are responsible for different types of resources within the same geographical areas.

### *2.3.2 Vegetation*

Vegetation associations are classified by dominant species in the area. Defining habitats is necessary for assessing the potential presence of wildlife, T&E species, and other sensitive species. In turn, these evaluations make it possible to identify areas that require preservation or management attention. See Appendix I. for a full list of flora species identified in this INRMP.

#### 2.3.2.1 Historical Vegetation Cover

Much of the area to the north and east of KPSFS has been under grazing leases operated by the State of Hawai'i DLNR. The ironwood (*Casuarina equisetifolia*), silk oak (*Grevillea robusta*), and Christmas berry (*Schinus terebinthiflius*) trees are the result of plantings and subsequent spread of these species as part of forestry programs dating back to the 1890s (Cuddihy and Stone 1990).

#### 2.3.2.2 Current Vegetation Cover

KPSFS has a relatively dry, lowland climate. As is common in many mid to lowland areas in Hawai'i, much of the native vegetation around the installation has been removed through forest cutting and grazing and replaced largely by introduced species. These species are now the predominate vegetation on the installation and most of O'ahu. Extensive barren areas on the installation (Figure 2-5) probably resulted from human disturbance of the vegetative cover, wildfire, and erosion, and have been exacerbated by the constant trade winds that buffet the ridgetops. There are no cover types dominated by native vegetation within the fenced portions of KPSFS, although native species do occur in scattered locations throughout the disturbed cover types surrounding the installation. Native vegetation is most prevalent in the rock outcroppings on steep slopes near the west end of the site, presumably due to the low level of human disturbance in these areas (Figure 2-6; USAF 1996, 2005). Table 2-7 provides descriptions of the native vegetation species on and surrounding the installation.

Figure 2-5. Example of a mostly barren area on the western edge of Ka'ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

Figure 2-6. 'Ilima growing near the western edge of Ka'ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

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Table 2-7. Native vegetation species on Ka'ena Point Space Force Station and in surrounding region (sources: USACE 2015, UH Manoa 2007, USFWS 2021b).

| Common Name (Hawaiian Name) | Scientific Name | Description/Habitat |
|---|---|---|
| Alahe'e | *Psydrax odorata* | A shrub found scattered throughout Koa-Haole Shrubland vegetation type on leeward-facing slopes around the installation perimeter and near the installation's west end on windward-facing slopes. |
| Florida Hopbush ('A'ali'i) | *Dodonaea viscosa* | A medium-sized shrub found on all the main islands except Kaho'olawe in almost every habitat ranging from almost sea level to 7,500 feet. It is often found in open locations such as ridges and is an early colonizer of lava fields and pastures. |
| Pili | *Heteropogon contortus* | A grass found in shallow pockets that have developed in rock outcroppings on leeward sites. |
| 'Ilima | *Sida fallax* | A shrub found on windward-facing slopes and shallow pockets that have developed in rock outcroppings on leeward sites. |
| Naio | *Myoporum sandwicense* | A shrub on windward-facing slopes. |
| Aweoweo | *Chenopodium oahuense* | A shrub found on windward-facing slopes. On old lava flows, it behaves as a colonizer following site disturbance. |
| Triangleleaf lipfern/'iwa'iwa | *Doryopteris decipiens* | A fern found on windward-facing slopes. |
| Little spurflower ('ala'ala wai nui wahine) | *Plectranthus parviflorus* | A forb found on windward-facing slopes. Occurs on dry, exposed, often rocky locations. |

| | | |
|---|---|---|
| Kāwelu | *Eragrostis variabilis* | A native bunchgrass found on windward-facing slopes. |
| O'ahu wormwood ('Ahinahina) | *Artemisia australis* | A shrub found on exposed, windward-facing slopes and cliff faces. |
| Ko'oko'olau | *Bidens* cf. *amplectens* | A forb/subshrub found on windward-facing slopes. |

**Nonnative, Invasive, and Pest Plant Species**

Nonnative, invasive, and pest species have the potential to be major contributors to ecosystem destabilization. Nonnative species, as the name indicates, are species from other regions of the world that have been introduced to the region, primarily through human activities. Invasive species are those that tend to become established in disturbed systems and competitively exclude native species. Invasive speciescan include native species that outcompete less competitive native species in disturbed areas. The disturbed sites on which these aggressive species have become established are where past or current land uses have resulted in disturbed soils and loss of native vegetative cover. Invasive, nonnative plant species also have been intentionally introduced for erosion control, aesthetics, or wildlife food plots. Pests are plant species that, for one reason or another (e.g., removal of natural controls, enhancement of habitats), have negative impacts on natural ecosystems or on human health.

Seven unmanaged cover types were identified and characterized in the 2021 Invasive Species Survey Report (see the *Draft Invasive Species Survey Report, Ka'ena Point Satellite Tracking Station*; USFWS 2021b). These seven types are described as follows.

Mixed Nonnative Forest (49.55 acres)—Mixed nonnative forest is the most prominent cover type found on KPSFS and covers a large portion of the eastern section of the base. This cover type is composed primarily of a mix of nonnative trees, including silk oak, Java plum (*Syzygium cumini*), African tuliptree (*Spathodea campanulata*), strawberry guava or waiwi (*Psidium cattleianum*), pines (*Pinus* spp.), koa haole (*Leucaena leucucephala*), and ironwood. These areas have a sparse understory of Guinea grass (*Urochloa maxima*) and molasses grass (*Melinis minutiflora*), along with scattered clumps of Christmas berry (Figure 2-7), corkystem passionflower or huehue haole (*Passiflora suberosa*), and perennial soybean (*Neonotonia wightii)*.

Koa Haole Scrub (10.87 acres)—Koa haole scrub occurs throughout KPSFS in small sections within the western edge of the base and bordering the eastern sections. This cover type is mainly composed of dense stands of two- to six-foot-high koa haole trees (Figure 2-8) with an understory of Guinea grass and buffelgrass (*Cenchrus ciliaris*). The koa haole or white lead tree is the dominant vegetation in many dry, lowland, and disturbed habitats. Many native species are found within this cover type, including hoary abutilon (*Abutilon incanum*), 'ilima (*Sida fallax*), 'a'ali'i (*Dodonaea viscosa*), alahe'e (*Psydrax odorata*), Triangleleaf lipfern (*Doryopteris decipiens*), Hawai'i hawthorn or eluehe (*Osteomeles anthyllidifolia*), and naio (*Myoporum sandwicense*).

Nonnative Grassland (8.59 acres)—Nonnative grasslands are found on the southeastern and western edges of the base and south of the main road. This cover type primarily consists of Guinea grass, which grows in thick stands up to six feet in height. Other grasses, including buffelgrass, pitted beardgrass (*Bothriochloa pertusa*), and molasses grass, also are found throughout this cover type. Other species found in nonnative

933 grassland include lantana (*Lantana camara*) (Figure 2-9), silk oak, Java plum, Christmas berry, and koa
934 haole, in addition to the native ‘a’ali’i and eluehe.

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Figure 2-7. Christmas berry at Ka’ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

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Figure 2-8. Koa haole growing on the west end of Ka’ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

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Figure 2-9. Lantana on Ka'ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

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943 Mixed Grass Scrub (2.99 acres)—Mixed grass scrub is found bordering the western end of the installation.
944 Although buffelgrass and koa haole are the two most common species, the Mixed Grass Scrub cover type
945 comprises the highest level of diversity and concentration of native species on the installation. The most
946 prominent native species are the alahe'e, naio, aweoweo (*Chenopodium oahuense*), and O'ahu wormwood
947 (*Artemisia australis*). Other native species that can be found in this type include 'a'ali'i, little spurflower
948 (*Plectranthus parviflorus*), 'ilima, wild leadwort or 'ilie'e (*Plumbago zeylanica*), common maidenhair or
949 'iwa'iwa kahakaha (*Adiantum capillus-veneris*), torrid panicgrass or kakonakona (*Panicum torridum*),
950 kāwelu (*Eragrostis variabilis*), and ko'oko'olau (*Bidens* cf. *amplectens*).

951 Ruderal Vegetation (1.39 acres)—Ruderal vegetation is found within the eastern section of the base, along
952 the main road, and surrounding the Power Plant Area. This cover type occurs on heavily disturbed land
953 with sparse sections of grass, including Guinea grass, pitted beardgrass, swollen fingergrass or mau'u-lei
954 (*Chloris barbata*), and Bermuda grass or manienie (*Cynodon dactylon*). Other species present include
955 creeping indigo (*Indigofera spicata*), narrow-leaved plantain or laukahi (*Plantago lanceolate*), Cinderella
956 weed (*Synedrella nodiflora*), Canada cocklebur (*Xanthium strumarium* var. *canadense*), and golden crown-
957 beard (*Verbesina encelioides*).

958 Ironwood Grove (0.68 acres)—Ironwood groves (Figure 2-10) were identified in a few small sections along
959 the installation's southeast roads. This cover type consist of large ironwood individuals clustered in dense
960 groups and grow 20–70 feet high. The understory in these areas consists mainly of fallen foliage and layers
961 of needles.

962 Strawberry Guava Forest (0.58 acres)—The strawberry guava forest cover type is found in the eastern end
963 of the base near many of the main support buildings and directly north of the main road. These forests are
964 composed of dense stands of strawberry guava that grows up to heights of 16 feet. The understory typically
965 consists of scattered strawberry guava juveniles that are about three fe

et high, along with Guinea grass and molasses grass.

The following sections describe the identified invasive and pest species, their classifications, and the recommended methods of control as described in the 2021 invasive species survey (USFWS 2021b). In addition to the recommended methods of removal, it would be beneficial to prioritize the maintenance and planting of appropriate native species wherever possible to increase the resilience of the KPSFS environment. A more structured Landscaping and Restoration Plant List would support these efforts by establishing the needs and benefits of promoting certain species along with the most effective landscaping efforts, as described in Project 2.3.3.

Figure 2-10. Ironwood on Ka'ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

The following four species identified on KPSFS are listed on the 18 June 1992 *List of Plant Species Designated as Noxious Weeds for Eradication or Control Purposes by the Hawai'i Department of Agriculture* under Hawai'i Administrative Rule (HAR*)* §4-68, *Noxious Weed Rules.*

Hedge (Spiny tree) Cactus (*Cerus hildamannianus*)—This species belongs to the Cactaceae (Cactus) family. At least 65 individual hedge cacti were identified on the western point of the installation and around Building 41 (Figure 2-11). This is consistent with the last survey, when the infestation was estimated to have started from an escaped ornamental plant. It is recommended that the species be removed manually at 12-month intervals, with continued monitoring to prevent further spread, as described in Project 2.3.2.

Figure 2-11. Hedge (Spiny Tree) cactus removal site on the western edge of Ka'ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

Comb bushmint (*Hyptis pectinata*)—This species is a member of the Lamiaceae (Mint) family. During the 2021 survey, an estimated 141 comb bushmint individuals were identified along the western border of the installation. In previous surveys, comb bushmint was found only in a single location; thus, this species appears to be spreading. The suggested control method is manual removal of all individuals at 12-month intervals, and plants should be disposed of at an offsite location. Given the high abundance and distribution of this species, eradication is unlikely.

Broomsedge (Andropogon virginicus)—This species is a member of the Poaceae (Grass) family. Approximately 120 individuals were identified along the main road, and it is estimated that there are more along the cliff outside of the surveyed area. This species was not as prevalent in previous surveys, indicating a spreading habit that will make eradication difficult. The suggested control method includes manual removal of individuals and rhizomes in addition to applications of herbicides at 12-month intervals.

Creeping mistflower (*Ageratina riparia*)—This species is a member of the Asteraceae (Sunflower) family. Approximately 15 individuals were found along the main road, which indicates that its abundance has decreased since previous surveys (SWCA 2019; Appendix F.). The best method of eradication is to manually remove all individuals at three-month intervals and revegetate the area to prevent re-establishment.

The following plant species are not listed in the noxious weed list, but are designated by the Hawai'i State Alien Species Coordinator as invasive and were identified on KPSFS.

Lantana—This species is a member of the Verbeneaceae (Verbena) family. An estimated 62 individuals were identified in the eastern section of the installation. This species was found solely in the Mixed Nonnative Forest environments, whereas previous surveys detected lantana primarily in the landscaped sections of the installation. Lantana is classified as a "transformer," the most damaging type of environmental weed because it can dominate or replace any canopy or sub-canopy layer of a natural ecosystem, thereby altering its structure and presenting a greater threat to the cover type that it occupies. Eradication efforts at KPSFS, however, have been moderately successful, with the number of individuals

decreasing since previous surveys. The recommended control method is manual removal and offsite disposal, paired with herbicide applications at six-month intervals.

Common Ironwood—This species is a member of the Casuarinaceae (Beefwood) family. Ironwood is found throughout the installation, although six juvenile individuals also were identified in the western end of KPSFS. During previous surveys, the species was also detected throughout the installation, likely due to deliberate landscaping efforts. Ironwood is an extremely aggressive and densely rooted species that can self-seed in disturbed areas and inhibit the growth of native species with dense stands that smother other plants with needle-like litter. Given the prominence of this species, the recommended treatment is to target juvenile individuals and manually remove them at 12-month intervals before they are able to establish larger groves.

Strawberry Guava—This species is a member of the Myrtaceae (Myrtle) family. Strawberry guava is common throughout the installation and is especially prominent in the Mixed Nonnative Forest and Strawberry Guava Forest cover types. Strawberry guava is another "transformer" species, with effective methods of seed dispersal (e.g., consumption by birds and feral pigs). Previous surveys identified strawberry guava as a prevalent invasive species, but since then it has spread throughout the installation to the point that it is now considered its own cover type. Because it is now securely established on KPSFS, the most effect treatment would be to manually remove seedlings and treat the new areas with herbicide every six months to reduce the spread.

Giant Toad Plant (*Stapelia gigantea*)—This species is a member of the Apocynaceae (dogbane) family. Giant toad plants have become one of the most established invasive species on KPSFS, with at least 235 individuals found along the roads throughout the west end of the installation. In a 2011 survey, only a single large clump was found along the same road, indicating a large increase in the abundance of this species and making removal much more difficult (AECOS 2011). Manual removal and/or herbicide application is recommended at six-month intervals to reduce the spread.

Formosan Koa (*Acacia confusa*)—This species is a member of the Fabaceae (Legume) family. During the previous surveys in 2011, a single tree was detected north of Building 41 and, during the most recent survey, only two seedlings were found in the understory of that tree, indicating that it is not invasive on the installation. No action is recommended for this species, although surveys and monitoring should continue to ensure detection if its population increases.

Tropical Almond or kamani-haole (*Terminalia catappa*)—This species is a member of the Combretaceae (Combretum) family. Only one tree was identified in the eastern section of KPSFS, consistent with the 2011 survey (AECOS 2011). No action is recommended for this species, although surveys and monitoring should continue to ensure detection if its population increases.

Wedelia (*Sphagneticola trilobata*)—This species is a member of the Asteraceaea (Aster) family. A clump of 100 individuals was found in the eastern section of the installation, consistent with previous surveys, and likely resulting from deliberate landscape planting. Despite its high abundance, the species is not considered invasive on the installation. No action is recommended for this species, although surveys and monitoring should continue to ensure detection if its population increases.

The following species is not listed as an invasive or noxious weed, but it is considered a high-risk species by the Hawai'i-Pacific Weed Risk Assessment.

Sourbush (*Pluchea carolinensis*)—This species is a member of the Asteraceae (Aster) family. Two sourbush individuals were identified on the roadside southeast of the Power Plant Area. Although this

species is not listed as invasive, its high-risk status makes it necessary to manually remove these individuals and recheck the area every three months to prevent any establishment.

The following species was identified as having the potential to become invasive, even though it is not included on the Hawai'i Department of Agriculture's noxious weeds list or the DLNR DOFAW list of invasive species.

Candelabra Aloe or panini 'awa'awa (*Aloe arborescens*)—This species is a member of the Asphodelaceae (Liliaceae) family. Approximately 50 individuals were observed along the roadside east of the Power Plant Area, growing in groups that were up to six feet high. This species was not identified during the 2011 survey, indicating that it recently spread (AECOS 2011). Given the size and abundance of this species, it has potential to become invasive and outcompete native species in the area. The recommended method of control is to manually remove all individuals at 12-month intervals to reduce any spread.

The following species designated as a noxious weed was identified during a 2004 survey on KPSFS (USAF 2005); however, this species was not identified during the 2021 invasive species survey (USFWS 2021b).

Sacramento burr (*Triumfetta semitriloba*)—This species is a member of the Tiliaceae (Basswood) family. Sacramento burr was previously identified along Road C before being removed (SWCA 2019). If the species were to become reestablished on the installation, the optimum method of control is manual removal paired with reseeding efforts to prevent reestablishment.

Table 2-8 summarizes the noxious weed and invasive plant species recently identified on KPSFS.

Table 2-8. Summary of noxious weeds and invasive plant species found on Ka'ena Point Space Force Station (sources: USFWS 2020, USFWS 2021b).

| Species | Hawai'i Designation | Management Priority | Vegetation Types at KPSFS[1] | Recommended Control Methods | Frequency |
|---|---|---|---|---|---|
| Aloe arborescens | Not listed | High | N | Manual | 12 months |
| Creeping | Noxious weed | High | F | Manual | 3 months |
| Ironwood | Invasive | High | I | Manual | 12 months |
| Lantana | Invasive | High | F | Manual, | 6 months |
| Sourbush | Invasive | High | K | Manual | 3 months |
| Hedge cactus | Noxious weed | High | K, M | Manual | 12 months |
| Strawberry guava | Invasive | High | I, SG | Manual, | 6 months |
| Broomsedge | Noxious weed | Medium | R | Manual, | 12 months |
| Comb bushmint | Noxious weed | Medium | F, K | Manual | 12 months |
| Giant Toad Plant | Invasive | Medium | N | Manual, | 6 months |
| Formosan koa | Invasive | Low | R | No action | NA |
| Tropical almond | Invasive | Low | F | No action | NA |
| Wedelia | Invasive | Low | F | No action | NA |

[1] N = Nonnative Grassland, F = Mixed Nonnative Forest, I = Ironwoodgrove, K = Koa-Haole Scrub, M = Mixed Grass Scrub, SG = Strawberry Guava Forest, R = Ruderal Vegetation.

#### 2.3.2.3 Future Vegetation Cover

Using the U.S. Geological Survey (USGS) National Gap Analysis LC 2011 data, three primary natural ecosystems on KPSFS were identified in the KPSFS Climate Change Summary Report: Invasive Grass and Shrubland, invasive forest, and Ironwood/Silk Oak Forest (CEMML 2019). The coverage of these natural ecosystems and the other cover types on the installation are summarized in Table 2-9.

Because the ecosystems on the installation are relatively dry with a strong seasonal climate, they are sensitive to climatic changes and vulnerable to shifts in climatic regime. Slight changes in temperature and precipitation can substantially alter the composition, distribution, and abundance of species in these ecosystems and the products and services they provide. Projected increases in seasonal, annual, minimum, and maximum temperatures and changing precipitation patterns are likely to affect the vegetation on the installation. The extent of these changes also will depend on changes in disturbance regimes such as fire.

Table 2-9. Ecosystem coverage, by area, on Ka'ena Point Space Force Station.

| Ecosystem Type | Area (acres) | Coverage (%) |
|---|---|---|
| Invasive Grass and Shrubland | 20.5 | 36.7 |
| Invasive Forest | 16.4 | 29.5 |
| Ironwood and Silk Oak Forest | 2.1 | 3.8 |
| Barren Land | 1.5 | 2.7 |
| Developed and Other Human Use | 15.3 | 27.3 |

Increased drought frequency could cause major changes in vegetation cover, and reduced vegetative cover coupled with increases in precipitation intensity and climate-induced reductions in the soil aggregate stability could dramatically increase potential erosion rates. Soil aggregate stability is related to the ability of soil particles to withstand exposure to raindrops or surface flow of water. Desirable aggregates are stable against the force of raindrops and allow percolation of surface flow, while soils that are disturbed (from loss of vegetation, burning, loss of microbial activity, etc.) may release individual particles that can seal the surface and clog pores, reducing infiltration and increasing harmful sheet flow and erosion. Moreover, rising temperatures under various climate change scenarios are likely to enhance soil decomposition; together with reductions in rainfall, this could exacerbate the problem by reducing plant productivity over large areas.

In general, woody areas are susceptible to climate change. There is a temperature below which the equilibrium state of the ecosystem appears constant, but above which the equilibrium of this vegetation cover declines steadily. Ironwood forests at KPSFS are associated with a minimal understory and ground layer and generally occur in company with other nonnative trees. Ironwood is an invasive, tall, fast-growing tree that can quickly reach heights of more than 20 feet and crowd out native trees and shrubs. This species is very common on poor inland soils, where it does well due to its ability to fix nitrogen, making it very resilient even under conditions of significant ecological disturbance (Whistler and Elevitch 2006). Ironwood has been planted on the installation as a landscaping species but is now recognized as invasive. Invasive-dominated forests may pose greater risks to infrastructure as storm severity increases. In the aftermath of Hurricane Iselle in 2014, United States Department of Agriculture (USDA), Forest Service employees noted that nonnative ironwood and albizia (*Falcatria moluccana*) succumbed to the hurricane's

force and fell, causing extensive damage, whereas native trees were much less likely to fall (Butler 2014). This underscores the need to continue invasive tree removal and replacement with native species.

#### 2.3.2.4 Turf and Landscaped Areas

Landscaped areas at KPSFS consist of irrigated turf grasses, nonnative grass plantings, and ornamental shrubs and trees. The landscaped areas include the grounds around all occupied buildings and parking areas. Ornamental shrubs and trees are mostly found around the administration Building 10.

Landscaped areas offer opportunities to increase both aesthetic and habitat values if native species are planted and cared for appropriately. Using native species for landscaping can provide pollinator habitat and wildlife foraging sites and, in many cases, native species may require less maintenance and pest control than introduced ornamentals. Resources such as plantpono.org can be used for guidance on the selection and evaluation of landscaping plants for new projects and to determine a species' fitness and potential for becoming invasive in a given area. Developing a Recommended Landscaping and Restoration Plant List would benefit grounds maintenance and improve landscaped areas on KPSFS.

### *2.3.3 Fish and Wildlife*

See Appendix H. for a full list of fauna species identified in this INRMP.

**Birds**

No native land bird species have been documented within KPSFS. Several pacific golden-plovers or kolea (*Pluvialis fulva*), a migratory shorebird species, were observed along Road C between the KPSFS facilities during the 1996 survey. Two seabirds, the Laysan albatross and white-tailed tropicbird (*Phaethon lepturus dorotheae*), also were observed flying over the installation during the survey. Laysan albatross nesting colonies have been documented in the vicinity, including one downslope of the installation at the Ka'ena Point NAR and one upslope of KPSFS (USACE 2015; Appendix E.).

Anecdotal observations of the pueo (*Asio flammeus sandwicensis*), or Hawaiian short-eared owl, have been made on or near KPSFS (USAF 2008c). This species is endemic to Hawai'i, and is state-listed as endangered on O'ahu. A field survey should be conducted to verify the presence of the pueo on the installation.

Neotropical migratory birds species are those that spend the nonbreeding season primarily south of the United States (U.S.) (e.g., West Indies, South America) and migrate to the U.S. and Canada to nest during the breeding season. With a few exceptions, all birds occurring in North America are protected under the Migratory Bird Treaty Act (MBTA). Table 2-10 shows all native or migratory bird species that have the potential to occur on KPSFS.

Table 2-10. Native or migratory bird species potentially occurring on Ka'ena Point Space Force Station (sources: Hawai'i DLNR 2009, USFWS 2021a).

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Hawaiian honeycreeper ('Apapane) | *Himatione sanguinea* [d] |
| Black-footed albatross (ka'upu) | *Phoebastria nigripes* |
| Great frigatebird ('Iwa) | *Fregata minor palmerstoni* |

Table 2-10. Native or migratory bird species potentially occurring on Ka'ena Point Space Force Station (sources: Hawai'i DLNR 2009, USFWS 2021a).

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Grey-backed tern (pakalakala) | *Onychoprion lunatus* |
| Hawaiian short-eared owl (Pueo) | *Asio flammeus sandwichensis* [c] |
| 'I'iwi | *Drepanis coccinea* [b c d] |
| Laysan albatross | *Phoebastria immutabilis* |
| O'ahu 'Elepaio | *Chasiempis sandwichensis gayi* [b] |
| Pacific golden-plover | *Pluvialis fulva* |
| Red-tailed tropicbird (koa 'e'ula) | *Phaethon rubricauda* |
| Ruddy turnstone ('Akekeke) | *Arenaria interpres* [a] |
| Sanderling (Hunakai) | *Calidris alba* [a] |
| Sooty tern ('ewa 'ewa) | *Onychoprion fuscatus* |
| Wandering tattler (Ulili) | *Tringa incana* [d] |
| Wedge-tailed Shearwater ('Ua 'u kani) | *Puffinus pacificus* |
| White tern (manu-o-ku) | *Gygis alba* |
| White-tailed tropicbird | *Phaethon lepturus dorotheae* |

[a] Neotropical migratory species.

[b] Federally listed endangered species.

[c] State listed endangered species

[d] Listed as a Bird of Conservation Concern

**Mammals**

The Hawaiian hoary bat (*Lasiurus cinereus semotus*), the only native terrestrial mammal on O'ahu, is a federally endangered species. A 2015 Natural Resource Assessment identified the presence of this species at the installation.

Examples of nonnative mammalian species that occur on KPSFS include feral pigs (*Sus scrofa*), cats (*Felis domesticus*), mongoose (*Herpestes auropunctatus*), rats (*Rattus* spp.), feral goats (*Capra hircus*), and domestic dogs (*Canis lupus familiaris*).

**Reptiles and Amphibians**

Lizards and geckos are observed frequently on KPSFS. A formal survey, however, has not been conducted to identify their populations, nor is it warranted. No federally protected reptiles or amphibians are expected to occur on KPSFS.

**Fish**

There are no surface waters on KPSFS to support fish populations.

**Fish and Wildlife Habitat**

KPSFS has a diversity of habitat features but, because the installation is relatively small, it provides limited opportunity for wildlife to inhabit the installation. Because natural areas dominate the surrounding region, however, the installation nonetheless can provide an important corridor between habitats.

Four distinct habitats have been identified at KPSFS, including turf, second-growth forest, shrubland, and grassland/shrubland mosaic. Turf areas, including lawn and roadside buffers with ornamental shrubs, are widely used by nonnative species, such as sparrows, doves, game birds, and other ground-feeders (Table 2-11). Second-growth forest and shrubland at KPSFS are often intermixed and used by a variety of nonnative species for foraging, nesting, and cover. The western end of KPSFS is primarily a mosaic of grassland and shrubland, used primarily by introduced land birds (USACE 2015).

**Nonnative and Pest Species**

Twenty-five nonnative land bird species have been observed in recent surveys on KPSFS (Table 2-11). The State of Hawai'i DOFAW periodically releases game birds in the Game Management Area, and recent stockings of wild turkey (*Meleagris gallopavo*) (Figure 2-13) and black francolin (*Francolinus francolinus*) have been confirmed (USACE 2015).

Feral pigs (Figure 2-12), feral cats, mongoose, feral goats, rats, and occasional dogs are the only mammal species that occur on KPSFS. Feral pigs pose a major ecological threat by consuming and destroying native understory plants, creating conditions favoring nonnative plant expansion and establishment, preventing the establishment of ground-rooting native plants, and disrupting soil nutrient cycling. The cumulative effect of these activities is the decline of native forests, watersheds, and suitable habitat for native plants and animals (Hawai'i DOFAW 2003). Protective fencing for especially rare plants in the nearby Pahole NAR is often the only way to protect them from feral pigs and other threats. A public hunting program for local hunters also helps to remove feral pigs from the NAR. Traps are set year-round in the state-owned portions and are checked every 72 hours. Cats, mongooses, rats, and mice (*Mus* sp.) also are expected to occur on the installation (USACE 2015). A USDA, Wildlife Services (USDA-WS) employee contracted by the DOFAW conducts daily surveys of KPSFS for feral pigs, cats, dogs, and mongooses. Problem animals are eradicated as needed.

Table 2-11. Nonnative bird species observed on Ka'ena Point Space Force Station (source: USACE

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Black francolin | *Francolinus francolinus* |
| Cattle egret | *Bubulcus ibis* |
| Common myna | *Acridotheres tristis* |
| Common peafowl | *Pavo cristatus* |
| Common waxbill | *Estrilda astrild* |
| Erckel's francolin | *Pternistis erckelli* |
| House finch | *Haemorhous mexicanus* |
| Japanese bush warbler | *Horornis diphone* |
| Japanese white-eye | *Zosterops japonicus* |

Table 2-11. Nonnative bird species observed on Ka'ena Point Space Force Station (source: USACE

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Java sparrow | *Padda oryzivora* |
| Northern cardinal | *Cardinalis cardinalis* |
| Northern mockingbird | *Mimus polyglottus* |
| Red junglefowl, moa | *Gallus gallus* |
| Red-billed leiothrix | *Leiothrix lutea* |
| Red-crested cardinal | *Paroaria coronata* |
| Red-vented bulbul | *Pycnonotus cafer* |
| Ring-necked pheasant | *Phasianus colchicus* |
| Rock pigeon | *Columba livia* |
| Saffron finch | *Sicalis flaveola* |
| Scaly-breasted Munia | *Lonchura punctulata* |
| Spotted or lace-necked dove | *Streptopelia chinensis* |
| Warbling white-eye | *Zosterops japonicas* |
| White-rumped shama | *Copsychus malabaricus* |
| Wild turkey | *Meleagris gallopavo* |
| Zebra or barred dove | *Geopelia striata* |

Figure 2-12. Feral pig on Ka'ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

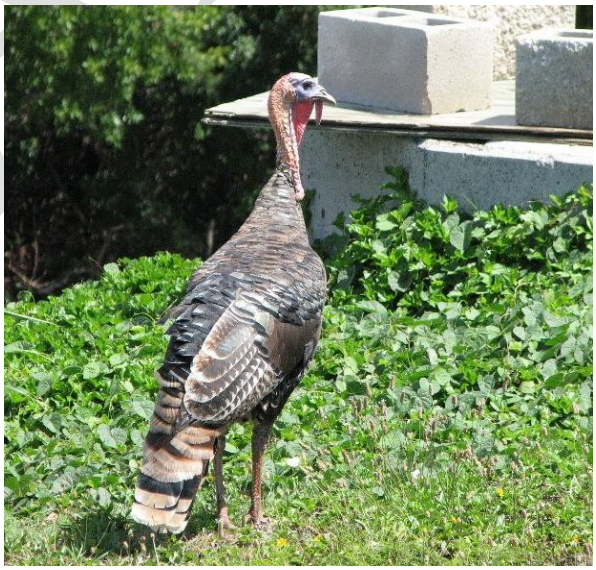

Figure 2-13. Wild turkey near Building 10 on Ka'ena Point Space Force Station (source: Bridget Kelly, Dan Savercool, e²M).

#### 2.3.3.1 Climate Impacts on Wildlife

The majority of wildlife species currently found on the installation are nonnative. Nonnative species such as feral pigs, mongooses, cats, and dogs are likely to continue inhabiting KPSFS, possibly becoming more prevalent with the projected changes in climate. Invasive species often have the ability to outcompete native species already experiencing reduced fitness due to shifts in environmental conditions (Hellmann et al. 2008). For example, nonnative predatory species are having a negative effect on migratory birds that travel through KPSFS. If nonnative populations continue to increase on KPSFS, so will the negative impacts on migratory bird species passing through the installation.

Other native species on KPSFS include reptiles and amphibians. Rising temperatures and decreasing precipitation could negatively affect both of these groups. The abundance of arthropods, an important food source for small reptiles and amphibians, is closely related to precipitation (Tanaka and Tanaka 2009). Precipitation is projected to decrease in several climate scenarios (CEMML 2019), likely reducing forage for reptiles and amphibians. Increased temperatures, paired with this reduction in precipitation, could further reduce available habitat for amphibians on KPSFS, as they require freshwater for all life cycle stages.

### *2.3.4 Threatened and Endangered Species and Species of Concern*

Biological field surveys that covered the entire KPSFS property were conducted in 2014 and were recorded in a Natural Resource Assessment Report for KPSFS (USACE 2015). Additional plant, animal, and habitat surveys were conducted on the Kuaokala Ridge near the Solar Observatory in 2019 (Table 2-12) (Hoksbergen 2019, SWCA 2019, Assured Bio Labs 2020) and on KPSFS in 2020 (Assured Bio Labs 2020). The following sections detail the T&E and MBTA-protected species that were identified in these recent surveys.

Table 2-12. Federally threatened, endangered, and other protected species known or likely to occur at Ka'ena Point Space Force Station (sources: USACE 2015, SWCA 2019, USFWS 2012, USFWS 2021a).

| Common (Hawaiian Name) | Scientific Name | Federal Status |
|---|---|---|
| **Mammals** | | |
| Hawaiian hoary bat (ʻŌpeʻapeʻa) | *Lasiurus cinereus semotus* | E |
| **Birds** | | |
| Hawaiian short-eared owl (Pueo) | *Asio flammeus sandwichensis* | MBTA [1 2] |
| O'ahu 'Elepaio | *Chasiempis sandwichensis gayi* | E |
| 'I'iwi | *Drepanis coccinea* | T[1] |
| Band-rumped storm petrel, Hawaiʻi Distinct Population Segment (ʻAkēʻakē) | *Hydrobates castro* | E |
| White-tailed tropicbird (Koaʻe) | *Phaethon lepturus dorotheae* | MBTA |
| Laysan albatross (Mōlī) | *Phoebastria immutabilis* | MBTA[2] |
| Black-footed albatross (Kaʻupu) | *Phoebastria nigripes* | MBTA[2] |
| Pacific golden-plover (kōlea) | *Pluvialis fulva* | MBTA |
| Hawaiian petrel ('Uaʻu) | *Pterodroma sandwichensis* | E, MBTA |
| Newell's (Townsend's) shearwater (Aʻo) | *Puffinus auricularis newelli* | T, MBTA |
| **Plants** | | |

Table 2-12. Federally threatened, endangered, and other protected species known or likely to occur at Ka'ena Point Space Force Station (sources: USACE 2015, SWCA 2019, USFWS 2012, USFWS 2021a).

| Common (Hawaiian Name) | Scientific Name | Federal Status |
|---|---|---|
| Ko'oko'olau | *Bidens* cf. *amplectens* | E |

E=Listed as Endangered under the Endangered Species Act (ESA)
T=Listed as Threatened under the ESA
MBTA = Listed as a protected migratory species under the Migratory Birds Treaty Act
[1] Listed as endangered by the State of Hawai'i on O'ahu.
[2] Listed as a Bird of Conservation Concern

#### 2.3.4.1 Mammals

**Hawaiian Hoary Bat**

The endangered Hawaiian hoary bat or 'ōpe'ape'a (*Lasiurus cinereus semotus*) has been documented at KPSFS in multiple surveys. Acoustic monitors deployed at KPSFS during December 2013 and March 2014 detected calls associated with hoary bats transiting across and feeding in the area (USACE 2015). Hoary bats have been observed foraging in a variety of habitats, including undisturbed native forest, mature eucalyptus plantations with mixed understory trees, lowland forest dominated by introduced trees, suburban and urban areas planted with ornamental trees, grassland/pasture, river gorges, arboretums, macadamia nut orchards, and coastal bays (Gorresen et al. 2013, Bonaccorso et al. 2015). At KPSFS, they may forage over the Nonnative Grassland, Mixed Nonnative Forest, 'a'ali'i Shrubland, Mixed Grass-Scrub, Ruderal Vegetation, Koa Haole Scrub, and landscaped vegetation types (SWCA 2019).

Once thought to be extirpated from O'ahu, recent observations and studies have confirmed that hoary bats are widely distributed and breeding on O'ahu (USFWS 2021c). Hawaiian hoary bats roost alone or with dependent young (pups) in native and nonnative woody vegetation, typically more than 15 feet tall, and will leave their young unattended in trees and shrubs when they forage. The pupping season is June to September, therefore the USFWS and DOFAW currently recommend avoiding tree-trimming from June 1 to September 15.

No critical habitat has been designated for the Hawaiian hoary bat.

#### 2.3.4.2 Birds

**Hawaiian Seabirds**

Three federally listed Hawaiian seabirds may traverse KPSFS at night during their breeding, nesting, and fledging seasons (1 March to 15 December). The endangered Hawai'i Distinct Population Segment of the band-rumped storm petrel or 'akē'akē (*Hydrobates castro*), endangered Hawaiian petrel or 'ua'u (*Pterodroma sanwichensis*), and threatened Newell's shearwater or a'o (*Puffinus auricularis newelli*) may traverse the airspace above KPSFS during flights to and from at-sea foraging areas and potential breeding sites on O'ahu. During recent studies, auditory recordings detected Newell's shearwaters and Hawaiian petrels at locations on the leeward and windward slopes, respectively, of nearby Mount Ka'ala, which is within the Ka'ala Natural Area Reserve. The frequency of detections at these sites suggest that both species are regularly prospecting on O'ahu and could be breeding there during the months of May, June, and July

(Young et al. 2019). The location of KPSFS between the coastline and the inland sites on O‘ahu where calls have been detected raise the possibility that at least two of the three listed seabird species may transit the installation area during their breeding, nesting, and fledging seasons (1 March to 15 December).

No critical habitat has been designated for the three seabird species. If a burrow is detected, KPSFS staff should contact the USFWS and DOFAW as soon as possible to determine the appropriate actions to minimize and avoid impacts or disturbances

**Pueo**

The pueo or Hawaiian short-eared owl is listed by the State of Hawai’i as endangered on the island of O‘ahu. A single pueo was observed flying in the northeastern section of the base, just above the grass near the foot of the cliffs and approximately 558 feet from and 492 feet below the parking area (USACE 2015). Pueo are most common in open habitats, such as grasslands, shrublands, and montane parklands, including urban areas and those actively managed for conservation (Mitchell et al. 2005). Given that grassy habitat is present at KPSFS, pueo could be present year round in the airspace or occasionally on the ground at KPSFS.

State of Hawai‘i law (HRS §195-D) does not include a provision for critical habitat designation, therefore, there is no designated critical habitat for the pueo at KPSFS.

Actions for avoiding impacts to the pueo are listed below.

- Minimize habitat alterations and disturbance during pueo breeding season.
- Before any potentially habitat-disturbing activity, especially ground-based, conduct surveys during crepuscular (twilight) hours and walk line transects throughout the area to identify any active pueo nests.
- If a pueo nest is discovered, notify DOFAW staff, minimize time spent at the nest, and establish a minimum buffer distance of 200 meters from the nest until the chicks are capable of flight (approximately two months after the nest is discovered).
- Remove and exclude non-native mammals such as mongoose, cats, dogs, and ungulates from the nesting areas.

#### 2.3.4.3 Reptiles

Based on available information, there are no known occurrences of rare or T&E reptile species at KPSFS (USACE 2015).

#### 2.3.4.4 Invertebrates

Based on available information, there are no known occurrences of rare or T&E invertebrate species at KPSFS (USACE 2015).

#### 2.3.4.5 Plants

The endangered ko’oko’olau is a perennial or a facultative annual of the sunflower family (Asteraceae). Listed as endangered in 2012, the species is currently known from about 10 populations totaling fewer than 500 individuals (USFWS 2019a). The typical ko’oko’olau habitat includes cliffs and talus slopes in lowland dry shrubland that is dominated by the indigenous plant species alahe’e, naio, and ‘ilima on the windward side of the Waianae Mountains (Wagner et al. 1999).

Recent surveys found that there were signs of hybridization between the federally listed *Bidens amplectens*, and the not-listed *Bidens torta*, which both currently share the same common name of ko'oko'olau. While these surveys did not record the presence of *B. torta*, not all identified *B. amplectens* individuals could be closely inspected. References to ko'oko'olau in this document will be referring to *B.* cf. *amplectens* to follow survey results, but more surveys are needed to fully determine the presence of these two species.

Surveys have documented over 200 individuals of ko'oko'olau within the vicinity of KPSFS (Figure 2-14; USACE 2015; SWCA 2019). In particular, significant clusters of plants were found in Mixed Nonnative Forest (*Casuarina-Pinus*) near the Kuaokalā Trail in the southeastern section (120 individuals); on the slopes surrounding and below the Solar Observatory (60+ individuals), and on windward-facing slopes and cliffs on the northwest section of the main base (30 individuals; SWCA 2019). During the surveys, detections of seedlings from these facultative annuals indicate that new plants could be found in areas of suitable habitat adjacent to observed plants within a year of the last surveys.


1304

1305 Figure 2-14. Identified locations containing ko'oko'olau on KPSFS

No critical habitat for plants occurs within KPSFS; however, the USFWS designated two critical habitat units for plants (Coastal—Unit 01 and Lowland Dry—Unit 02) adjacent to the installation (USFWS 2012). At its closest point, Coastal—Unit 01 is approximately 150 feet southwest of the main base. This unit is known to be occupied by three listed plants: Maui chaff-flower or ‘ewa hinahina(*Achyranthes splendens* var. *rotundata*), ‘akoko, and O’ahu riverhemp. It also contains unoccupied habitat for an additional four plant taxa: ko’oko’olau, ‘āwiwi, Waianae Range schiedea, and O’ahu cowpea (USFWS 2012).

Lowland Dry—Unit 02 is roughly 0.5 miles southwest of the Control Unit. This unit is occupied by four listed plant species: Hawai’i lady’s nightcap (*Bonamia menziesii)*, nehe (*Melanthera tenuifolia*), kaala rockwort or kulu’i (*Nototrichium humile*), and Waianae Range hala pepe (*Pleomele forbesii*). It is also considered to have unoccupied habitat for an additional 12 plant species: ‘ewa hinahina, ko’oko’olau, ‘akoko, Kaua’i spurge *(Euphorbia haeleeleana),* smoothfruit chewstick (*Gouania meyenii*), O’ahu chewstick (*Gouania vitifolia*), ma’o hau hele, wahine noho kula (*Isodendrion pyrifolium*), angularfruit ma’oloa (*Neraudia angulata*), sprawling schiedea (*Schiedea hookeri*), Waianae Range schiedea, and Hawai’i scaleseed (*Spermolepis hawaiiensis*) (USFWS 2012).

#### 2.3.4.6 Avoidance and Minimization Measures for Threatened and Endangered Species

The USFWS Pacific Islands Fish and Wildlife Office has compiled general and species-specific conservation measures that can help to avoid or minimize project impacts to T&E species. These measures should be considered during project design and pre-consultation process if it may affect T&E species. Avoidance and minimization measures for the endangered Hawaiian hoary bat, T&E seabirds, and the endangered ko’oko’olau are provided below. For information on other species, go to https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

**Hawaiian Hoary Bat**

If trees or shrubs 15 feet or taller are cleared during the pupping season, which is 1 June through 15 September, there is a risk that young bats could be harmed or killed inadvertently because they are too young to fly or move away from disturbance. Hawaiian hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing.

Actions for avoiding impacts to the Hawaiian hoary bat are listed below.

- Do not remove or trim woody vegetation greater than 15 feet in height during the hoary bat pupping season (June 1 to September 15).
- Do not use barbed wire for fencing in which bats may become entangled and damage their wings. Security fences should use barbless top-strand wire to prevent entanglements where practicable (SWCA 2019).

**Hawaiian Seabirds**

Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and, after circling the lights, they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds can collide with automobiles and die of starvation and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between 15 September and 15 December on their first flights from their mountain nests to the sea are particularly vulnerable to light attraction.

Actions for avoiding impacts to Hawaiian seabirds are listed below.

- Use only hooded, fully shielded outdoor lighting, the light from which may be seen only when viewed from beneath the lights.
- Install automatic motion-sensor switches and controls on all outdoor lights so that lights remain off in the absence of human activity.
- Do not engage in nighttime construction during the seabird fledging period (15 September to 15 December).
- If nighttime construction is required during the seabird fledgling season, it is recommended that a qualified biologist be present at the site to monitor and assess the risk of seabirds being attracted or grounded due to the lighting. If seabirds are seen circling the area during these activities, lights should be turned off. If a downed seabird is found, KPSFS and construction personnel should follow DOFAW's response protocol, which can be found at https://dlnr.hawaii.gov/wildlife/seabird-fallout-season/#response.

**Ko'oko'olau**

Project activities may affect listed plant species by causing physical damage to plant parts (roots, stems, flowers, fruits, seeds, etc.), as well as their habitat, which may result in reduced germination, growth, and/or reproduction. Cutting and removing vegetation surrounding listed plants has the potential to alter microsite conditions (e.g., light, moisture, temperature) and increase the risk of invasion by nonnative plants, which can lead to a greater fire frequency or intensity. Activities, such as grazing, use of construction equipment or vehicles, and increased human traffic (i.e., trails, visitation, monitoring), can cause ground disturbance, erosion, and/or soil compaction, which decrease absorption of water and nutrients and damage plant root systems and lead to reduced growth and/or mortality. Soil disturbance or removal also has the potential to negatively impact the soil seed bank of listed plant species if such species are present or historically occurred in the project area.

Actions for avoiding impacts to ko'oko'olau are listed below.

- Minimize potential adverse effects to listed plants that may occur on the proposed project site by minimizing disturbance outside of existing developed or otherwise modified areas. When disturbance outside existing developed or modified sites is proposed, conduct a botanical survey for listed plant species within the project action area, defined as the area where direct and indirect effects are likely to occur. Surveys should be conducted by a knowledgeable botanist with documented experience in identifying native Hawaiian plants, including listed plant species. Optimally, botanical surveys should be conducted during the wettest part of the year (typically October to April) when identifiable features of the plants (fruit, flowers, etc.) are more likely to be visible, especially in drier areas. If surveys are conducted outside of the optimal wet season, the USFWS may assume plant presence regardless of KPSFS survey findings.
- The boundary of the area occupied by listed plants should be marked with flagging by the surveyor. To avoid potential adverse effects to listed plants, buffer distances for various activities similar to those described at https://www.fws.gov/media/plant-avoidance-and-minimization-measures-may-2023 should be established. Where disturbed areas do not need to be maintained as an open area, restore them with native plants, as appropriate for the location.
- If listed plants occur in a project area, the avoidance buffers are recommended to reduce direct and indirect impacts to listed plants from project activities; however, where project activities will occur within the recommended buffer distances, consultation with the USFWS is required. The impacts to the plants of concern within the buffer area may be reduced by placing temporary fencing or other barriers at the boundary of the disturbance as far from the affected plants as practicable.

- All activities, including site surveys, carry the risk of introducing nonnative species into project areas. Specific action needs to be taken to ensure that all equipment, personnel, and supplies are properly checked and free of contamination (weed seeds, organic matter, or other contaminants) before entering project areas. Quarantines and or management activities occurring on specific priority invasive species proximal to project areas need to be considered or adequately addressed. This information can be acquired by contacting local experts such as the O'ahu Invasive Species Committee (see https://www.oahuisc.org/).
- Confirmation of the endangered ko'oko'olau at KPSFS and adjacent areas and the presence of designated critical habitat within close proximity to KPSFS (Coastal – Unit 01), coupled with the ko'oko'olau's restricted distribution and low numbers of individuals and populations, presents an opportunity for KPSFS to take action to benefit its conservation. Habitat loss and degradation caused by nonnative plant species, fire, and climate change; herbivory and/or ground disturbance from ungulates and rodents; and hybridization with the closely related *Bidens torta* are ongoing factors contributing to the risk of extinction for this species (USFWS 2019a).
- Provide maps and incorporate into project planning and/or brief installation personnel on the location of endangered ko'oko'olau.

### *2.3.5 Wetlands and Floodplains*

**Wetlands**

Wetlands are areas found along streams, rivers, springs, ponds, and drainage ditches. Riparian areas refer to the banks of ponds and streams that support a variety of water-dependent vegetation not found in drier upland areas and are often considered a subset of the wetlands classification. Vegetation along riparian corridors supports a variety of habitats and associated plant and wildlife species. Riparian zones serve as nutrient filters, sediment traps, climate regulators, and wildlife refuges; thus, their disturbance can have far-reaching effects on the structure and function of stream and watershed ecosystems.

A wetland inventory was undertaken during a 1996 field survey to determine the location and approximate boundaries of any potential jurisdictional wetlands that might occur on KPSFS. The field inventory confirmed that no wetlands occur on or adjacent to the installation. The closest wetlands lie along the marine shoreline at the bottom of steep cliffs, approximately 1,000–1,300 feet lower the installation's elevation (USAF 1996).

**Floodplains**

According to a 2004 report by the Federal Emergency Management Agency (FEMA), KPSFS is within Zone D, an area with possible but undetermined flood hazards; no flood hazard analysis has been conducted for this area (FEMA 2004). Flooding on O'ahu is generally associated with severe rainstorms, high waves, and tsunamis. The island is also subject to severe tropical storms and hurricanes. Because most of the KPSFS facilities are located along Kuaokalo Ridge at elevations ranging from 800 feet to more than 1,400 feet AMSL, the potential for coastal flooding is low; however, Building 1 (Entry Control Point area) is near sea level and could be subjected to high storm or tidal surges and tsunami damage. Manini Gulch, located in close proximity to an onsite water well, is the only watercourse that could pose a flood hazard to KPSFS facilities. The specific flood hazard posed by Manini Gulch has not been delineated (USAF 1996).

### *2.3.6 Other Natural Resource Information*

Not applicable.

## *2.4 Mission and Natural Resources*

### *2.4.1 Natural Resource Constraints to Mission and Mission Planning*

Some of the natural resources topics of concern mentioned in the previous sections could have an adverse impact on the KPSFS's mission or future planning operations. The natural resources constraints to KPSFS's planning and missions are presented below.

- Any projects that are anticipated to impact off-installation wetlands must acquire approval and the appropriate permits from the USACE, the USEPA, and the Hawai'i DLNR. At minimum, jurisdictional delineations must be accomplished for each potentially affected wetland.
- Any projects that are anticipated to significantly impact floodplains must undergo the National Environmental Policy Act (NEPA) process, per 32 CFR 989. Any projects that permanently alter the hydrology of a floodplain must be reported to FEMA.
- The planning for any anticipated projects that could impact local T&E species or their habitats will need to be coordinated with the Pacific Region of the USFWS and the Hawai'i DLNR

#### 2.4.1.1 Climate Impacts on Mission and Mission Planning

Climate change may impact the military mission at KPSFS in several ways. Wildland fires at KPSFS are expected to increase with the projected changes in climate (CEMML 2019), and its primary effects on the military mission could include damage to equipment and precluding personnel access to mission-critical infrastructure. Secondary effects of increased fire occurrence or magnitude, such as habitat shifts that lead to an increased regulatory environment, also could affect the mission. Climate change is also expected to increase the frequency of extreme weather events that result in significant damage to DoD property; in 2018 alone, this such damage required over $8 billion in repairs (Center for Climate and Security 2019). The projected increase in the number of HOTDAYS from the historical average of 22 days to 96 days under the 2050 RCP 4.5 scenario may increase maintenance requirements for outdoor infrastructure and indoor cooling systems for employees. The increased frequency of HOTDAYS also may limit outdoor work to reduced periods of time on a daily or seasonal basis.

Other impacts to the mission at KPSFS linked to climate change could include

- increased wind velocities that damage vital mission infrastructure (Sydeman et al. 2014);
- increased number of HOTDAYS that damage vital mission infrastructure, such as roads and runways;
- increased drought potential (Glick et al. 2011); and
- potential loss of future training areas that may be needed in light of a changing geopolitical landscape and base realignment.

In addition, climate change has the potential to disrupt the acquisition and transportation of materials required for the maintenance, construction, and storage of the equipment required for these systems (DoD 2014).

### *2.4.2 Land Use*

KPSFS occupies approximately 153 acres of leased land from the State of Hawai'i, including easements and rights of way. Of this area, approximately 83 acres include fenced facilities, roadways, and a 50-foot buffer zone (USAF 1997). The installation consists of several clusters of satellite tracking and radio communication facilities connected by an access road extending approximately two miles along Kuaokala Ridge (Tab 5). Light industrial land-use areas encompass basically all of the installation that is not in semi-

natural open space. This land use includes administration buildings, buildings for computer processing and satellite tracking, antennas, and ancillary structures, such as maintenance shops and pump houses. The primary land-use considerations are personnel access and military security. The open space area at KPSFS includes unimproved areas surrounding the installation, antenna separation, and rights of way. The primary land-use considerations of open space areas pertain to securing the borders around the station and preventing interference with antennas (USAF 1996).

Approximately 27 acres of the installation are classified as improved, including lawns, buildings, antennas, ancillary structures, roads, parking areas, and a helicopter landing pad. The remaining grounds (approximately 126 acres) are classified as Landscaped or Semi-improved (e.g., areas with periodic maintenance activities, such as mowing along the road shoulders) and Natural Resources Multiple Use or Unimproved (e.g., forested areas, shrublands, and grasslands) areas (Figure 2-15) (Tab 5).

Approximately 53 personnel work at KPSFS, including military personnel, USSF civilian employees who perform civil engineering and real property maintenance for KPSFS, tenant mission personnel, and contractor personnel supporting mission operations. Most activities are confined to the buildings except for grounds maintenance and surveillance and maintenance of the antennas and their linkages (USAF 1997).

Approximately 91 acres of KPSFS are established as Management Emphasis Areas, 75 acres of which are designated as Natural Resources Multiple Use, 8 acres are Landscaped High Maintenance, and 8 acres are Landscaped Low Maintenance (USAF 1997).

### *2.4.3 Current Major Mission Impacts on Natural Resources*

This discussion focuses on KPSFS's current major impacts on the local environment, including hazardous materials and hazardous wastes, the Environmental Restoration Program (ERP), water quality, noise, air pollution, fire, and pest management.

**Hazardous Materials and Hazardous Wastes**

The operation of vehicles and equipment at KPSFS requires the use of a variety of hazardous and non-hazardous materials (HMs), including fuels, lubricants, and solvents. If released to the environment, these materials have the potential to impact air, soil, and water quality. KPSFS produces minimal quantities of hazardous waste and is categorized by USEPA as a conditionally exempt, small-quantity generator (USEPA 2008). KPSFS is currently replacing the fueling station near Building 19 with two new storage tanks that will hold 1,000-gallons of gasoline and 750-gallons of diesel. These tanks will be filled by fuel transport trucks and include float-type level indicators to help prevent overfilling, fuel dispensers with automatic shut-offs to prevent overfilling vehicles, and an auxiliary kill switch. Spill kits are stored at the filling station to clean any spills. Limited quantities of POL and other chemicals are stored in several buildings at KPSFS with proper secondary containment where needed. Each of these buildings has no floor drains and is either staffed or kept locked. Table 2-13 provides a summary of buildings on KPSFS that store POLs or HMs.

Used or waste chemicals, including POLs, and solvents generated during maintenance operations are fully contained and removed off the installation for recycling or proper disposal. Pesticide usage at KPSFS is minimal and handled by the United States Navy Facilities Engineering Command (NAVFAC). An installation Pesticide Management Plan is in effect (USAF 2007b).

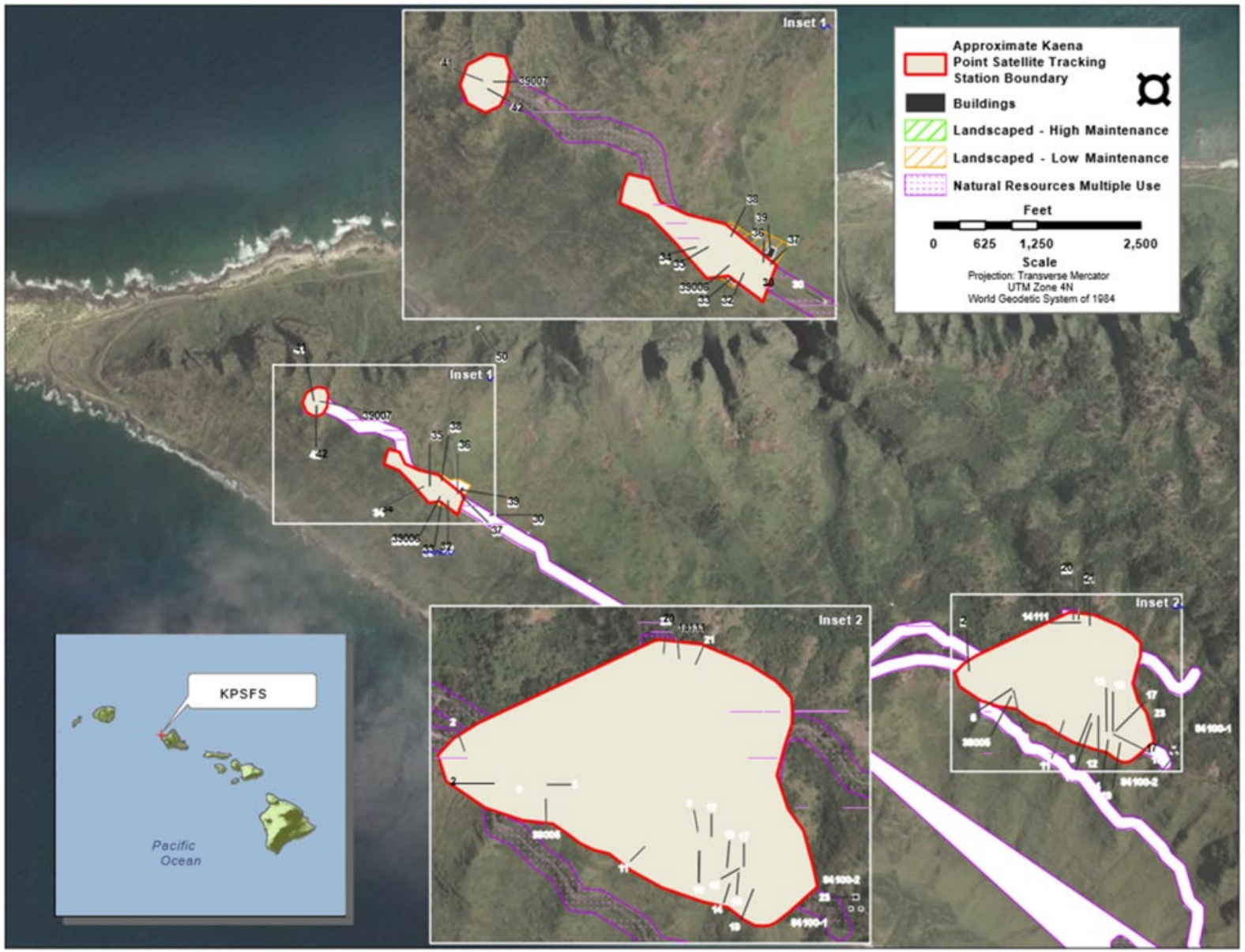


Figure 2-15. Management emphasis areas on Ka'ena point Space Force Station.

Table 2-13. Summary of buildings on Ka'ena point Space Force Station with petroleum, oil, and lubricants (POL) and hazardous materials (HM) storage.

| Building Number | POL/HM | Building Number | POL/HM |
|---|---|---|---|
| 6 | POL | 39 | POL/HM |
| 10 | POL/HM | 41 | POL/HM |
| 12 | POL | 39005 | POL/HM |
| 14 | POL/HM | 39006 | POL/HM |
| 19 | HM | 39009 | POL/HM |
| 35 | HM | 39010 | POL/HM |
| 36 | POL/HM | | |

1512

1513

1514 **Environmental Restoration Program**

1515 The ERP was established by the DoD to ensure that military installations identify and evaluate suspected
1516 problems associated with past waste-disposal actions. Within the ERP, the Installation Restoration Program
1517 (IRP) addresses the releases of hazardous substances, pollutants, or contaminants from past commonly
1518 accepted practices on DoD installations that pose environmental health and safety risks. The IRP was
1519 initiated by the DoD to cost-effectively assess and remediate environmental contamination at DoD facilities
1520 that occurred prior to 1984. Following the passage of the Comprehensive Environmental Response,
1521 Compensation, and Liability Act (CERCLA, or "Superfund") of 1980, the DoD issued the Defense
1522 Environmental Quality Program Policy Memorandum (DEQPPM) 80-6 in June 1980, which mandated
1523 identification of hazardous waste disposal sites on DoD facilities. The USAF implemented DEQPPM 80-6
1524 in December 1980 (USAF 1997).

1525 As of November 2008, KPSFS has one active IRP site (remediation site ST01). Eight Areas of Concern
1526 (AOCs) were identified in 1996. Five of these AOCs were determined No Further Response Action Planned
1527 (NFRAP), two were administratively closed, and one was incorporated into IRP site ST01 (USAF 2007a).
1528 IRP site ST01 is located near Building 39 and was associated with a fuel leak from a former 25,000-gallon
1529 underground storage tank (UST) and its associated piping. The former UST was installed in 1965 to service
1530 the Building 39 power plant. Approximately 1,800 gallons of diesel fuel were reportedly released to the
1531 ground in 1972. The areas of contamination in ST01 are considered to be subsurface (3–9 feet below ground
1532 surface). Surface soils were found to be unaffected and sampling near Building 39 indicated possible POL-
1533 constituent contamination of the subsurface soils and a perched ground water feature. It is believed that this
1534 site has not impacted storm water (USAF 2007b). Table 2-14 summarizes active and previous IRP and
1535 AOC sites.

1536 **Water Quality**

1537 Water quality changes in the surface drainages could occur during storm events. An increase in
1538 sedimentation might occur during construction activities; however, BMPs applied to minimize the erosion
1539 of loose soils from the site ameliorate any potential impacts that could occur. Several BMPs are used at
1540 KPSFS to provide pollution prevention and good housekeeping. HM are managed according to all
1541 applicable regulations and, therefore, should not affect water quality.

Table 2-14. Summary of current Installation Restoration Program (IRP) and Area of Concern (AOC) sites (sources: USAF 2007a, Hawai'i DOH 2003, USAF 2003a, USAF 2003b, USAF 2003c, USAF 2010, USAF 2019)

| WIMS Site Code | Site Type | Description | Material Disposed/ Discovered | Remedial Actions | Status | Date of Final Action |
|---|---|---|---|---|---|---|
| ST01 | IRP | Underground storage tank (UST) Spill/Leak | Approximately 1,800 gallons of diesel fuel | Record of Decision | Active | Feb 2010 |
| EA02 | AOC | Day Tank Spill Area | See ST01 | See ST01 | Incorporated into IRP site ST01 | NA |
| EA06 | AOC | Base of Metal Platform | Lead and chromium detected in surface soils | None | Administratively closed | N/A |
| EA08 | AOC | 500-gallon UST abandoned | Gasoline | Site closure | Active | 2014 |
| TU500 | | 3000-gallon UST removed in 1997, release of fuel occurred | Diesel fuel | Site closure | Active | 2014 |
| OT501 | | Six buildings built between 1959 and 1968 have peeling lead-based paint | Lead and chromium detected in surface soils | None | N/A | N/A |
| OT502 | IRP | Discarded items observed on hillside down slope of Bldg. 19 | Chromium, lead, mercury, and isopropyl toluene detected in surface soils | No further action | Closed | 2019 |
| OT503 | IRP | Discarded items observed on cliff side behind bldg. 33. | Chromium, lead and mercury, detected in surface soils | Land-use controls | Active: Site will require five-year reviews | 2019 |

In the past, the Hawai'i DOH issued a Notice of General Permit Conditions to KPSFS, but it determined in 2021 that a permit was no longer needed. KPSFS will continue to maintain its SWMP. There are no known sources of illicit discharges at KPSFS. If KPSFS becomes aware of any illicit discharges, steps will be taken immediately to correct the problem and take measures to prevent any recurrence. Personnel at KPSFS have been made aware of the drainage feature locations and the drainage points for the various facilities on the installation (USAF 2007b).

Control measures are in place at KPSFS to reduce pollutants in storm water runoff from any future construction activities that disturb an area greater than or equal to one acre or that are part of a larger construction plan or development that disturbs one acre or more. It should be noted that there are no ongoing

construction activities or anticipated plans for construction projects of this magnitude at KPSFS. If the need for construction projects of this size arises in the future, construction contractors will be required to conform to 40 CFR §122-124 regarding control of runoff from the construction site. Designers (i.e., NAVFAC or the United States Army Department of Public Works) use the United Facilities Guide Specifications as a basis of contract requirements for the construction contractor. The specifications, which can be viewed at http://www.wbdg.org/ccb/browse_org.php?o=70, require the construction contractor to provide BMPs for erosion and sediment control during construction, and for handling wastes, including discarded building materials, cement truck washout, chemicals, litter, and sanitary waste at the construction site. During the construction phase of such projects, these BMPs will be monitored by KPSFS personnel to ensure compliance with contractual requirements (USAF 2007b).

It is mandated in 40 CFR §122.34(b)(6) that, for any storm water management program, there must be an operations and maintenance (O&M) program that includes a training component so that employees receive information on preventing and reducing storm water pollution. Due to the critical importance of the mission at KPSFS, there are rigorous O&M inspection programs in place, including frequent and periodic preventive maintenance inspections (USAF 2007b).

**Noise**

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Formal noise studies have not been conducted for KPSFS because there is no regular air traffic for the installation. Helicopters are authorized to land at the installation for emergency evacuation of personnel (USAF 1997). KPSFS has applied to the Hawai'i DOH for, and has been granted, a variance to its noise permitting requirements for operating the power plant.

**Air Quality**

The Hawai'i Air Pollution Control Act (Hawai'i Revised Statutes, Chapter 342B, Air Pollution Control); HAR, Title 11, Chapter 59, *Ambient Air Quality Standards*; and HAR, Title 11, Chapter 60.1, *Air Pollution Control* regulate the emissions of air pollutants into the atmosphere. These regulations cover emissions of any air contaminants, including solid particles, liquid particles, vapors, or gases. The State of Hawai'i, Department of Health, Clean Air Branch is the state's regulatory authority for air quality. The Branch's primary services are provided by its three sections: Engineering, Monitoring, and Enforcement. These sections conduct engineering analysis and permitting, perform monitoring and investigations, and enforce the federal and state air pollution-control laws and regulations.

In 2004, it was determined that KPSFS should apply for an air permit to allow operation of its power plant generators as non-emergency sources. The application was completed and Hawai'i DOH issued the permit in 2006, allowing KPSFS to operate the diesel-powered generators with up to 100,000 gallons of fuel usage annually. KPSFS monitors the permit conditions and has maintained compliance, submitted its required periodic reports, and is regularly inspected by the Hawai'i DOH.

**Pest Management**

The Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended, regulates pesticide use. In 1996, the DoD signed a Memorandum of Understanding with the USEPA to reduce the potential risks to human health and the environment associated with pesticides by adopting Integrated Pest Management (IPM) strategies. IPM is ". . . a comprehensive approach to pest control or prevention that considers various chemical-, physical-, and biological-suppression techniques; the habitat of the pest; and the interrelationship between pest populations and the ecosystem" (Army Study Guide [AR] 200-5). The DoD committed to

fully implementing IPM to help achieve a 50% reduction in its pesticide use by the end of fiscal year (FY) 2000. Adoption of the IPM approach has been accepted as a policy approach that will reduce problems associated with pesticides.

Pests encountered at KPSFS are typical of the region and include black ants, roaches, centipedes, bees and wasps, rodents (i.e., mice and rats), spiders, and various weed plants. An Invasive Species Management Plan was prepared for KPSFS in 2020 (USFWS 2020; Tab 3). NAVFAC Hawai'i has been contracted by KPSFS to provide pest management services at KPSFS (USAF 2006). Presently, pesticides, herbicides, rodenticides, and insecticides are used at KPSFS to control pest populations and have the potential to affect natural resources. These chemicals are inherently toxic to most biological systems and, as such, often have no natural degradation pathways and can persist for long periods in the environment. The presence of such compounds can degrade the quality of soil, surface water, and groundwater. Wildlife and plant life could be affected detrimentally by any inadvertent contact with pest management chemicals.

Restricted Use pesticides are not generally used at KPSFS. The least toxic IPM techniques are used prior to the use of restricted pesticides. Typically, only nonchemical methods or General Use pesticides from the *Standard DoD Pesticide List* are used (Armed Forces Pest Management Board 2008). Pest management activities at KPSFS are accomplished in a manner that prevents these actions from impacting storm water or groundwater or pesticide drift onto or runoff into surface water or drainage ways. KPSFS uses pest management techniques that have the lowest possible chance of impacting T&E or protected species and environmentally sensitive areas through selection of the most effective, least toxic formulations and application techniques. Least toxic IPM techniques (i.e., mechanical removal, mulching) are used unless chemical herbicides are required to manage noxious weeds (USAF 2006).

NAVFAC Hawai'i pest management personnel are trained in the proper handling, mixing, and application of chemical pesticides and in the proper methods and reporting requirements associated with an accidental release and cleanup of chemical pesticides. Pest management vehicles are equipped with spill kits.

USAF installations receive guidance for pest management programs from DoDI 4150.07, *DoD Pest Management Program,* and AFMAN 32-1053, *Integrated Pest Management*, which meets or exceeds DoDI 4150.07. DoDI 4150.07 states that it is DoD policy to establish and maintain safe, effective, and environmentally sound IPM programs to prevent or control pests and disease vectors that might adversely impact readiness or military operations by affecting the health of personnel or by damaging structures, material, or property. It sets the Measures of Merit for base pest management, as listed below.

- IPM Planning—All DoD installations will maintain IPM plans that are reviewed and approved by a DoD-certified PMC and annually updated by the IPMC.
- Pesticide Use—The DoD will maintain or reduce total pesticide use on DoD installations to a level no greater than 425,000 pounds (average usage of the fiscal years 2007 and 2009 usage) of active ingredient per year.
- Pesticide Applicator Certification—All DoD pesticide applicators will be certified. Direct-hire employees, certified in accordance with Volumes 1 and 2 of DoDM 4150.07, have up to 2 years to become certified after initial employment. Contracted employees must have appropriate State or HN certification in the appropriate categories at the time the contract is awarded.
- Pesticide Reporting and Archiving—By the end of Fiscal Year 2020, all pesticide application on all DoD installations, or in support of a DoD operation, will be reported. Reports will be entered into a searchable DoD database and permanently archived.

Typical installation Pest Management Plans outline and describe policies, standards, and requirements for personnel (e.g., KPSFS and NAVFAC Hawai'i) in performing all operations in connection with the Pest Management Program at an installation and are consistent with DoDI 4150.07.

**Socioeconomics and Environmental Justice**

Socioeconomics

Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Socioeconomic data permit characterization of baseline conditions and trends in a given area. The population of the area surrounding the installation in 2019 (Census Tracts 98.01 and 99.04 of Honolulu County, Hawai'i) was 8,195. The average per capita income in 2019 in these two census tracts was approximately $30,904 and $34,764, respectively, and approximately 16.3% and 12.1% of the respective populations live below the poverty line. The Ka'ena Point region has a diverse work force with the majority distributed evenly among the management/professional sector, service sector, and sales sector (United States Census Bureau 2019).

Environmental Justice

On 11 February 1994, the U.S. President issued EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO requires that federal agency actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The essential purpose of the EO is to ensure the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, tribal, and local programs and policies. Environmental justice concerns that must be considered include race, ethnicity, and the poverty status of populations in the vicinity of where a proposed action would occur. Such information aids in evaluating whether a proposed action would render vulnerable any of the groups targeted for protection in the EO.

On 21 April 1997, the U.S. President issued EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO requires federal agencies, to the extent permitted by law and mission, to identify and assess environmental health and safety risks that might disproportionately affect children. The EO further requires federal agencies to ensure that their policies, programs, activities, and standards address these disproportionate risks. The order defines environmental health and safety risks as ". . . risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink and use for recreation, the soil we live on, and the products we use or are exposed to)." Such information aids in evaluating whether a proposed action would render children vulnerable and help to target them for protection under the EO.

Any Proposed Action when implementing the INRMP would not pose any adverse or disproportionate environmental health risks or safety risks to children in the areas associated with the Proposed Action. The likelihood of children being present at KPSFS would be considered minimal, which further limits the potential for any impacts. Accordingly, a detailed examination of health and safety risks that might disproportionately affect children has been dismissed from further analysis.

The percentage of the population considered to be potentially impacted in relation to environmental justice concerns in the region of influence is considered negligible. No minority or low-income populations would be expected to be impacted adversely or disproportionately. Accordingly, a detailed examination of environmental justice concerns in the surrounding areas has been dismissed from further analysis.

### *2.4.4 Potential Future Mission Impacts on Natural Resources*

Known future mission impacts at KPSFS would include continuation of current impacts as described above, and additional impacts due to new missions or mission components. For example, ground disturbances to build new mission infrastructure could damage endangered plants or their habitats found on the installation. The types of infrastructure used for mission activities could also alter species habitats. For example, use of barbed wire on installation fencing could result in Hawaiian hoary bats becoming entangled and damaging their wings (see Section 2.3.4.6). In addition, outdoor lighting fixtures on KPSFS buildings and streets have the potential to negatively impact migratory seabirds that fly over the installation at night. These lights can cause disorientation and grounding due to exhaustion or collision with KPSFS facilities (see Section 2.3.4.6) or alter suitable habitat, resulting in changes to breeding behavior and success (Young et al. 2019). As discussed in Sections 2.4.1 and 2.4.3, Det 3, 21 SOPS will engage in the necessary processes to minimize future impacts on natural resources and ensure regulatory compliance.

# 3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The USAF environmental program adheres to the Environmental Management System (EMS) framework and its Plan, Do, Check, Act cycle for ensuring mission success. EO 13834, *Efficient Federal Operations*; DoDI 4715.17, *Environmental Management Systems*; AFI 32-7001, *Environmental Management*; and International Organization for Standardization 14001 standard, *Environmental Management Systems—Requirements with Guidance for Use*, provide guidance on how environmental programs should be established, implemented, and maintained to operate under the EMS framework.

The natural resources program employs EMS-based processes to achieve compliance with all legal obligations and current policy drivers, effectively manage associated risks, and instill a culture of continual improvement. The INRMP serves as an administrative operational control that defines compliance-related activities and processes.

# 4.0 GENERAL ROLES AND RESPONSIBILITIES

General roles and responsibilities that are necessary to implement and support the natural resources program are listed in Table 4-1. Specific natural resources management-related roles and responsibilities are described in appropriate sections of this plan.

Table 4-1. Roles and responsibilities for the natural resources program at Ka'ena Point Space Force Station.

| Office/Organization/ Job Title (listing is not in order of hierarchical responsibility) | Installation Role/Responsibility Description |
|---|---|
| **Installation Commander (CC)** | The Commander of the Detachment 3, 21st Space Operations Squadron (Det 3, 21 SOPS) serves as the Chairman of the KPSFS Environmental, Safety, Occupational Health Council. In this capacity, the Det 3, 21 SOPS CC will ensure implementation of the Integrated natural Resource Management Plan (INRMP) to the fullest extent practicable based on funding and manpower availability. The final approval of the INRMP and any future changes rest with Det 3, 21 SOPS CC. |
| **Air Force Civil Engineering Center (AFCEC) Natural Resources Media Manager/Subject Matter Specialist** | Karla Meyer, AFCEC<br>AFCEC provides technical assistance and guidance on natural resources issues; advocates for resources required to implement the INRMP; and provides and manages contracts, interagency agreements, and cooperative agreements. |
| **Installation Natural Resources Manager/Point of Contact** | Lance H. Hayashi, Det 3, 21 SOPS/Civil Engineer (CE)/Chief of Civil Engineer |
| **Installation Security Forces** | Mr. Cory Favors, Det 3, 21 SOPS/Security Manager |
| **Installation Unit Environmental Coordinators; see Air Force Instruction 32-7001 for role description** | Primary: Vacant, Det 3, 21 SOPS/CEV Environmental Support Contractor<br>Alt: Lance Hayashi, Det 3, 21 SOPS/CE |
| **Installation Wildland Fire Program Manager** | Lance H. Hayashi, Det 3, 21 SOPS/CE |
| **Pest Manager** | LeeRoy Wymer, Det 3, 21 SOPS/ Civil Engineer Operations, Chief of Civil Engineer Operations |
| **Range Operating Agency** | N/A |
| **Conservation Law Enforcement Officer** | N/A |

Table 4-1. Roles and responsibilities for the natural resources program at Ka'ena Point Space Force Station.

| Office/Organization/ Job Title (listing is not in order of hierarchical responsibility) | Installation Role/Responsibility Description |
|---|---|
| **National Environmental Policy Act/Environmental Impact Analysis Process Manager** | Lance H. Hayashi, Det 3, 21 SOPS/CE Chief of Civil Engineer |
| **National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries)** | N/A |
| **United States Department of Agriculture (USDA), Forest Service** | N/A |
| **United States Fish and Wildlife Service (USFWS)** | The USFWS may provide technical assistance to KPSFS. Specifically, this agency will alert the Det 3, 21 SOPS Environmental Staff whenever new species with potential for inhabiting the station are added to the federal or state endangered species lists. In addition, this agency should support KPSFS personnel during scheduled wildlife and vegetation surveys. This agency is a signatory on this INRMP. |
| **USDA, Animal and Plant Health Inspection Service, Wildlife Services (USDA-WS)** | The Hawai'i Division of Forestry and Wildlife (DOFAW) contracts the USDA-WS to monitor nuisance wildlife at KPSFS and eradicate individuals as needed. |
| **Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife** | The DOFAW may provide technical assistance to KPSFS. Specifically, this agency will alert the Det 3, 21 SOPS Environmental Staff whenever new species that have the potential for inhabiting the station are added to the federal or state endangered species lists. The DLNR also contributes to the development of the KPSFS Wildland Fire Management Plan. In addition, this agency should support KPSFS personnel during scheduled wildlife and vegetation surveys. This agency is a signatory on this INRMP. |
| **Chief of Civil Engineering–Det 3, 21 SOPS** | The Det 3, 21 SOPS Chief of Civil Engineering (CE) plans, budgets, approves, and oversees all maintenance, environmental, and construction activities conducted on the installation. All projects or management activities proposed in this INRMP should be approved by the installation CE to ensure that (1) funding is available, and (2) these projects are complementary to the installation comprehensive planning process. |

Table 4-1. Roles and responsibilities for the natural resources program at Ka'ena Point Space Force Station.

| Office/Organization/ Job Title (listing is not in order of hierarchical responsibility) | Installation Role/Responsibility Description |
|---|---|
| **Environmental–Det 3, 21 SOPS** | The Environmental Staff has responsibility for ensuring that activities associated with the implementation of this INRMP adhere to applicable federal, state, local, and USAF environmental regulations and guidelines. Deviation from the projects proposed in this INRMP should be independently reviewed by the installation CE. The Environmental Staff will be responsible for the overall implementation of the INRMP. Environmental Staff will be assisted by key installation personnel from the host unit (i.e., the P-S Garrison). The Environmental Staff will meet and coordinate frequently with other established committees/ working groups to ensure implementation of the INRMP. The Environmental Staff, in conjunction with the Public Affairs Office, is responsible for establishing and implementing a conservation education program to instruct installation personnel on the protection and enhancement of biological diversity on KPSFS. The Environmental Staff directs most of the ongoing natural resources management activities presented in this INRMP. Environmental Staff will serve as technical POCs for natural resources-related activities for which the Environmental Staff is not directly responsible. |
| **Legal–P-S Garrison** | The Legal Office is responsible for ensuring that implementation of the management objectives contained in this INRMP meet regulatory and statutory requirements. The Legal Office will review any future natural resources management proposals and alert the Det 3, 21 SOPS CC and the Det 3, 21 SOPS CE if there are any regulatory conflicts or shortfalls. In addition, the Legal Office will keep staff informed of any new statutes or regulations that might affect natural resources management on the installation |
| **Public Affairs–15th Wing** | The 15 Wing/PA at Joint Base Pearl Harbor-Hickam is tasked with public relations and media interface for KPSFS through a host tenant support agreement. Although Public Facilities/Recreation land is not present within KPSFS, the installation provides public access via Road A and Road B to adjacent State lands for hunters or hikers who have obtained the proper hunting license or permit from the Hawai'i Department of Land and Natural Resources. |
| **KPSFS Operations and Maintenance Office–Det 3, 21 SOPS** | The KPSFS Operations and Maintenance Office is responsible for majority of grounds maintenance activities on the installation. In addition, this office will ensure that the habitat management protocols established in this INRMP for conserving biodiversity on KPSFS are followed. The Operations and Maintenance Office also will periodically review the types and conditions of grounds maintenance equipment to determine whether new or additional equipment is needed for the proper maintenance of the installation's landscapes. |

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# 5.0 TRAINING

USAF installation NRMs/POCs and other natural resources support personnel require specific education, training, and work experience to adequately perform their jobs. Section 107 of the Sikes Act requires that professionally trained personnel perform the tasks necessary to update and carry out certain actions required within this INRMP. Specific training and certification may be necessary to maintain a level of competence in relevant areas as installation needs change, or to fulfill a permitting requirement.

*Installation Supplement—Training*

- NRMs at Category I installations must take the course DoD Natural Resources Compliance, endorsed by the DoD Interservice Environmental Education Review Board and offered for all DoD Components by the Naval Civil Engineer Corps Officers School (CECOS). See http://www.netc.navy.mil/centers/csfe/cecos/ for CECOS course schedules and registration information. Other applicable environmental management courses are offered by the Air Force Institute of Technology (http://www.afit.edu), the National Conservation Training Center managed by the USFWS (http://www.training.fws.gov), and the Bureau of Land Management Training Center (http://training.fws.gov).
- Natural resource management personnel shall be encouraged to attain professional registration, certification, or licensing for their related fields, and may be allowed to attend appropriate national, regional, and state conferences and training courses.
- All individuals who will be enforcing fish, wildlife, and natural resources laws on USAF lands must receive specialized, professional training on the enforcement of fish, wildlife, and natural resources in compliance with the Sikes Act. This training may be obtained by successfully completing the Land Management Police Training course at the Federal Law Enforcement Training Center (http://www.fletc.gov/).
- Individuals participating in the capture and handling of sick, injured, or nuisance wildlife should receive appropriate training, to include training that is mandatory to attain any required permits.
- Personnel supporting the Bird/Wildlife Air Strike Hazard (BASH) program should receive flight line drivers training, training in identification of bird species occurring on airfields, and specialized training in the use of firearms and pyrotechnics as appropriate for their expected level of involvement.
- The DoD supported publication Conserving Biodiversity on Military Lands —A Handbook for Natural Resources Managers (http://dodbiodiversity.org) provides guidance, case studies, and other information regarding the management of natural resources on DoD installations.

Natural resources management training is provided to ensure that installation personnel, contractors, and visitors are aware of their role in the program and the importance of their participation to its success. Training records are maintained IAW the Recordkeeping and Reporting section of this plan. Listed below is the key natural resources management-related training requirement and program.

- Protecting Natural Resources at KPSFS from the expansion of invasive species.

# 6.0 RECORDKEEPING AND REPORTING

## *6.1 Recordkeeping*

The installation maintains required records IAW Air Force Manual 33-363, *Management of Records*, and disposes of records IAW the Air Force Records Management System records disposition schedule. Numerous types of records must be maintained to support implementation of the natural resources program. Specific records are identified in applicable sections of this plan, in the Natural Resources Playbook, and in referenced documents.

*Installation Supplement—Recordkeeping*

All electronic records are stored and maintained on the installation's shared drive, which can be accessed by all authorized KPSFS personnel. General files are stored on the shared "S" drive, while official records and management files are stored on the shared "O" drives.

## *6.2 Reporting*

The installation NRM is responsible for responding to natural resources-related data calls and reporting requirements. The NRM and supporting AFCEC Natural Resources Media Manager and Subject Matter Specialist should refer to the Environmental Reporting Playbook for guidance on execution of data gathering, quality control/quality assurance, and report development.

*Installation Supplement—Reporting*

Not applicable.

# 7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

This section describes the current status of the installation's natural resources management program and program areas of interest. Current management practices, including common day-to-day management practices and ongoing special initiatives, are described for each applicable program area used to manage existing resources. Program elements in this outline that do not exist on the installation are identified as not applicable and include a justification, as necessary.

*Installation Supplement—Natural Resources Program Management*

Natural resources program management involves the integration of numerous management areas, including coordination among stakeholders, geographic information systems (GIS), fish and wildlife management, T&E species management, water resources and wetlands protection, grounds maintenance, management of the urban forest, agricultural outleasing, wildland fire management, integrated pest management, outdoor recreation, cultural resources protection, enforcement, and public outreach. This section describes current management practices employed at KPSFS and identifies management issues that need to be addressed to preserve and protect the natural resources. Through a holistic approach, management goals and objectives as well as projects can be identified to address these key areas.

## *7.1 Fish and Wildlife Management*

*Applicability Statement*

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

*Program Overview/Current Management Practices*

For the purposes of this INRMP, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. The installation's habitats are primarily used by a variety of nonnative species rather than by native species. The primary goal of wildlife management at KPSFS is to reestablish native species on the installation.

The basis of managing a rich assemblage of wildlife is to provide a mosaic of habitats that are structurally and biologically diverse. In managing for a diversity of habitats and diversity within those habitats, there is the potential for finding numerous species. KPSFS should employ five basic techniques for managing wildlife.

- Control Invasive Plant Species—KPSFS should continue to control and monitor invasive plant species at the installation. Control of invasive plant species at a given site should halt or reverse the degradation of habitat and enhance biological diversity at that site.
- Control Predators and Nonnative Animal Species—KPSFS should continue to coordinate with the USDA-WS and the DOFAW for controlling predator and nonnative animal species.
- Monitor Wildlife—Implement monitoring surveys. Creating, monitoring, and updating GIS data on wildlife species will allow KPSFS to store, retrieve, analyze, and present the data to make informed management decisions.
- Restore Barren Areas—Environmental Office Staff should identify barren areas and restore them using native plant species.
- Manage for Migratory Birds—The MBTA provides for a year-round closed season for nongame birds and prohibits the taking of migratory birds, nests, and eggs, except as permitted by the USFWS. The USFWS recommends avoiding impacts on birds protected under the MBTA by

conducting surveys for nesting birds in areas proposed for disturbance and, if necessary, waiting until the nesting and fledging process is complete. Alternatively, the USFWS recommends that conducting activities outside of nesting areas or outside of the general migratory bird nesting season that extends from March through August can help to avoid direct impacts.

Techniques for managing rare or T&E species are discussed in Section 7.4. In addition, it is DoD policy to promote and support a partnership role in the protection and conservation of neotropical migratory birds and their habitats by protecting vital habitats, enhancing biological diversity, and maintaining healthy and productive natural systems on DoD lands consistent with the military missions. Therefore, the DoD is a participant in the Partners in Flight program.

A summary of the wildlife and fisheries management goals is provided in Table 7-1.

Table 7-1. Summary of fish and wildlife management goals.

| Fish and Wildlife Management Goals |
|---|
| • Protect, restore, and maintain viable populations of native species found in the ecosystem, including rare and T&E flora and fauna species, IAW all regulations and adhering to the principles of ecosystem management.<br>• Conduct surveys to assess, at a minimum, avian, mammalian, and invertebrate species and populations to establish baseline population levels and ranges and repeat these surveys on an annual basis or as needed according to the species' biology.<br>• Reduce predation on native species by nonnative predator species, such as mongoose, feral cats, and dogs, through coordination with DLNR.<br>• Ensure the installation's activities support the State of Hawai'i's Comprehensive Wildlife Conservation Strategy. |

**FWM-1—Establish a Flora and Fauna Monitoring Program**

Concern—KPSFS is lacking in the biological information needed to effectively manage wildlife.

Objective—Protect, restore, and maintain viable populations of native species found in the ecosystem, including rare and T&E flora and fauna species, IAW state and federal laws and regulations, and adhering to the principles of ecosystem management. Establish and conduct planning-level surveys on the installation, as deemed necessary.

Actions

1. Conduct surveys to assess, at a minimum, floral, avian, mammalian, and invertebrate species and populations. The surveys should include

    a. detailed survey protocols and established timelines for their completion to ensure that KPSFS personnel maintain the most current data available concerning the resources they are managing;

b. a comparison of previous survey data to assess temporal trends in population and habitat conditions; and

c. information from the USFWS, DOFAW, and other local experts.

2. Incorporate biological survey data into the INRMP as they are collected.

Monitoring Criteria—Continue to monitor plant and wildlife populations (at least once every five years) and conduct new biological surveys as needed (at a minimum, prior to permanently impacting vegetated habitat).

**FWM-2—Predator and Nonnative Species Control**

Concern—The installation's habitats are primarily used by nonnative species. The reestablishment of native species could be limited by the presence of nonnative predators, such as feral cats and feral pigs. Feral pigs are not considered a pest outside of KPSFS because the area is classified as a Game Management Area.

Objective—Reduce predation on native species by predator species, such as mongoose, feral cats, and dogs.

Objective—Minimize the introduction of new invasive species and reduce the impact of nonnative species on native species.

Actions

1. Continue to coordinate with the USFWS, the USDA-WS program, and the DOFAW for ongoing control on the installation.
2. Determine effective trapping methodologies and hunting strategies.
3. Survey for predator and nonnative species activity.
4. Ensure that the perimeter fence is reinforced.
5. Following the framework established within the USGS Early Detection Rapid Response protocol for incipient invasive species, regularly monitor for invasive species using walk-through surveys, and installation personnel reports, and communicate the findings with the appropriate land managers and state agencies.
6. Collaborate with DLNR DOFAW and the O'ahu Invasive Species Committee to assess status of invasive species presence on the installation, and discuss potential methods of control.

Monitoring Criteria—Continue to monitor wildlife populations and predator and nonnative species activity.

**FWM-3—Periodic Review of the State of Hawai'i's Comprehensive Wildlife Conservation Strategy**

Concern—The State of Hawai'i's Comprehensive Wildlife Conservation Strategy (Hawai'i DLNR 2005) is used as a management tool for the adjacent state lands.

Objectives—Ensure that the installation's activities support the Comprehensive Wildlife Conservation Strategy.

Actions

1. Periodically review the Comprehensive Wildlife Conservation Strategy. It is available online at http://dlnr.hawaii.gov/wildlife/cwcs/.
2. Coordinate with DOFAW to ensure that management actions on the installation support the goals of the Comprehensive Wildlife Conservation Strategy.

Monitoring Criteria—Conduct periodic reviews of the Comprehensive Wildlife Conservation Strategy, which is revised every 10 years. The most recent version is from 2015.

### *7.1.1 Climate Impacts on Fish and Wildlife Management*

Wildlife management on KPSFS likely be able to continue with many of its same practices to address wildlife issues caused by climate change. Nonnative invasive species are currently the largest management concern on the installation, and it will continue to be in the future. Plans for establishing a floral and faunal monitoring program should be completed to track the impacts of increasing temperature and decreasing precipitation on biodiversity at KPSFS, as well as the expansion of nonnative invasive species. Current plans to cooperate with DLNR to reduce predation on native species by invasive predators, such as mongoose, feral cats, and feral dogs, will be increasingly important in a changing climate, as invasive species are likely to be more competitive as environmental conditions shift away from historical norms (Hellmann et al. 2008). The projected increases in the frequency and intensity of wildfires may also present threats to wildlife found on KPSFS, and additional management may be needed to mitigate those effects as discussed in Section 7.9.

## *7.2 Outdoor Recreation and Public Access to Natural Resources*

*Applicability Statement*

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

*Program Overview/Current Management Practices*

People and social uses/needs are an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Activities that could affect species populations, such as game harvest or soil erosion arising from hiking trails, will be monitored and management will adapt to to mitigate negative impacts. Public recreation will not be limited by KPSFS unless emergencies or threats to the mission occur. From these general outdoor recreation management philosophies, a series of goals and objectives have been developed and used to identify management issues and actions to address them. A summary of the goals used for managing outdoor recreation resources is provided in Table 7-2.

Table 7-2. Summary of outdoor recreation/public access management goals.

| **Outdoor Recreation and Public Access Management Goals** |
|---|
| • Foster community within KPSFS and with neighboring landowners by conducting outreach and maintaining public access when it does not conflict with base security or the mission.<br>• Promote discussion with KPSFS leadership, personnel, and pertinent stakeholders about incorporating ecosystem management philosophy into natural resource planning and include education of KPSFS personnel in ecosystem management goals and objectives.<br>• Increase outreach, educational opportunities, and outdoor recreation on base by developing interpretive sites and incorporating recreational options into natural areas.<br>• Ensure that the public-access protocol is compatible with KPSFS's mission and incorporate the hunting regulations into the station's safety protocols for protection of hunters, personnel, and the public. |

**OR-1—Public Access, General Safety, and Security**

Concern—The consequences of public access regarding general safety and the operational security of the mission should be evaluated.

Objective—Ensure that the public-access protocol is compatible with KPSFS's mission.

Action

1. Evaluate the public-access protocol.

Monitoring Criteria—Continually review the public-access protocol to ensure that a safe, secure environment compatible with KPSFS's mission is being maintained.

**OR-2—Establish a Watchable Wildlife Site**

Concern—Public recreation on the installation is limited to providing an access point for the Kuaokala Game Management Area and Forest Reserve.

Objective—Establish a Watchable Wildlife bird- and whale-watching site at the installation.

Action

1. Erect interpretive signs that include information on birds that commonly occur in the area, an explanation and diagrams of wind dynamics near coastal bluffs, information on whale migration patterns and whale species that can be seen from the bluff, and native plant species that occur on the nearby rock outcroppings.
2. Install a safety rail and a picnic table.

Monitoring Criteria—Continually review the public's interest in the Watchable Wildlife site and possible impacts that increased access to this site could have on the natural resources at the installation.

#### *7.2.1 Climate Impacts on Outdoor Recreation and Public Access to Natural Resources*

The projected increase in HOTDAYS may lead to outdoor recreation being less safe and less appealing on many more days of the year. Public access and recreation on the installation is currently restricted to an access point for entering the Kuaokala Game Management Area. As the majority of game species are nonnative invasive species, the need for an access point for hunting likely will still be needed under the projected climate changes.

### ***7.3 Conservation Law Enforcement***

*Applicability Statement*

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

*Program Overview/Current Management Practices*

The Sikes Act makes the Secretary of each military department responsible for employing sufficient numbers of professionally trained natural resources personnel, and ensures natural resources law enforcement personnel are available and assigned responsibility to carry out all of Title 16—Conservation, including the preparation and implementation of INRMPs (16 U.S.C. 670e-2). It also authorizes the DoD to enforce all federal environmental laws, including the National Historic Preservation Act, Archeological Resources Protection Act, MBTA, CWA, and Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531–

1544, as amended) when violations occur on the installation. DoDI 4715.03 (18 March 2011) further states that, "DoD components shall coordinate with appropriate agencies to support conservation law enforcement to enforce federal and applicable state laws and regulations pertaining to the management and use of the natural resources under their jurisdiction."

Historically, no conservation law enforcement measures or activities have been conducted on KPSFS due to an apparent lack of violations of natural resource laws and regulations. This lack of natural resources law enforcement implementation on the installation has negated the need for conservation law enforcement training and certifications.

## *7.4 Management of Threatened and Endangered Species, Species of Concern, and Habitats*

*Applicability Statement*

This section applies to USAF installations that have threatened and endangered species on USAF property. This section **IS** applicable to this installation.

*Program Overview/Current Management Practices*

Six federally or state listed T&E species have been documented or could occur at KPSFS (Table 2-13). In 2015, a cooperative agreement between the USAF and the USFWS was established to provide technical assistance in support of the USAF's responsibilities under the Sikes Act and the ESA. The cooperative agreement has funded a USAF liaison position (1.0 full-time equivalent) at the USFWS Pacific Islands Fish and Wildlife Office. The liaison's duties include technical assistance and support of INRMP implementation and section 7 ESA consultation activities at KPSFS and other USAF installations in Hawai'i and the Wake Island Atoll. Monthly coordination meetings between the USFWS and Hawai'i-based USAF installations promote information sharing and communication regarding INRMP implementation and section 7 ESA consultation activities.

For future reference if federally listed species or their critical habitat are documented on base, Figure 7-1 presents an endangered species coordination-decision chart (Figure 7-1) that would be followed as part of the planning process for projects that would impact those species or habitats on the installation.

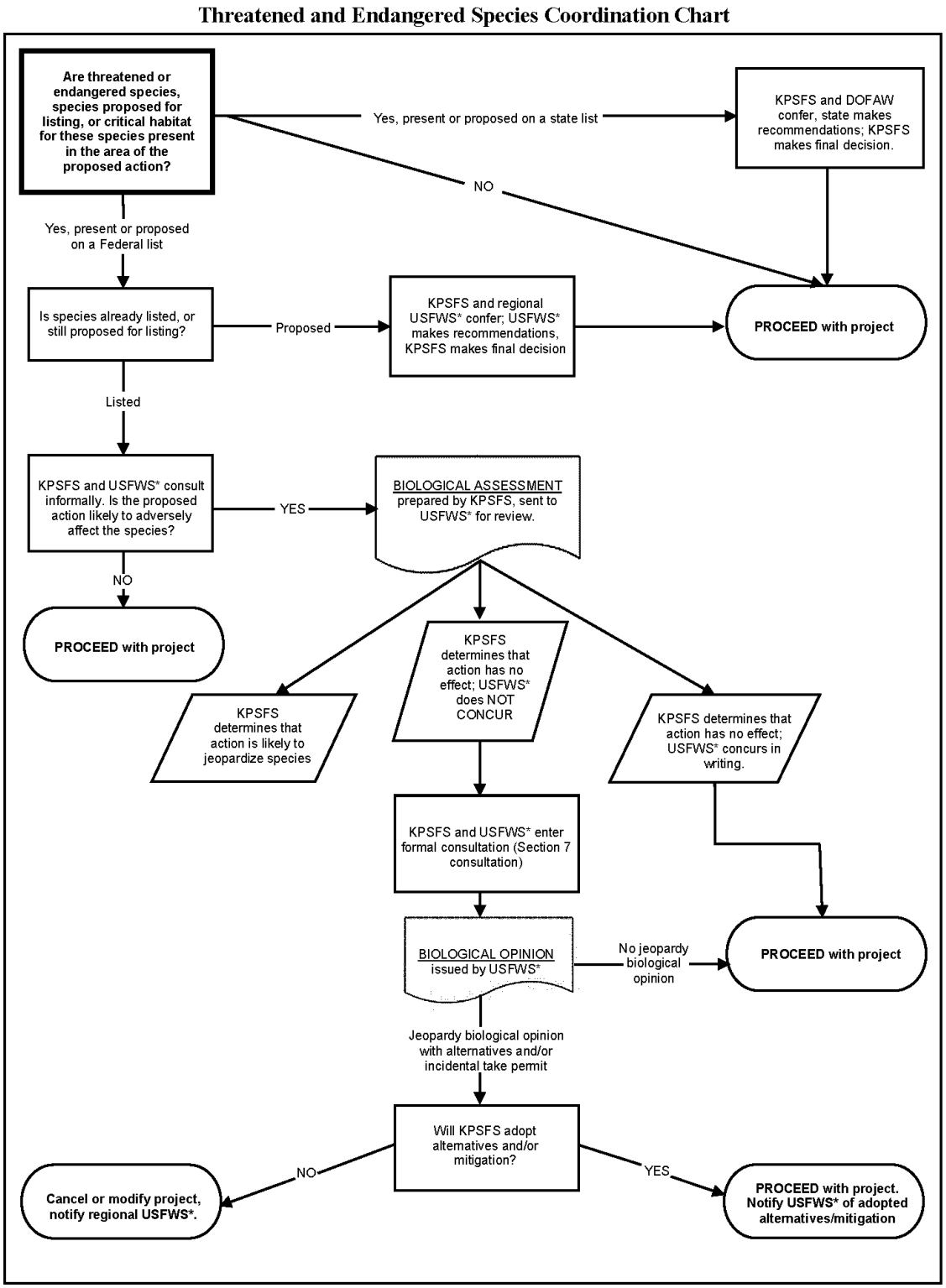
Section 3G of AFMAN 32-7003—*Threatened and Endangered Species Management* (20 April 2020) provides specific guidance for managing T&E species on USAF installations, as listed below.

- Endangered Species Act Compliance (Section 3.38)
- Inventory and Monitoring (Section 3.39)
- ESA Consultation (Section 3.40)
- The INRMP as a Substitute for Critical Habitat Designation (Section 3.41)
- Exclusion of Military Lands from Critical Habitat Designation Due to Economic Impacts or National Security Issues (Section 3.42)
- Marine Mammal Protection Act Compliance (Section 3.43) This section seeks to address compliance with AFMAN 32-7003 subsections 3.38 to 3.42; subsection 3.43 does not apply to KPSFS.

**Endangered Species Act Compliance**

The ESA provides for the conservation of federally listed T&E species and their habitats (16 U.S.C. 1531 *et seq*.). T&E species are plants and animals that have been determined to be in danger of extinction. Factors contributing to the T&E status of these species include habitat loss or degradation, predation or herbivory, inadequate regulatory protection, and other factors including climate change, hybridization, low numbers

of individuals or populations, or lack of pollinators. At the time a species is listed, the USFWS also must designate critical habitat—a specific area or areas within the geographic area occupied by the species at the time it was listed—that contains the physical or biological features that are essential to the species' conservation and may need special management or protection. Critical habitat also may include areas that were not occupied by the species at the time of its listing but are essential to its conservation. Finally, Section 7(a)(1) of the ESA requires federal agencies to use their respective authorities to carry out programs for the conservation of T&E species.




1989

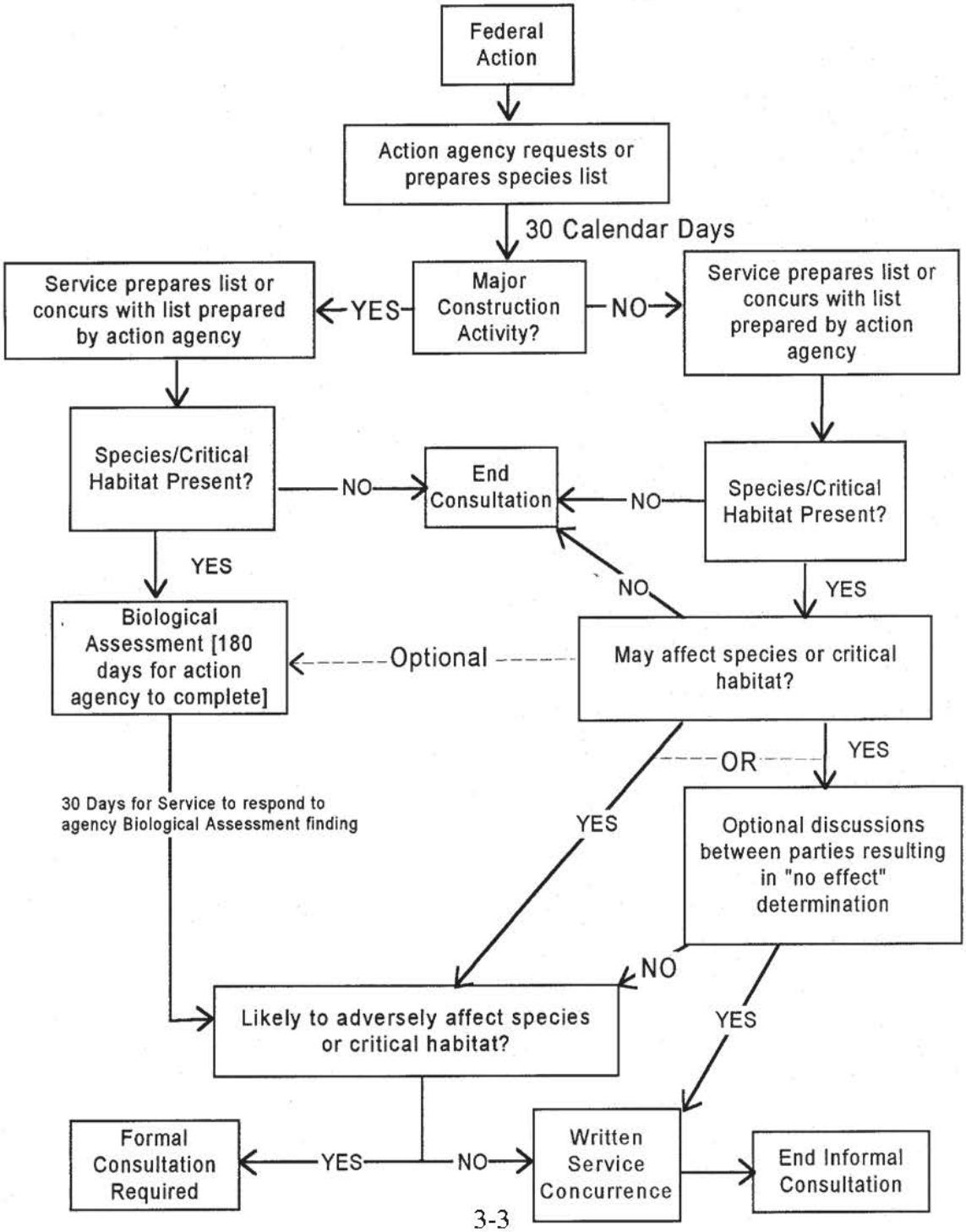
1990 Figure 7-1. Threatened and endangered species coordination chart (DOFAW = Hawai'i Division of
1991 Forestry and Wildlife, KPSFS = Ka'ena Point Space Force Station, USFWS = United States Fish and
1992 Wildlife Service).

All federally listed T&E species are given similar status by the State of Hawai'i law (HRS §195D-4), with some exceptions. The State of Hawai'i also may determine whether (1) additional species warrant T&E status, and (2) federally listed threatened species may warrant endangered status in the state.

**Endangered Species Act Section 7 Consultations**

Section 7(a)(2) of the ESA requires that federal agencies consult with the USFWS to insure that any action authorized, funded, or carried out by such agencies, including the implementation of an INRMP, is not likely to jeopardize the continued existence of T&E species or result in the destruction or adverse modification of critical habitat. On 22 June 2023, the USFWS and NOAA Fisheries proposed revisions to the 2019 final rule regarding regulations for Section 7 consultations and threatened species protections. Revisions to 50 CFR § 402 and 424 clarified and improved the language regarding interagency consultation and the processes for listing and classifying species and designating critical habitat. The final revision to 50 CFR § 17 was to reinstate the 4(d) "blanket rule" protections that were available for threatened species prior to 2019. The final rule is expected in the spring of 2024 (USFWS 2023).

The *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section* 7 of the ESA (USFWS and National Marine Fisheries Service 1998) provides detailed guidance on how Section 7 consultations are conducted. A flow chart showing the informal consultation process is provided (Figure 7-2). In addition, installations must notify the AFCEC Environmental Directorate (CZ) when entering into formal consultations under 50 CFR § 402.14.




2013 Figure 7-2. Endangered Species Act, Information Section 7, Consultation Process (USFWS and National
2014 Marine Fisheries Service 1998).
2015

### The Integrated Natural Resources Management Plan (INRMP) as a Substitute for Critical Habitat Designation

Pursuant to Section 4(a)(3)(B)(i) of the ESA, the Secretary of Interior ". . . shall not designate as critical habitat any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an INRMP prepared under Section 101 of the Sikes Act, if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." In accordance with 50 CFR § 424.12(h), an INRMP is considered sufficient for critical habitat exemption if it meets the following criteria.

- The INRMP provides a conservation benefit to the species.
- The INRMP provides assurance that the management activities necessary to implement the goals and objectives of the plan are implemented.
- The INRMP provides assurance that the conservation effort is effective.

### Exclusion of Military Lands from Critical Habitat Designation Due to Economic Impacts or National Security Issues

In accordance with ESA Section 4(b)(2) (16 U.S.C. § 1533(b)(2)), the Secretary of Interior may exclude areas owned or controlled by the DoD from critical habitat designation if the USFWS or NOAA Fisheries determines that the benefits of such exclusion outweigh the benefits of specifying the area as critical habitat and the exclusion of such area from critical habitat will not result in the extinction of the species concerned. When requesting that the USFWS or NOAA Fisheries exclude military lands from a proposal to designate critical habitat, the installation must provide evidence of how a critical habitat designation would impact national security.

The Threatened and Endangered Species Protection Management Goals for this section are summarized in Table 7-3 below.

Table 7-3. Threatened and endangered species protection management goals.

| Threatened and Endangered Species Management Goals |
|---|
| • Protect, restore and maintain viable populations of native species found in the ecosystem, including rare, T&E flora and fauna species IAW all regulations and adhering to the principles of ecosystem management.<br>• Update the Biological Inventory of T&E species for KPSFS to ensure compliance with federal and state regulations and effective management of threatened and endangered resources. |

### TE-1—Update Biological Inventory and Monitoring

Concern—A resource inventory report of T&E and candidate species at KPSFS was last conducted in 2014 (USACE 2015).

Objective—Update and maintain the current inventory and status of T&E or candidate species at KPSFS.

Actions

1. Conduct an updated survey for federally listed T&E or candidate species prior to the next five-year INRMP update.
2. Coordinate regularly with USFWS and DOFAW on any change in the status of T&E and candidate species in the vicinity of KPSFS.
3. Incorporate findings into relevant planning documents and the INRMP as part of the annual review.
4. Consult with the USFWS under section 7 of the ESA on all activities that may impact T&E species.
5. Conduct a survey of external light sources on the installation to assess potential impacts to wildlife and identify potential mitigation measures.

Monitoring Criteria—Updated survey or status of federally listed T&E species, state-listed species, and species of special concern at KPSFS. If federally listed species are found, fulfill requirements of Section 7(a)(1) and 7(a)(2) of the ESA.

**TE-2—Incorporate Threatened and Endangered Species Avoidance and Impact Minimization Measures Into Project Planning**

Concern—Standard measures to avoid and minimize impacts to T&E species have been developed by USFWS. Incorporation of these measures during project planning can reduce ESA section 7 consultation time while ensuring ESA compliance, thereby increasing efficiency for KPSFS project execution.

Objective—Minimize impacts to T&E species as a result of activities at KPSFS.

Actions

1. Natural Resources Manager will maintain current knowledge of USFWS Avoidance and Impact Minimization Measures. See https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.
2. When proposed activities at KPSFS may effect T&E species, incorporate Avoidance and Impact Minimization Measures for listed species into the proposed action, as appropriate.

Monitoring Criteria—Avoidance and impact minimization measures are incorporated into the project planning and section 7 consultation process. Maintain compliance with ESA and appropriate state regulations. Projects and activities to meet the installation's mission are completed on schedule.

**TE-3—Conservation Actions for Ko'oko'olau**

Concern—KPSFS supports a significant portion of the last remaining wild population of this species with fewer than 500 individuals.

Objective—Develop a conservation plan to address management of ko'oko'olau at KPSFS.

Actions

1. Conduct regular surveys to monitor the status ko'oko'olau at KPSFS.
2. Work with USFWS and DOFAW to identify actions to benefit ko'oko'olau at KPSFS.
3. Before starting construction or operational activities, and if practicable, collect seeds to be transferred to DOFAW or the Lyon Arboretum for long-term storage to support future conservation efforts.

Monitoring Criteria—Current information on the status and condition of ko'oko'olau at KPSFS is maintained. A plan of action to conserve ko'oko'olau at KPSFS is developed.

**TE-4—Maintain Partnerships and Coordination with the State of Hawai'i**

Concern—KPSFS is adjacent to recreation, conservation, and forest reserve areas managed by the State of Hawai'i.

Objective—Establish and/or maintain regular coordination to improve resource management.

Actions

1. Conduct annual forum/meeting/site visit between KPSFS Environmental and Natural Resources Managers and State Parks, Forestry, NARs staff.

Monitoring Criteria—Regular communication and coordination is established/maintained.

### *7.5 Water Resource Protection*

*Applicability Statement*

This section applies to USAF installations that have water resources. This section **IS** applicable to this installation.

*Program Overview/Current Management Practices*

Watershed protection is important to natural resources management because it directly affects surface water quality and the value of aquatic habitats. KPSFS currently protects the surrounding watershed through compliance with its SWMP, as well as a number of federal, state, local, and USAF environmental regulations that require the installation to have detailed spill-control and response procedures and to implement storm water pollution prevention BMPs. The objective of these regulations is to prevent pollutants (e.g., fuels, solvents, sediments) from entering the watershed, thus protecting surface waters. The watershed protection management objectives and actions presented in this INRMP are designed to reduce/control nutrient and sediment inputs into the surrounding watershed. A summary of the watershed management goals is presented in Table 7-4.

Table 7-4. Summary of watershed protection management goals.

| Watershed Protection Management Goals |
|---|
| • Maintain and enhance the grounds and habitats of Ka'ena Point Space Force Station to support the military mission and sustain native species biodiversity.<br>• Avoid erosion and sediment transport following activities that disturb the vegetative cover or the soil surface, and revegetate barren areas with a diverse range of native, fire tolerant shrubs, brushes, grasses and to preserve and enhance these species and reduce soil erosion.<br>• Remain in compliance with United States Army Corps of Engineers, United States Environmental Protection Agency, and State of Hawai'i's wetland regulations and continue the implementation of the Storm Water Management Plan to avoid, minimize, or mitigate impacts from erosion and protect local water quality. |

In addition, several topics of concern have been identified. The following watershed topics of concern, objectives, and actions are designed to meet the watershed management goals of this INRMP.

**WP-1—Erosion Prevention Program**

Concern—On-installation land-disturbing activities could cause erosion and sedimentation if disturbed areas are not protected by adequate erosion and sedimentation controls.

Objective—Continue the implementation of the SWMP to avoid, minimize, or mitigate impacts from erosion.

Actions

- Identify, inventory, and map areas at high risk for erosion in order of priority (i.e., road banks, unvegetated areas). Gathered data should then be entered into the AutoCAD/GIS database and monitored to identify any new erosion problems.
- Consult with the NRCS on conservation practices and assistance with prioritizing problem areas.
- Promptly revegetate exposed areas after construction or maintenance activates. Only native species, including those listed in Project 2.4.1, derived from local seed sources (if available) should be used for these purposes. Consult with the local office of the USFWS or DOFAW for additional guidance.
- Monitor revegetation efforts annually.

Monitoring Criteria—Disturbed areas and areas with high erosion potential are stabilized with appropriate native vegetation.

**WP-2—Implement the Control Measures Presented in the Storm Water Management Plans**

Concern—The discharge of pollutants can adversely affect local water quality and put the installation in violation of its storm water permit issued by the State of Hawai'i Department of Health, Clean Water Branch.

Objective—Continue to implement the six control measures presented in the SWMP. Reduce the discharge of pollutants to the maximum extent practicable. Implement BMPs and minimum control measures to protect local water quality.

Actions

1. Control Measure 1—Public Education and Outreach
2. Control Measure 2—Public Participation and Involvement
3. Control Measure 3—Illicit Discharge Detection and Elimination
4. Control Measure 4—Construction Site Storm Water Runoff Control
5. Control Measure 5—Post-Construction Storm Water Management
6. Control Measure 6—Pollution Prevention and Good Housekeeping

Monitoring Criteria—Control measures are implemented and the discharge of pollutants is reduced.

## *7.6 Wetland Protection*

*Applicability Statement*

This section applies to USAF installations that have existing wetlands on USAF property. This section **IS NOT** applicable to this installation.

*Program Overview/Current Management Practices*

There are no wetlands or floodplains on KPSFS, but the installation should be aware of the regulations associated with the wetlands or water bodies in the vicinity of the installation. The goal for wetland and floodplain management is summarized in Table 7-5.

Table 7-5. Summary of wetlands and floodplains management goals.

| Wetlands and Floodplains Management Goals |
|---|
| • Maintain and enhance the grounds and habitats of KPSFS to support the military mission and sustain native species biodiversity.<br>• Remain in compliance with USACE, USEPA, and State of Hawai'i's wetland regulations and continue the implementation of the SWMP to avoid, minimize, or mitigate impacts from erosion and protect local water quality. |

**WT-1—Remain in Compliance with USACE, USEPA, and State of Hawai'i's Wetlands Regulations**

Concern—There are no wetlands or floodplains on KPSFS, but the installation should be aware of the regulations associated with the wetlands or water bodies in the vicinity of the installation.

Objective—Remain in compliance with USACE, USEPA, and the State of Hawai'i's wetland regulations.

Actions

1. Comply with the CWA, NEPA, and other applicable EOs and regulations when planning and completing construction activities.

Monitoring Criteria—KPSFS activities have no adverse effect on wetlands in the vicinity of the installation and remain in compliance with federal and state regulations.

## *7.7 Grounds Maintenance*

*Applicability Statement*

This section applies to USAF installations that perform ground maintenance activities that could impact natural resources. This section **IS** applicable to this installation.

*Program Overview/Current Management Practices*

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings and parking areas, establishing wildflower areas, reducing mowing, and use of IPM techniques are all ways to spend dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment. To ensure compliance with the 1994 Memorandum on Environmentally and Economically Beneficial Practice on Federal Landscaped Grounds; EO 13112, *Invasive Species*; and EO 13148, *Greening the Government Through Leadership in Environmental Management*, only native vegetation will be used in grounds landscaping.

The following are guidelines for grounds management.

- Use selective landscaping and vegetative management, including pruning, cutting, or planting, to provide for regeneration, shrub development, pest-hazard reduction, and site stabilization.
- Where appropriate, plant shelter belts of shrubs around the borders of parking lots and near buildings. Choose native shrubs that provide food and cover for wildlife. Shrubs should be spaced about four to six feet apart. To create shelter belts, plant several rows of larger shrubs and smaller shrubs with rows about 15 feet apart.
- Native species should be used whenever possible in landscape plantings.

In the process of identifying grounds maintenance and lawn management actions, a list of goals was generated and used to create management objectives for ecological sustainability (Table 7-6).

Table 7-6. Summary of grounds maintenance management goals.

| Grounds Maintenance Management Goals |
|---|
| • Maintain and enhance the grounds and habitats of KPSFS to support the military mission and sustain native species and threatened and endangered species biodiversity.<br>• Revegetate improved and semi-improved (see Section 13.2 for "improved grounds" and "semi-improved grounds") areas after invasive plant species control using native species that are/were present in this area and approved for introduction into the areas by the USFWS, DLNR, and/or biologist/botanist to increase preservation and enhancement of native species.<br>• Avoid erosion and sediment transport following activities that disturb the vegetative cover or the soil surface, and revegetate barren areas with a diverse range of native, fire tolerant shrubs, brushes, grasses and to preserve and enhance these species and reduce soil erosion. |

Based on these goals, a series of items have been identified in the following subsection that provides workable management actions through which the grounds maintenance goals can be reached. The topics of concern and associated goals and objectives involving grounds maintenance are presented below.

**GM-1—Landscape and Revegetation Plan**

Concern—The soils on KPSFS have a moderate to severe erosion hazard and are susceptible to water erosion if not protected with vegetation or other cover. Maintenance of key ecosystem functions, such as erosion control and sediment retention, require a healthy, uniform ground cover be established as quickly as possible following land use conversion or disturbance, and that interim soil stabilization measures be implemented.

Concern—A recent out-planting of nursery grown native species was used to replace invasive species; however, it was determined to be infested with insects that could spread to naturally growing species in this area. Consulting with the USFWS, DLNR, and/or a biologist/botanist could prevent future issues with out-planting and to also identify the appropriate species to introduce into the area.

Concern—Although there is limited food available for coconut rhinoceros beetle, they have been identified in Phoenician palms near Building 10 and their larvae have been found in mulch piles on the installation. There has also been an increasing number of this species collected in the five onsite traps.

Actions

1. Develop and implement a revegetation plan, with interim mechanisms to stabilize the soil until vegetative cover has become established, to reclaim disturbed areas following land use conversion, brush removal, and other disturbances.
2. Seed areas that are currently bare with native grass mix. Only native species derived from local seed sources (if available) should be used for these purposes and, if nursery-grown, plants should be inspected by a knowledgeable biologist or botanist to ensure that they are pest-free. If native grasses are not available, then a sterile turf grass can be used.
3. Monitor revegetation efforts for effectiveness and modify as needed.
4. Inspect all soil, plants, and construction materials for harmful pest species or propagules to prevent establishment in project areas.
5. Continue deploying coconut rhinoceros beetle traps to monitor population trends.

Monitoring Criteria

1. A revegetation plan that is understood and implemented by the various installation organizations and contractors involved in disturbance activities on the installation is developed.
2. Bare areas are converted to uniform coverage with native grasses.
3. Documented monitoring activities (e.g., evaluation of ground cover establishment, amount of bare ground not covered with vegetation/other stabilization mechanisms, evidence of erosion) show successful revegetation and no evidence of erosion or sediment transport into local waterways.

**GM-2—IPM Plan**

Pest management objectives at KPSFS include the protection of real estate, control of potential disease vectors or animals of other medical importance, control of undesirable or nuisance plants and animals (including insects), and prevention of damage to natural resources.

DoDI 4150.07 states that it is DoD policy to establish and maintain safe, effective, and environmentally sound IPM programs to prevent or control pests and disease vectors that might adversely impact readiness or military operations by affecting the health of personnel or damaging structures, material, or property. KPSFS currently implements an IPM Program. This method of pest management involves four primary control strategies: mechanical and physical control (physical removal or exclusion of pests), cultural control (altering the environment to make it less suitable or attractive to the pest), biological control (use of other organisms that control the pest), and chemical control (use of pesticides and herbicides). AFMAN 32-1053, *Integrated Pest Management*, defines a policy to conduct effective pest management programs, and establishes responsibilities and procedures for pest management at USAF installations.

Protection of Real Estate

Protection of real estate from depreciation requires that animals (including insects) that seek refuge or other life necessities within human dwellings in a manner that causes damage to structures be controlled or prevented from entering the dwellings. Animals seek refuge inside human dwellings because the dwellings can provide warmth, protection from the elements, and materials or locations for nest building.

Many animals are attracted to human dwellings, including rodents, birds, and feral cats; however, those that enter and cause damage at KPSFS are not numerous. Rodents cause damage to structures and fixtures within buildings at KPSFS in their search for food, nesting materials or sites, warmth, or shelter. They can gain entry through small openings, but they often enlarge these openings to suit their needs. They also use materials found within human dwellings, such as insulation for nesting material, and gnaw on loose or

obstructive objects, such as electrical wiring or the outside corners of structures, in an effort to make their surroundings more suitable to themselves. The odors from their feces and urine also can be damaging to the value of the structures. Pest management at KPSFS includes control of these animals to prevent serious structural damage.

Control of Potential Disease Vectors or Animals of Other Medical Importance

The control of potential disease vectors or animals of other medical importance is important for the protection of human life and well-being. Animals that carry diseases or can cause other medical problems are attracted to human dwellings in search of food and shelter or egg-laying sites. They also might be transported to human dwellings by people themselves or by other animals. Transmission of disease to humans is passive, and non-disease medical problems (e.g., bites and stings) are the result of an animal's need for food or self-protection.

Flies are attracted to human dwellings by odors in their search for food and organic materials on which to lay eggs. Cockroaches establish themselves in human dwellings in search of food and shelter. Fleas are transported to human dwellings by other animals and might establish themselves in carpeting or furniture if a continuing source of food (i.e., blood) is available. Birds might seek nesting sites in protected locations on the outside of buildings and occasionally in protected locations inside buildings. Their nests can harbor disease-carrying organisms. All of these types of animals, although they themselves are not harmful to humans, can potentially transmit diseases to humans. Their establishment in human dwellings or in close proximity to humans must, therefore, be prevented or controlled to the extent that the likelihood of disease transmission is very small.

Rodents can carry diseases internally and pass them to humans through bites that might occur if the animals are disturbed or threatened. Rodent nests and rodent feces also can harbor other disease-carrying organisms or disease vectors.

Bees and wasps that nest on or near human dwellings will sting or bite humans when disturbed or threatened. Generally, these injuries are only painful and do not cause long-term problems, although some individuals might be sensitive to stings of certain insects, and bites of poisonous snakes can be dangerous.

Control of Undesirable Nuisance Animals (including insects)

Animals that are nuisances when in human dwellings are controlled to make the dwellings more enjoyable to inhabit, but these animals generally do not pose any real threat to humans. Spiders, ants, earwigs, crickets, stray bees, wasps, or hornets that gain entry to dwellings can be nuisances. Moths or beetles might create a nuisance if they establish themselves in stored food products, and some species can damage fabrics. Birds that nest on dwellings or that search for food in the materials of dwellings are sometimes a nuisance. Stray dogs and cats can become nuisances if they become accustomed to the presence of humans or to finding food near human dwellings, cause damage to grounds around dwellings, or gain entrance to dwellings.

Some animals mostly constitute a nuisance but have the potential to cause other problems, such as structural damage or the spread of disease. These animals include cockroaches, flies, fleas, some ants, and rodents. The problems associated with these animals are discussed elsewhere in this section.

Most animals that are no more than nuisances only need to be controlled when their presence is substantial enough that they affect morale or the comfort of dwellings or they present a potential danger to installation personnel. Their presence might be seasonal and they can generally be controlled on a case-by-case basis. A plan for their control is generally not necessary.

Prevention of Damage to Natural Resources

Wetlands, birds, mammals, amphibians, reptiles, and insects can be negatively affected by pesticide use. For example, neotropical migratory birds, which pass through KPSFS, feed primarily on insects and fish. Pesticides that are sprayed to kill insects can accumulate in the tissues of higher mammals that eat the insects and fish. This process is called bioaccumulation and can eventually lead to the death of the bioaccumulator. For this reason, nonchemical means of control for insects should be used if possible. The guidelines for pest management operations are provided below:

- Use mechanical or biological control methods whenever feasible and economical. Only apply pesticides when no biological or mechanical control method can be found, or such controls are prohibitively expensive.
- By law, all pesticides must be applied according to label specifications. Never exceed the manufacturer's recommended dosage for pesticides, apply only to the target pests identified on the label, wear required safety clothing, and apply the lowest labeled pesticide rate that adequately controls pests. Lower rates reduce the total amount of chemical in the environment. Rotate pesticides among chemical families to minimize pest resistance. IPM does not rely on continuous use of a single pesticide or pesticide family.
- Apply all chemicals according to manufacturer's instructions and away from drainages.
- Only certified pesticide applicators are authorized to purchase and spray pesticides. All applicators must become certified and should remain current in new developments in pest management.
- Use rapidly degrading pesticides, which are less likely to contaminate soil and groundwater.
- Pesticides should be applied at a time when they will be most effective against the pest. Pest cycles are influenced by temperature and moisture conditions. In many cases, pests under dormant or stressed conditions might not be susceptible to pesticide treatments. Avoid pesticide applications during adverse weather, especially windy, wet conditions. Do not apply volatile chemicals under high-temperature conditions.
- Keeping accurate records of all agricultural chemicals applied on the site will help KPSFS make informed management decisions. By law, records of all restricted use pesticides must be maintained by operators for at least 2 years. Records of non-restricted chemicals can be maintained on the same form as the required records with minimal additional effort. This information has further value for use with crop and pest modeling programs and economic analyses.
- No pesticides are applied directly to sensitive areas (e.g., critical habitat to endangered, threatened, or rare flora or fauna species; unique geological and other natural features; wetlands; ponds; standing water' or other water areas) unless use in such an area is specifically approved on the label.

Concern—Pest management objectives at KPSFS include the protection of real estate, control of potential disease vectors, control of undesirable or nuisance plants and animals (including insects), and prevention of damage to natural resources.

Objective—The IPM will continue to be implemented on the Installation.

Actions

1. Continue to implement the Invasive Species Management Plan.
2. Implement actions to prevent the destruction of the structures by pests at KPSFS, such as the following.
    a. Prevent the entry of pests into buildings by closing holes, cracks, and crevices.
    b. Apply tracking powder or other poisons to eliminate rodents that have established

themselves in building interiors.
c. Capture burrowing mammals that pose a threat to building or infrastructure integrity for release or euthanasia. Any pest mammals captured are considered feral or invasive, and should be destroyed or euthanized.

3. Implement management measures to control pests posing a potential threat to human health to include the following.
   a. Ensure proper sanitation and housekeeping to remove any food sources that might be attractive to interior pests (e.g., cockroaches, ants, flies).
   b. Practice proper personal hygiene, wear proper clothing, and wear repellants to reduce or eliminate problems associated with sucking insects (fleas, ticks, and mosquitoes).
   c. Remove the excrement of bats and birds from underneath their roosts to prevent the growth of harmful bacteria.
   d. Eliminate artificial breeding and larval habitat for flies and mosquitoes.
   e. Destroy the nests of bees and wasps where their locations present a hazard to people.
   f. Apply insecticides for the control of ticks, mosquitoes, and ants for large infestations.
4. General Management measures that should be used to control nuisance pests include the following.
   a. Capturing individual large animals (e.g., feral pigs) for removal, euthanasia, or re-introduction into the Game Management Area.
   b. Using snap traps and glue boards to trap rodents.
   c. Placing pesticide baits along the paths of ants and cockroaches.
5. Incremental updates to the plan will be conducted every 5 years to ensure that the plan reflects changes in pest populations and current management issues.
6. Management of wildlife and the effective elimination of concentrated and diseased populations will be fully implemented.
7. All soils, plants, and construction materials will be inspected for harmful pest species or propagules.

Monitoring Criteria—Monitor pest species populations. Track usage of active ingredients (e.g., pesticides and herbicides) and man-hours spent controlling pest species to ensure that the management strategies are efficient and sufficient. Each eradication measure used will be evaluated to determine its level of success.

### *7.8 Forest Management*

*Applicability Statement*

This section applies to USAF installations that maintain forested land on USAF property. This section **IS NOT** applicable to this installation.

*Program Overview/Current Management Practices*

Not applicable.

### *7.9 Wildland Fire Management*

*Applicability Statement*

This section applies to USAF installations with unimproved lands that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool. This section **IS** applicable to this installation.

*Program Overview/Current Management Practices*

Wildland fire management goals are presented in Table 7-7.

Table 7-7. Summary of wildland fire management goals.

| Wildland Fire Management Goals |
| --- |
| • Maintain and enhance the grounds and habitats of KPSFS to support the military mission and sustain native species biodiversity.<br>• As wildfires are projected to increase over the next decades at KPSFS, prevent wildfires on the installation and respond effectively in instances of wildfires at the installation or nearby areas. |

According to AFMAN 32-7003, Section 3.80, all USAF installations with burnable acreage are required to develop and implement a WFMP. The purpose of the WFMP is to reduce wildfire potential, protect and enhance valuable infrastructure and natural resources, and implement ecosystem resiliency goals and objectives on properties managed by the USAF. The INRMP must be consistent with the WFMP. This section was written to be compatible with the most recent draft of the KPSFS WFMP (Tab 5), which was approved for commander signature in 2023.

Wildfire threatens KPSFS on an almost annual basis due to the prevalence of grass fuels throughout the installation. Approximately 141.3 acres of the installation is composed of burnable vegetation that could support large, fast-moving fires and present a threat to all KPSFS facilities, infrastructure, and personnel. An average of two to three wildfires occur in the vicinity of KPSFS each year, with a majority starting on the west coast of O'ahu, south of the installation. These fires are typically ignited by members of the public within or near the public beach recreation areas. However, recent wildfires that threatened KPSFS originated from the Makua Military Reservation training area to the south (Tab 5). It is typical for fires that start in this area to burn between 600-800 acres if they surpass initial containment efforts. Fires that originate on the northern coast of O'ahu are usually contained at 50–150 acres.
Wildfires have the potential to disrupt the KPSFS mission by restricting access to facilities that support the systems and hardware that are essential for the Defense Meteorological Satellite Program. Many of the primary access roads onto the installation are surrounded by grass fuels like cured guinea grass, which provide heavy, flashy fuels that create high-intensity fires. These fires can move rapidly up the ridge surrounding KPSFS. Wildfires in these areas could restrict access to the installation or create a situation where personnel, members of the public, or firefighters are at risk of becoming trapped. Wildfires also may cause the release of hazardous materials into the KPSFS environment if they were to spread to any of the storage areas on the installation, which includes two 500-gallon gas tanks. The release of these materials would likely negatively impact the quality of the surrounding air, soil, and water. Damage to KPSFS facilities would also result in significant financial losses, which would drain funds that are intended for use on other mission activities.

Wildfires also pose a direct threat to all installation assets, which includes structures, endemic species and ecosystems, T&E species, cultural and archaeological resources, and adjacent game management areas. The reduced cover of endemic species following a wildfire creates areas that invasive species can quickly spread to and permanently establish. Many of the invasive grass species on KPSFS can cure rapidly, which further increases the frequency and intensity of wildfires.

The environmental support staff at KPSFS are responsible for wildland fire management and the implementation of the objectives and actions described in the 2021 WFMP. KPSFS personnel are not required to maintain National Wildfire Coordinating Group fireline qualifications to engage in fire

suppression activities. A majority of the active grounds maintenance and fire management effort at the installation is directed towards providing 30-foot buffer zones around all structures and utilities to create defensible space and road access for firefighters (Tab 5).

Wildfires on KPSFS are primarily reported by the public, and the 911 operating system is used to dispatch the Honolulu Fire Department and notify the DOFAW. The Honolulu Fire Department's Waianae Fire Station provides the primary response for all wildfires and is given further support by the Federal Fire Department if necessary. During normal operating hours, reports can also be sent directly to the KPSFS Senior Contract Representative, who refers to the Emergency Management Checklist 006-1, which directs personnel to call 911. If necessary, KPSFS must support firefighting efforts that are conducted by federal, state, and local organizations. There are two water storage tanks on the installation that are used for initial, interagency responses to wildfires, and engine crews are directed to work from KPSFS roads to contain fires. When fires spread to steep or inaccessible slopes, helicopter water drops are initiated that use dip sites at the Makua Military Reservation and the ocean to collect more water. Wildland fire planning and implementation is also supported by the DOFAW's State Protection Forester, the O'ahu Protection Forester, the U.S. Army wildland fire program, the U.S. Forest Service, and the University of Hawai'i (Tab 5).

KPSFS does not currently conduct prescribed burns or have a prescribed burn plan. Prescribed burning is not recommended for invasive vegetation removal in the ISMP for KPSFS due to the small size of the installation and its ineffectiveness as a control for certain species (Tab 5).

The WFMP was developed to address the following concern through the listed Objective and Actions. Additional information on the management goals and actions included below can be found in the KPSFS WFMP (Tab 5).

Concern—Wildfires threaten the mission of KPSFS and the existing native vegetation at the installation.

Objective—Prevent wildfires on the installation and respond effectively in instances of wildfires at the installation or nearby areas.

Actions

1. Maintain firebreak clearances and control vegetation around all structures and utilities. A buffer of 30 feet should be maintained for buildings, structures, and vulnerable utilities, and a buffer of 50 feet should be used for fuel storage tanks and hazardous storage areas.
2. Develop and implement a WFMP and train personnel accordingly.
3. Support firefighting efforts conducted by Federal, state and city/county organizations.
4. Maintain the Mutual Aid Agreement for firefighting resources between the Federal Fire Department on O'ahu and the City and County of Honolulu.
5. Ensure that all water storage tanks and systems are properly filled and maintained to support interagency wildfire prevention, mitigation, and suppression activities. Also, pursue the development of an aboveground helicopter dip tank.
6. Continue to provide water to cattle in the nearby areas to reduce fuel use and support wildfire pre-suppression.
7. Avoid accidental ignitions at the installation by following safety requirements, including restrictions to outdoor activity when grass is curing or cured, as indicated by live herbaceous fuel moistures below 100%.
8. Include the dangers of wildland fires on future signs for visitors.

Concern—Wildfires present a threat to KPSFS and firefighter safety.

Objective—Ensure zero wildland fire-related serious injuries or deaths through effective fire management techniques and policies.

Actions

1. Continue road maintenance and improvements where necessary to ensure that access roads sustain their purpose.

The Hawai'i Wildfire Management Organization recommends the following actions for reducing the potential for wildland fires during high-risk activities.

1. Water any surrounding vegetation before beginning the activity, and re-water the area as needed.
2. Keep a fire extinguisher on-hand at all times.
3. If the activity has the potential to impair personnel vision (i.e. welding), ensure that a spotter is present to watch for potential ignitions.
4. Avoid construction on red flag days and ensure that excess vegetation is removed in the area surrounding the equipment and work area.

### *7.9.1 Climate Impacts on Wildland Fire Management*

Wildfires threaten KPSFS regularly. Increased temperatures and decreased rainfall across most months in all scenarios will likely increase the frequency of wildfires, though fire intensity is likely to remain roughly constant or possibly drop slightly due to changes in fuel loads and fuel bed characteristics.

Both the RCP 4.5 and 8.5 scenarios in 2030 project small increases in temperature, with maximum temperatures rising by only approximately two degrees F at most. By 2050, however, both the RCP 4.5 and 8.5 estimates include maximum temperature increases of roughly three to four degrees F in almost all months of the year.

It is the decrease in precipitation, however, that will increase the potential for fire activity. In all but the RCP 4.5 2050 scenario, decreased precipitation of 11 to 16 inches are projected, representing decreases of 20–28%. This will alter the fire regime by reducing the prevalence of guinea grass and drastically increasing the prevalence of fire-adapted drought tolerant species such as buffelgrass and possibly fountain grass (*Pennisetum setaceum*). Buffelgrass is already widespread within the installation and dominates the grass species at the bottom of the cliff where fires most often start.

With the decrease in precipitation and the change in species, the fuel load of live herbaceous material will be reduced. Guinea grass tends to retain a higher proportion of its biomass in a live herbaceous state (as opposed to curing or senescing its leaves) relative to buffelgrass or fountain grass. The replacement of guinea grass with bufflegrass and fountaingrass will therefore remove the fire dampening moisture contained in the guinea grass live herbaceous material from the system. Buffelgrass and fountaingrass produce fires that spread more rapidly than guinea grass fires, likely resulting in fires that grow to be larger and reach important resource in a shorter period of time, possibly before firefighting resources can arrive on scene. Fire intensity may be reduced marginally due to the lower fuel loads and the shorter stature of the new invasive grasses, but they can produce fires of sufficient intensity to overwhelm fire containment resources and do significant damage to all manner of resources at risk.

Fire frequency is likely to increase due to the decrease in precipitation as well, as fuels will spend more of the year in a cured state and will be moist from precipitation less of the time and therefore will be receptive to ignition sources a greater proportion of the time. This analysis does not include information about relative humidity which is a major factor controlling ignition probability.

The introduction of other nonnative species could mitigate, negate, or worsen these conclusions. For example, some portions of Oahu have been invaded by herbaceous plants that do not produce the fuel loads or the fuel characteristics that lead to active fire behavior. However, analogues for a drier climate exist on Oahu already, particularly southwestern Oahu near Nanakuli and Barbers Point. These areas experience frequent fires, including relatively large fires that grow rapidly, and it is reasonable to conclude that similar conditions will affect KPSFS given the climate projections.

### *7.10 Agricultural Outleasing*

*Applicability Statement*

This section applies to USAF installations that lease eligible USAF land for agricultural purposes. This section **IS NOT** applicable to this installation.

*Program Overview/Current Management Practices*

Not applicable.

### *7.11 Integrated Pest Management Program*

*Applicability Statement*

This section applies to USAF installations that perform pest management activities in support of natural resources management (e.g., invasive species, forest pests, etc.). This section **IS** applicable to this installation.

*Program Overview/Current Management Practices*

Invasive species management is a large part of pest management activities. The Federal Noxious Weed Act and EO 13112 requires Federal agencies to control noxious and invasive species on Federal lands. The Federal Noxious Weed Act, enacted 3 January 1975, established a federal program to control the introduction and spread of foreign noxious weeds into the U.S. Amendments in 1990 established management programs for undesirable plants (including noxious weeds) on federal lands. There are several plant species that are considered noxious and control is mandatory for those found on the Federal list. EO 13112 requires that federal agencies prevent the introduction of invasive species, detect and control populations of invasive species, and restore native species and habitat conditions in ecosystems that have been invaded. Invasive species are alien species (not native to the ecosystem) whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health. Table 7-8 presents the goals for the IPM Program.

Table 7-8. Summary of IPM goals.

| Integrated Pest Management Program Goals |
|---|

- Maintain and enhance the grounds and habitats of KPSFS to support the military mission and sustain native species biodiversity.
- Revegetate improved and semi-improved areas after invasive plant species control using native species that are/were present in this area and approved for introduction into the areas by the USFWS, DLNR, and/or biologist/botanist to increase preservation and enhancement of native species.
- Continue nonnative and invasive species eradication per the Invasive Species Management Plan (ISMP).
- Continue to implement the IPM, and revise and update it as necessary to reflect newly arrived pests, expanded or reduced populations, and improved control techniques as these become available.

The following concerns have been identified, and objectives and management actions designed to meet the habitat management goals in light of those concerns.

**IPM-1—Protection and Revegetation of Native Plant Species**

Concern—Koa-haole shrubland located along the leeward-facing slopes around the installation perimeter includes some native shrubs. More native species can be found near the west end of the installation. Due to the high level of invasive and nonnative species on the installation, native plant species are an important natural resource.

Objective—Protection and revegetation of the native species found in these areas would provide a potential opportunity for the preservation and enhancement of these species.

Actions

1. Focus invasive and nonnative plant species eradication projects in these areas of the installation.
2. Protect and plant native species such as alahe'e and ‘a’ali’i.

Monitoring Criteria—Continue to monitor invasive and nonnative plant species infestation levels in the koa-haole shrubland and on the west end of the installation.

**IPM-2—Revegetation of Barren Areas with a Diverse Range of Shrubs, Bushes, Grasses and Other Native Species**

Concern—Barren areas and the lack of native plant species contribute to soil erosion on the installation.

Objective—Revegetation of barren areas with a diverse range of shrubs, brushes and native grasses would provide a potential opportunity for the preservation and enhancement of these species and the reduction of soil erosion.

Actions

1. Plant barren areas with pili (*Heteropogon contortus*), kāwelu (*Eragrostis variabilis*), Javanese flatsedge or ‘ehu’awa (*Cyperus javanicus*), Pau o Hiiaka (*Jaquemontia ovalifolia* ssp *sandwicense*), wiliwili (*Erythrina sandvicensis*), olopua (*Nestegis sandwicensis*), pohinahina (*Vitex rotundifolia*), akia (*Wikstroemia uva-ursi*), ‘ilima, ‘a’ali’i and other native species.

Monitoring Criteria—Monitor the planted areas for invasive and nonnative plant species and native species survival.

**IPM-3—Continue Nonnative and Invasive Species Eradication per the Invasive Species Management Plan (ISMP)**

Concern—Nonnative and invasive species are endangering populations of native species and creating lower quality habitat available for wildlife.

Objective—Continue nonnative and invasive species eradication per the ISMP. Eradicate nonnative and invasive species utilizing methods that will cause the least disturbance of native species that might be present. Develop and adopt proactive management measures to control the proliferation of nonnative and invasive species.

Actions

1. Develop specific management actions for nonnative and invasive species identified in the ISMP.
2. Continue to monitor the spiny cactus treatment area for new growth and treat as necessary.
3. Do not purchase or use nonnative and invasive species in landscaping, or for land restoration or erosion-control projects.
4. For landscaping, use plants that are native to the local region as much as possible or those that are known to not be invasive, have a low score on the Hawai'i weed risk assessment, or are sterile. If they are installed as container plants, ensure that they are free of pests that could spread to nearby native plants.
5. Notify adjacent land managers of nonnative and invasive plant occurrences and offer to assist in nonnative and invasive plant removal projects.
6. To prevent damage to structures by termites, coordinate with Entomology to inspect all wooden/wood containing buildings during annual facility condition assessments for signs of damage to drywood and subterranean termites.
7. Promptly notify CE of infestation of pests such as mosquitos, flied, and fleas posing a potential threat to human health so it can be addressed by NAVFAC. Inform base staff of the no feeding of feral animals policy and use non-toxic pest management measures such as traps to reduce the impact to humans.

Monitoring Criteria—Continue to survey as necessary for new nonnative and invasive species and continue to implement the ISMP. Update plan as needed.

### *7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)*

*Applicability Statement*

This section applies to USAF installations that maintain a BASH program to prevent and reduce wildlife-related hazards to aircraft operations. This section **IS NOT** applicable to this installation.

*Program Overview/Current Management Practices*

Not applicable.

### *7.13 Coastal Zone and Marine Resources Management*

*Applicability Statement*

This section applies to USAF installations that are located along coasts and/or within coastal management zones. This section **IS NOT** applicable to this installation.

*Program Overview/Current Management Practices*

Not applicable.

### *7.14 Cultural Resources Protection*

*Applicability Statement*

This section applies to USAF installations that have cultural resources that may be impacted by natural resource management activities. This section IS applicable to this installation.

*Program Overview/Current Management Practices*

The ICRMP for KPSFS (in the process of review and approval at the time of this INRMP) is a five-year compliance and management document that provides guidelines and procedures for preserving and protecting cultural resources on the installation, pursuant to AFMAN 32-7003, *Environmental Conservation*, dated 20 April 2020.

The ICRMP provides the installation with information that will assist in planning, developing, and implementing a program for effective cultural resources management and it provides a foundation for coordinating and consulting with the Hawai'i State Historic Preservation Officer, the Advisory Council on Historic Preservation, and other groups in order to assess the importance of and afford adequate protection for historic properties on the installation. Cultural resources at and near KPSFS include 13 archaeological sites, one World War II-era concrete structure, four Cold War-era facilities, and possible cultural places/sacred sites.

Areas of cultural resources concern at KPSFS are discussed by resource identification and evaluation, activities that could affect cultural resources, cultural resources management coordination and training, GIS mapping and consultation with Native Hawaiians. The ICRMP also provides Standard Operating Procedures for activities that can be considered routine occurrences, makes recommendations to address the areas of cultural resources, and identifies cultural resources management projects to be carried out through the life span of the ICRMP in order to achieve the goals and objectives for KPSFS cultural resources management. Details of these cultural resources and management recommendations can be found in the 2016 ICRMP.

### *7.15 Public Outreach*

*Applicability Statement*

This section applies to all USAF installations that maintain an INRMP. The installation is required to implement this element.

*Program Overview/Current Management Practices*

Public access to the base is restricted because KPSFS is a closed installation, scheduled visitors are required to sign in at the main gate with photo identification. Developing outreach programs for military personnel and the general public is a high priority at KPSFS as long as such programs can be accomplished within military mission constraints.

## *7.16 Climate Change Vulnerabilities*

*Applicability Statement*

This section applies to USAF installations that have identified climate change risks, vulnerabilities, and adaptation strategies using authoritative region-specific climate science, climate projections, and existing tools. This section **IS** applicable to this installation.

*Program Overview/Current Management Practices*

The environments, infrastructure, and facilities at KPSFS are vulnerable to the projected increases in temperature and decreases in precipitation that occur under both carbon emission scenarios (RCP 4.5 and 8.5). Both scenarios project that the temperature experienced at KPSFS will increase from its current average of 76.1 °F to 79.5 °F by 2050. Additionally, the average yearly precipitation is projected to decrease from the current average of 55.8 inches to between 55.2 and 40.2 inches under RCP 4.5 and 8.5 respectively (CEMML 2019).

These changes have the potential to reduce vegetative cover and drastically alter the composition and distribution of the ecosystems present at KPSFS. Grass and shrubland species may experience these changes due to their sensitivity to increased stress on the already dry environments. Forest ecosystems are also generally vulnerable to increases in temperature, as it may surpass their temperature threshold and result in a progressive die-back that will continue even if the climate is stabilized. These alterations in the composition and distribution of the current cover types may result in the increased establishment of invasive species due to their adaptability and plasticity. Additionally, these changes could result in an overall loss of plant productivity when paired with drought, further reducing vegetation cover and endemic species fitness.

The effect that these changes will have on the mission will primarily be the progressive diversion of physical and financial resources into the surrounding environments and infrastructure. More specifically, the increasing prevalence of invasive species will require consistent mechanical and herbicidal treatments in order to mitigate their spread while promoting species that require less maintenance. Additionally, increased erosion could reduce the stability of Kuaokala Ridge, creating unsafe driving conditions on the main road and restricting access to KPSFS.

In addition to requiring consistent mitigation work, these changes will create the need for more proactive measures that can provide buffer time for plant and animal species to adapt to changing climatic conditions. This buffer time will help to avoid catastrophic declines that may happen when stochastic events occur on an already stressed ecosystem (Bierbaum et al. 2013). The proactive measures that may be needed on KPSFS are focused around drought and wildfire mitigation through measures including increased monitoring, the promotion of drought-resistant plants, and increased irrigation and water storage facilities.

## *7.17 Geographic Information Systems (GIS)*

*Applicability Statement*

This section applies to all USAF installations that maintain an INRMP, since all geospatial information must be maintained within the USAF GeoBase system. The installation is required to implement this element.

*Program Overview/Current Management Practices*

KPSFS currently has no GIS data for the installation. The use of a GIS is to manage and catalog information acquired in natural resources research. The GIS assists in planning by charting areas of environmental concern and providing a baseline for analyzing the potential impacts of any proposed natural resources management action. Managers can implement the capabilities of a GIS to watershed, wildlife, and various other natural resources management applications. The goals for establishing GIS management issues and actions are summarized in Table 7-9.

Table 7-9. Summary of GIS management goals.

| Geographic Information Systems Management Goals |
|---|
| • Support the mission of KPSFS and maintain healthy ecosystems by implementing the INRMP and providing a well-trained natural resources staff.<br>• Collaborate with installation GIS analysts to collect and maintain natural resources GIS data, maintain the GeoBase, and ensure staff have appropriate training to ensure the accuracy and relevance of data collection and manipulation. |

Concern—KPSFS has no GIS data for the installation.

Objective—Acquire a GIS and train Environmental Office Staff in ArcView methods to ensure the accuracy and relevance of data collection and manipulation. Develop and implement written standards and procedures for GIS administration, including managing metadata. Define how GIS should be used by KPSFS Environmental, Facilities, and Training staffs. Acquire necessary core database layers. Once acquired, develop GIS to allow for integrated presentation of management alternatives (all data will be in accordance with the Federal Geographic Data Committee guidelines [FGDC format]).

Action

1. Acquire a GIS and train Environmental Office Staff in ArcView methods to ensure the accuracy and relevance of data collection, and manipulation.
2. Develop and implement written standards and procedures for GIS administration, including managing metadata.
3. Define questions to be answered by GIS, comparisons that should be made, and what formats for GIS output are necessary for KPSFS staff.
4. Educate decision makers about the capabilities and limitations of the GIS.
5. Acquire necessary GIS layers.
6. Maintain and operate GIS database to provide current, site-specific information.
7. Develop an annual report that clearly states the condition and trends within KPSFS.

Monitoring Criteria—Ensure properly trained Environmental Office Staff are on hand to use and manage the GIS. Continue to input new layers as they become available.

# 8.0 MANAGEMENT GOALS AND OBJECTIVES

The installation establishes long-term, expansive goals and supporting objectives to manage and protect natural resources while supporting the military mission. Goals express a vision for a desired condition for the installation's natural resources and are the primary focal points for INRMP implementation. Objectives indicate a management initiative or strategy for specific long or medium range outcomes and are supported by projects. Projects are specific actions that can be accomplished within a single year or over the course of several years for phased or long-term projects. Also, in cases where off-installation land uses may jeopardize USSF missions, this section may list specific goals and objectives aimed at eliminating, reducing, or mitigating the effects of encroachment on military missions. These natural resources management goals for the future have been formulated by the preparers of the INRMP from an assessment of the natural resources, current condition of those resources, mission requirements, and management issues previously identified. Below are the integrated goals for the entire natural resources program.

The installation goals and objectives are displayed in the 'Installation Supplement' section below in a format that facilitates an integrated approach to natural resource management. By using this approach, measurable objectives can be used to assess the attainment of goals. Individual work tasks support INRMP objectives. The projects are key elements of the annual work plans and are programmed into the conservation budget, as applicable.

*Installation Supplement—Management Goals and Objectives*

**GOAL 1 SUPPORT THE MISSION OF KPSFS AND MAINTAIN HEALTHY ECOSYSTEMS BY IMPLEMENTING THE INRMP AND PROVIDING A WELL-TRAINED NATURAL RESOURCES STAFF**

OBJECTIVE 1.1 Maintain the INRMP in cooperation with USFWS, the DLNR DOFAW, and KPSFS.

PROJECT 1.1.1 Consult with USFWS and DOFAW as needed to maintain an INRMP that accommodates operational requirements while conserving regional ecosystem function and biodiversity.

PROJECT 1.1.2 After each five-year INRMP review, ensure that the goals and objectives of the approved INRMP are consistent with those of the KPSFS General Plan and other operational plans.

PROJECT 1.1.3 Facilitate integration of the approved INRMP into the installation's General Plan, and other operational plans as they are updated.

PROJECT 1.1.4 Develop generic Scope of Work and Individual Independent Government Cost Estimate for the rewrite of this INRMP and associated component plans.

PROJECT 1.1.5 Negotiate, award, and oversee the performance of the rewrite of this INRMP and associated component plans.

OBJECTIVE 1.2 Maintain an adequate level of qualified staff within Det 3, 21 SOPS/CE Natural Resources and ensure that staff have sufficient budget, training, and professional development opportunities.

PROJECT 1.2.1 On an annual basis, prepare the budget to implement the next fiscal year's actions including all high-priority projects and as many medium and low-priority projects as possible.

PROJECT 1.2.2 Investigate alternative sources for funding projects (e.g., cooperative agreements).

PROJECT 1.2.3 Annually refer to the eDASH Natural Resources Training Matrix and ensure all staff can access course material.

OBJECTIVE 1.3 Collaborate with installation GIS analysts to collect and maintain natural resources GIS data, maintain the GeoBase, and ensure staff have appropriate training to ensure the accuracy and relevance of data collection and manipulation.

PROJECT 1.3.1 Develop and implement written standards and procedures for GIS administration, including managing metadata and maintaining Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE). Define how GIS should be used by KPSFS Environmental, Facilities, and Training staffs. Acquire necessary core database layers. Once acquired, develop GIS to allow for integrated presentation of management alternatives (all data will be in accordance with the FGDC format.

PROJECT 1.3.2 Work with the USAF GeoBase team to digitize or transfer historical data into the SDSFIE standard format and train installation staff on accessing, using, and inputting new data to the system.

PROJECT 1.3.3 Define questions to be answered by GIS, comparisons that should be made, and what formats for GIS output are necessary for KPSFS staff.

PROJECT 1.3.4 Educate decision makers about the capabilities and limitations of the GIS.

PROJECT 1.3.5 Acquire necessary GIS layers, including digitizing historical data or converting old layers to SDSFIE standards.

PROJECT 1.3.6 Maintain and operate GIS database to provide current, site-specific information by auditing it yearly, determining data gaps, and programming for collection of missing data.

PROJECT 1.3.7 Develop an annual report using the GeoBase that clearly states the condition and trends in invasive and T&E species within and adjacent to KPSFS.

**GOAL 2 MAINTAIN AND ENHANCE THE GROUNDS AND HABITATS OF KPSFS TO SUPPORT THE MILITARY MISSION AND SUSTAIN NATIVE SPECIES BIODIVERSITY.**

OBJECTIVE 2.1 Evaluate ecosystem stressors that inhibit management, degrade habitat quality, or cause negative effect to sensitive species, and design a decision tree or matrix to facilitate making management decisions to reduce stressors.

PROJECT 2.1.1 Develop a tool that evaluates the stressors on ecosystem health.

PROJECT 2.1.2 Apply the tool or matrix developed in Project 2.1.1 in management decisions to reduce or eliminate ecosystem stressors.

OBJECTIVE 2.2 Revegetate improved and semi-improved areas after invasive plant species control using native species that are/were present in this area and approved

for introduction into the areas by the USFWS, DLNR, and/or biologist/botanist to increase preservation and enhancement of native species.

PROJECT 2.2.1 Focus invasive and nonnative plant species eradication projects in USSF property leased from the State of Hawai'i that is semi-improved/improved where the invasive species is encroaching on KPSFS facilities/infrastructure and impacting safety, security, and/or mission .

PROJECT 2.2.2 Plant native species such as alahe'e and 'a'ali'i.

OBJECTIVE 2.3 Continue nonnative and invasive species eradication per the Invasive Species Management Plan (ISMP).

PROJECT 2.3.1 Develop specific management actions for nonnative and invasive species identified in the ISMP.

PROJECT 2.3.2 Continue to monitor the hedge (spiny tree) cactus treatment area for new growth and treat as necessary.

PROJECT 2.3.3 Develop a Recommended Landscaping and Restoration Plant List for use in all revegetation efforts and increase awareness of the need to use native plant species for habitat benefit and to decrease maintenance".

PROJECT 2.3.4 If invasive or T&E surveys document new nonnative and invasive plant occurrences encroaching on the installation from adjacent properties, notify the adjacent landowner and offer to assist in nonnative and invasive plant removal projects.

PROJECT 2.3.5 Conduct invasive species surveys once every five years to support and monitor the progress of invasive species removal efforts.

OBJECTIVE 2.4 Avoid erosion and sediment transport following activities that disturb the vegetative cover or the soil surface, and revegetate barren areas with a diverse range of native, fire tolerant shrubs, brushes, grasses and to preserve and enhance these species and reduce soil erosion.

PROJECT 2.4.1 Plant barren areas along the transportation/utility easements, specifically along Road C toward the western half of the installation with heat tolerant and low-water native species such as pili, kāwelu, 'ehu'awa, 'ilima, and 'a'ali'i.

PROJECT 2.4.2 Develop and implement a revegetation plan, with interim mechanisms to stabilize the soil until vegetative cover has become established, to reclaim disturbed areas following land use conversion, timber harvest, and other disturbances.

PROJECT 2.4.3 Seed areas with native grass mix that are currently bare. Only native species, derived from local seed sources (if available) should be used for these purposes.

PROJECT 2.4.4 Monitor revegetation efforts for effectiveness and modify as needed.

OBJECTIVE 2.5 Continue to implement the IPM, and revise and update it as necessary to reflect newly arrived pests, expanded or reduced populations, and

improved control techniques as these become available.

PROJECT 2.5.1 Continue to implement the Invasive Species Management Plan.

PROJECT 2.5.2 To prevent damage to structures by termites at KPSFS, coordinate with Entomology to inspect all wooden/wood containing buildings during annual facility condition assessments for signs of damage by drywood and subterranean termites. Also inspect all off-site materials for pest species.

PROJECT 2.5.3 Promptly notify CE of infestations of pests such as mosquitos, flies, and fleas posing a potential threat to human health to be addressed by NAVFAC pests Inform base staff of the no feeding of feral animals policy and use non-toxic pest management measure such as traps to reduce the impacts to humans.

PROJECT 2.5.4 Update the IPM every five years to ensure that the plan reflects changes in pest populations and current management issues.

PROJECT 2.5.5 Develop a biosecurity plan to support invasive and pest species management efforts.

OBJECTIVE 2.6 Remain in compliance with USACE, USEPA, and State of Hawai'i's wetland regulations and continue the implementation of the SWMP to avoid, minimize, or mitigate impacts from erosion and protect local water quality.

PROJECT 2.6.1 Comply with the CWA, NEPA and other applicable EOs and regulations when planning and completing construction activities.

PROJECT 2.6.2 Identify, inventory, and map areas at high risk for erosion in order of priority (i.e., road banks, unvegetated areas). Gathered data should then be entered into the AutoCAD/Geographical Information System (GIS) database and monitored to identify any new erosion problems.

PROJECT 2.6.3 Consult with the Natural Resources Conservation Service (NRCS) on conservation practices and assistance with prioritizing problem areas.

PROJECT 2.6.4 Monitor revegetation efforts annually.

PROJECT 2.6.5 Establish monitoring for erosion base-wide as increasing temperatures and intensity of precipitation may increase rates of soil loss.

PROJECT 2.6.6 Implement the six control measures presented in the SWMP.

OBJECTIVE 2.7 As wildfires are projected to increase over the next decades at KPSFS, prevent wildfires on the installation and respond effectively in instances of wildfires at the installation or nearby areas.

PROJECT 2.7.1 Maintain firebreak clearances and control vegetation monthly around all structures and utilities.

PROJECT 2.7.2 Implement the WFMP and train personnel accordingly.

PROJECT 2.7.3 Support firefighting efforts conducted by Federal, state, and city/county organizations.

PROJECT 2.7.4 Maintain the Mutual Aid Agreement for firefighting resources between the Federal Fire Department on O'ahu and the City and County of Honolulu.

PROJECT 2.7.5 Ensure that all water storage tanks and systems are properly filled and maintained to support interagency wildfire prevention, mitigation, and suppression activities. Also, pursue the development of an aboveground helicopter dip tank.

PROJECT 2.7.6 Continue to provide water to cattle in the nearby areas to reduce fuel use and support wildfire pre-suppression.

PROJECT 2.7.7 Avoid accidental ignitions at the installation by following safety requirements, including restrictions to outdoor activity when grass is curing or cured, as indicated by live herbaceous fuel moisture below 100%.

PROJECT 2.7.8 Develop signs describing the dangers of wildland fires for visitors.

PROJECT 2.7.9 Continue road maintenance and improvements where necessary to ensure that access roads sustain their purpose.

**GOAL 3 PROTECT, RESTORE, AND MAINTAIN VIABLE POPULATIONS OF NATIVE SPECIES FOUND IN THE ECOSYSTEM, INCLUDING RARE AND T&E FLORA AND FAUNA, IAW ALL REGULATIONS AND ADHERING TO THE PRINCIPLES OF ECOSYSTEM MANAGEMENT.**

OBJECTIVE 3.1 Conduct surveys to assess, at a minimum, avian, mammalian, and invertebrate species and populations to establish baseline population levels and ranges and repeat these surveys on an annual basis or as needed based on the species' biology.

PROJECT 3.1.1 Conduct detailed survey protocols and establish timelines for their completion to ensure that KPSFS personnel maintain the most current data available concerning the resources they are managing.

PROJECT 3.1.2 Conduct a review of past survey data, incorporate this data into the GIS and compare current survey data to baselines to assess temporal trends in population and habitat conditions. Coordinate efforts with the USFWS, DOFAW, and other local experts.

PROJECT 3.1.3 Incorporate biological survey data into the INRMP as they are collected during annual reviews.

OBJECTIVE 3.2 Reduce predation on native species by predator species such as mongoose, feral cats, and dogs through coordination with DLNR.

PROJECT 3.2.1 Survey the perimeter fence yearly or more frequently as needed, and plan for yearly efforts to maintain the fence to prevent incursions of additional pest species.

PROJECT 3.2.2 Survey for predator and nonnative species activity and quantify the scale of damage or population levels for each species.

PROJECT 3.2.3 Continue to coordinate with the USFWS, the USDA-WS program, and the DOFAW for on-going control on the installation and adjacent lands.

OBJECTIVE 3.3 Ensure the installation's activities support the State of Hawai'i's Comprehensive Wildlife Conservation Strategy.

PROJECT 3.3.1 Periodically review the Comprehensive Wildlife Conservation Strategy. It is available online at http://dlnr.hawaii.gov/wildlife/cwcs/

PROJECT 3.3.2 Coordinate with DOFAW to insure management actions on the installation support the goals of the Comprehensive Wildlife Conservation Strategy.

OBJECTIVE 3.4 Update the biological inventory of T&E species for KPSFS to ensure compliance with federal and state regulations and effective management of T&E resources.

PROJECT 3.4.1 As part of the annual INRMP review, determine if new species have been listed in the vicinity of KPSFS as federally T&E species or state-protected species. If new species have been added that could occur, plan for a survey of the base to determine presence or usage of resources.

PROJECT 3.4.2 Conduct an updated survey of potentially occurring federally listed T&E species. Given the extent of the 1996 survey, this effort need not be extensive and should focus only on a reconnaissance of the potential habitats on the installation where newly listed species of concern might occur.

PROJECT 3.4.3 Incorporate findings into relevant planning documents and the INRMP as part of the annual review.

PROJECT 3.4.4 Conduct regular surveys to monitor the status of the ko'oko'olau population, develop a monitoring plan capable of tracking population trends, and use the data to develop specific management actions to benefit the species.

OBJECTIVE 3.5 Minimize mission impacts to ko'oko'olau and other native species found on KPSFS

PROJECT 3.5.1 Conduct a botanical survey for listed plant species when disturbance to unmodified areas is proposed to assess potential impacts.

PROJECT 3.5.2 Mark the boundary area around listed plants with flagging conducted by a surveyor. Buffer distances for various activities (similar to those described in https://www.fws.gov/media/plant-avoidance-and-minimization-measures-may-2023) should be established.

PROJECT 3.5.3 When activities are required within these buffer distances, USFWS consultation is required. Impacts can be reduced by placing temporary fencing or barriers as far from affected plants as practicable.

PROJECT 3.5.4 Inspect all personnel, equipment, and supplies that are brought into project sites for seeds, organic matter, or other contaminants to prevent the introduction of invasive or nonnative species

PROJECT 3.5.5 Provide maps and incorporate into project planning and/or brief installation personnel on the location of ko'oko'olau.

**GOAL 4 FOSTER COMMUNITY INVOLVEMENT WITHIN KPSFS AND WITH NEIGHBORING LANDOWNERS BY CONDUCTING OUTREACH AND MAINTAINING PUBLIC ACCESS WHEN IT DOES NOT CONFLICT WITH BASE SECURITY OR THE MISSION.**

OBJECTIVE 4.1 Promote discussion with KPSFS leadership, personnel and pertinent stakeholders about incorporating ecosystem management philosophy into natural resource planning and include education of KPSFS personnel in ecosystem management goals and objectives.

PROJECT 4.1.1 Include ecosystem management justification in direction provided by the environmental office on all land management projects.

PROJECT 4.1.2 Develop educational materials that describe ecosystem management, natural resources, and operational policies for use in training permanent and visiting units to ensure that maintenance and other personnel who work independently of environmental personnel are aware of and able to comply with ecosystem management principles.

PROJECT 4.1.3 Distribute educational materials on ecosystem management and the installation's commitment to it to personnel and visitors.

OBJECTIVE 4.2 Increase outreach, educational opportunities, and outdoor recreation on base by developing interpretive sites and incorporating recreational options into natural areas.

PROJECT 4.2.1 Establish a Watchable Wildlife bird and whale-watching site at the installation to increase recreation and education opportunities. Erect interpretive signs that include information on birds that commonly occur in the area, an explanation and diagrams of wind dynamics near coastal bluffs, and information on whale migration patterns and whale species that can be seen from the bluff, and native plant species that occur on the nearby rock outcroppings. Install a safety rail and a picnic table.

PROJECT 4.2.2 Evaluate the existing natural areas for development of recreational opportunities such as hiking, bird watching, photography, and nature appreciation.

OBJECTIVE 4.3 Ensure the public access protocol is compatible with KPSFS's mission, and incorporate the hunting regulations into base safety protocols for protection of hunters, personnel, and the public.

PROJECT 4.3.1 Evaluate the public access protocol for compatibility with the military mission and safety.

OBJECTIVE 4.4 Continue the successful relationship with adjacent landowners by coordinating with them as needed on issues of mutual interest such as invasive species and maintenance of fences.

PROJECT 4.4.1 Educate site personnel & visitors about the presence of invasive and nonnative plant species on the installation, the potential for them to spread to and from adjacent lands, and the legal requirements to control those species.

2993 PROJECT 4.4.2 Ensure grazing animals on the adjacent property do not enter the
2994 installation by surveying fencelines annually and reporting
2995 maintenance needs to the Rancher.
2996

# 9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

## *9.1 Natural Resources Management Staffing and Implementation*

The purpose of this section is to present a road map for the implementation of specific management actions to satisfy the goals and objectives for several natural resources subject areas. The tasks proposed for this INRMP are aggressive, and might not be accomplished within the established timelines due to a number of factors (e.g., budget and manpower constraints, wartime taskings); however, their importance to the proper management of the base's natural resources cannot be understated. Therefore, the management actions presented in the Annual Work Plans should be modified as part of the annual review of this INRMP by the INRMP Working Group to ensure that these taskings are continually emphasized and accomplished when practicable. Table 9-1 provides a brief summary of the estimated oversight required to accomplish the actions identified in Section 8.0 and incorporated in the Section 10.0 Annual Work Plans (i.e., to implement this INRMP).

Table 9-1. Estimated total oversight person hours of implementing INRMP.

| INRMP Funding Category | Oversight Estimated Person Hours |
|---|---|
| INRMP Review and Update | 240 |
| Ecosystem Management | 108 |
| Fish and Wildlife Management | 600 |
| Threatened and Endangered Species | 400 |
| Habitat Management | 560 |
| Wetlands and Floodplains | 24 |
| Watershed Protection | 160 |
| Grounds Maintenance | 360 |
| Outdoor Recreation and Public Access | 80 |
| Surrounding Land Use | 80 |
| Geographical Information System | 160 |
| **Total** | **2,772** |

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by the Sikes Act, and the associated NEPA analysis and documentation to be a high priority. The reality, however, is that not all of the projects and programs identified in this INRMP will receive immediate funding. As such, the actions identified in this INRMP (Section 8.0 and Section 10.0) have been placed into three priority categories based on guidance provided in AFMAN 32-7003 and AFI 32-7001 Environmental Budgeting. These three priority ranks or categories are briefly described as follows.

- Projects rated as High in the Annual Work Plan are essential for achieving INRMP goals and objectives in the year they are programmed. Sikes Act cooperating agencies would consider the INRMP to not be implemented if the project is not accomplished in the year programmed.

- Projects rated as Medium in the Annual Work Plan constitute actions that cooperating agencies agree to be important to achieve INRMP goals and objectives; but the projects may be deferred if not completed in programmed year.

- Projects rated as Low in the Annual Work Plan support INRMP goals and objectives and enhance the natural resources program, but cooperating agency partners would agree that the activity is not deemed essential to implement INRMP goals and objectives.

Funding sources are also identified in AFMAN 32-7003 and AFI 32-7001. While some of the actions described in this INRMP could potentially be funded under "Environmental Compliance" in addition to "Conservation Resources Management" (*sensu* AFI 32-7001) such as Legacy funds, the most probable funding sources for the majority of the actions are O&M Funds, and Reimbursable Conservation Program Funds (AFMAN 32-7003). While the above provides a brief summary of budget priorities and funding sources, it is the responsibility of the installation's CE and Environmental Staff to carefully examine and adhere to the entirety of the two referenced AFIs, and any subsequent supplements or revisions, in preparing each year's budget for implementation of the actions identified in this INRMP.

This INRMP reflects the commitment set forth by KPSFS to conserve, protect, and enhance the natural resources present on the installation. This INRMP is the final plan that will direct the natural resources management at KPSFS from FY 2021 through FY 2026. An ecosystem approach was used to develop the management measures for each resource area. Implementation of the management measures will maintain and conserve the ecological integrity of the base and the biological communities inhabiting the base. In addition, the natural resources management measures described in this INRMP will protect KPSFS ecosystems and their components from unacceptable damage or degradation.

Natural resources and land use management issues are not the only factors contributing to the development and implementation of the INRMP. Installation management and other seemingly unrelated issues affect the implementation of this INRMP. It is of utmost importance to the implementation of this INRMP that base personnel take "ownership" of the INRMP (i.e., individual or organizational responsibility to implement the INRMP), to provide the necessary resources (e.g., personnel and equipment), and to allocate the appropriate funding to enact the plan. It is extremely important that an INRMP Working Group be established to aid in the continued development of and commitment to the implementation of this INRMP. The INRMP Working Group shall be made up of the key base and host unit personnel, and will assume an oversight role to ensure the effective implementation of this Plan. Top- and middle-level management representation, as well as representation from several individuals with day-to-day on-base field experience, will provide the INRMP Working Group with the leadership and structure necessary for the successful implementation of this INRMP.

This INRMP is a "living" document that is based on several short-, medium-, and long-term planning goals. Short-range goals include activities that are planned to occur in 0 to 5 years, while medium-range goals include activities in a 6- to 10-year period. Long-range goals are usually scheduled beyond 10 years. A majority of the goals and objectives discussed in this INRMP are based on short-term natural resources management goals. Because an INRMP is a "living" document, goals can be revised over time to reflect evolving environmental conditions and mission demands. In addition, medium- and long-range planning goals could eventually become short-range activities that also require implementation.

Currently, KPSFS personnel are responsible for implementing programs at the installation other than the natural resources management responsibilities that will be necessary to implement this INRMP. Additional sources of temporary labor, such as seasonal employees (e.g., summer hires), could be utilized to augment current staff. Outside agency reimbursable hires and guardsman, reservists, or active-duty USAF personnel

assigned to KPSFS on temporary duty are another source of supplemental labor. Implementation of a number of projects discussed in this INRMP will require active outside assistance. The outside assistance might come from state and federal agencies, private consortiums and organizations, universities, and contractors. Using these resources is the most efficient and cost-effective method for acquiring expertise on a temporary basis. The INRMP Working Group should assess the level of additional resources necessary to fully implement this INRMP during the INRMP annual review process and determine the extent to which outside assistance will be required.

### *9.2 Monitoring INRMP Implementation*

The tasks identified in Chapter 10, Work Plans, will be reviewed annually for completion in each respective fiscal year. This exercise will be undertaken in conjunction with the annual review process with Sikes Act cooperators, namely the USFWS and Hawai'i Department of Land and Natural Resources (DLNR), DOFAW.

The Environmental Office must monitor the progress of natural resource projects to measure their success and recommend adjustments in management actions, if necessary, that increase progress toward achieving the goals and objectives outlined in this INRMP.

### *9.3 Annual INRMP Review and Update Requirements*

To ensure that this INRMP properly addresses all aspects of the natural and cultural resources present on the installation and proposes actions that are in accordance with USAF goals and objectives, this INRMP and all its components are subject to approval by the Installation Commander.

Similarly, all changes to be incorporated into this INRMP must be approved by the Installation Commander. This INRMP must also be approved by the USFWS and the DOFAW.

This INRMP is effective for 5 years from the date of approval; however, the Operational Component Plans must be updated annually during preparation of the KPSFS environmental budgets.

This INRMP should be reviewed annually to assess the suggested management practices in terms of their appropriateness for current conditions at the installation. In addition, the INRMP should be updated whenever there is a modification to the installation's mission, or when there is a substantial change to the installation's natural or cultural resources.

# 10.0 ANNUAL WORK PLANS

The INRMP Annual Work Plans are included in this section. These projects are listed by fiscal year, including the current year and four succeeding years. For each project and activity, a specific timeframe for implementation is provided (as applicable), as well as the appropriate funding source and priority for implementation. The work plans provide all the necessary information for building a budget within the USAF framework. Priorities are defined as follows.

- High— The INRMP signatories assert that if the project is not funded the INRMP is not being implemented and the USAF is non-compliant with the Sikes Act; or that it is specifically tied to an INRMP goal and objective and is part of a "Benefit of the Species" determination necessary for ESA Sec 4(a)(3)(B)(i) critical habitat exemption.
- Medium—Project supports a specific INRMP goal and objective and is deemed by INRMP signatories to be important for preventing non-compliance with a specific requirement within a natural resources law or by EO 13112, Exotic and Invasive Species. However, the INRMP signatories would not contend that the INRMP is not being implemented if not accomplished within the programmed year due to other priorities.
- Low—Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the installation mission, and/or supports long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| INRMP Review | 1 | 1.1 | 1.1.1 | Consult with USFWS and DOFAW as needed to maintain an INRMP that accommodates operational requirements while conserving regional ecosystem function and biodiversity. | | Every update | 23-24 |
| INRMP Review | 1 | 1.1 | 1.1.2 | After each five-year INRMP review, ensure that the goals and objectives of the approved INRMP are consistent with those of the KPSFS General Plan and other operational plans. | | Every 5-year update | 23-24 |
| INRMP Review | 1 | 1.1 | 1.1.3 | Facilitate integration of the approved INRMP into the installation's General Plan, and other operational plans as they are updated. | | Every update | 23-24 |
| INRMP Review | 1 | 1.1 | 1.1.4 | Develop generic Scope of Work and Individual Independent Government Cost Estimate for the rewrite of this INRMP and associated component plans. | | Every 5-year update | 23-24 |
| INRMP Review | 1 | 1.1 | 1.1.5 | Negotiate, award, and oversee the performance of the rewrite of this INRMP and associated component plans. | | Every 5-year update | 23-24 |
| INRMP Review | 1 | 1.2 | 1.2.1 | On an annual basis, prepare the budget to implement the next fiscal year's actions including all high-priority projects and as many medium and low-priority projects as possible. | | Annual | 23-24 |
| INRMP Review | 1 | 1.2 | 1.2.2 | Investigate alternative sources for funding projects (e.g., cooperative agreements). | | | |
| Training | 1 | 1.2 | 1.2.3 | Annually refer to the eDASH Natural Resources Training Matrix and ensure all staff can access course material. | | Annual | 23-24 |
| Training | 1 | 1.3 | 1.3.1 | Develop and implement written standards and procedures for GIS administration, including managing metadata and maintaining Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE). Define how GIS should be used by KPSFS Environmental, Facilities, and Training staffs. Acquire necessary core database layers. Once acquired, develop GIS to allow | | | |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| | | | | for integrated presentation of management alternatives (all data will be in accordance with the FGDC format. | | | |
| Training | 1 | 1.3 | 1.3.2 | Work with the USAF GeoBase team to digitize or transfer historical data into the SDSFIE standard format and train installation staff on accessing, using, and inputting new data to the system. | | | |
| GIS | 1 | 1.3 | 1.3.3 | Define questions to be answered by GIS, comparisons that should be made, and what formats for GIS output are necessary for KPSFS staff. | | | |
| GIS | 1 | 1.3 | 1.3.4 | Educate decision makers about the capabilities and limitations of the GIS. | | | |
| GIS | 1 | 1.3 | 1.3.5 | Acquire necessary GIS layers, including digitizing historical data or converting old layers to SDSFIE standards. | | | |
| GIS | 1 | 1.3 | 1.3.6 | Maintain and operate GIS database to provide current, site-specific information by auditing it yearly, determining data gaps, and programming for collection of missing data. | | | |
| Invasive and Pest Species Mgmt; T&E Species Mgmt | 1 | 1.3 | 1.3.7 | Develop an annual report using the GeoBase that clearly states the condition and trends in invasive and T&E species within and adjacent to KPSFS. | | Annual | 23-24 |
| All | 2 | 2.1 | 2.1.1 | Develop a tool that evaluates the stressors on ecosystem health. | | | |
| All | 2 | 2.1 | 2.1.2 | Apply the tool or matrix developed in Project 2.1.1 in management decisions to reduce or eliminate ecosystem stressors. | | | |
| Invasive and Pest | 2 | 2.2 | 2.2.1 | Focus invasive and nonnative plant species eradication projects in USSF property leased from the State of Hawai'i that is semi-improved/improved where | | | |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| Species Mgmt | | | | the invasive species is encroaching on KPSFS facilities/infrastructure and impacting safety, security, and/or mission. | | | |
| Invasive and Pest Species Mgmt | 2 | 2.2 | 2.2.2 | Plant native species such as alahe'e and ‘a’ali’i ('a'ali'i). | | | |
| Invasive and Pest Species Mgmt | 2 | 2.3 | 2.3.1 | Develop specific management actions for nonnative and invasive species identified in the ISMP. | | | |
| Invasive and Pest Species Mgmt | 2 | 2.3 | 2.3.2 | Continue to monitor the hedge (spiny tree) cactus treatment area for new growth and treat as necessary. | | | |
| Restoration; Invasive and Pest Species Mgmt | 2 | 2.3 | 2.3.3 | Develop a Recommended Landscaping and Restoration Plant List for use in all revegetation efforts and increase awareness of the need to use native plant species for habitat benefit and to decrease maintenance”. | | | |
| Restoration; Invasive and Pest Species Mgmt | 2 | 2.3 | 2.3.4 | If invasive or T&E surveys document new nonnative and invasive plant occurrences encroaching on the installation from adjacent properties, notify the adjacent landowner and offer to assist in nonnative and invasive plant removal projects. | | | |
| Restoration; Invasive | 2 | 2.3 | 2.3.5 | Conduct invasive species surveys once every five years to support and monitor the progress of invasive species removal efforts. | | Every 5 years | 26-27 |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| and Pest Species Mgmt | | | | | | | |
| Restoration | 2 | 2.4 | 2.4.1 | Plant barren areas along the transportation/utility easements, specifically along Road C toward the western half of the installation with heat tolerant and low-water native species such as pili, kāwelu, ‘ehu’awa, ‘ilima, and ‘a’ali’i. | | | |
| Restoration | 2 | 2.4 | 2.4.2 | Develop and implement a revegetation plan, with interim mechanisms to stabilize the soil until vegetative cover has become established, to reclaim disturbed areas following land use conversion, timber harvest, and other disturbances. | | | |
| Restoration | 2 | 2.4 | 2.4.3 | Seed areas with native grass mix that are currently bare. Only native species, derived from local seed sources (if available) should be used for these purposes. | | | |
| Restoration | 2 | 2.4 | 2.4.4 | Monitor revegetation efforts for effectiveness and modify as needed. | | | |
| Invasive and Pest Species Mgmt | 2 | 2.5 | 2.5.1 | Continue to implement the Invasive Species Management Plan. | | | |
| Invasive and Pest Species Mgmt | 2 | 2.5 | 2.5.2 | To prevent damage to structures by termites at KPSFS, coordinate with Entomology to inspect all wooden/wood containing buildings during annual facility condition assessments for signs of damage by drywood and subterranean termites. | | | |
| Invasive and Pest Species Mgmt | 2 | 2.5 | 2.5.3 | Promptly notify CE of infestations of pests such as mosquitos, flies, and fleas posing a potential threat to human health to be addressed by NAVFAC pests Inform base staff of the no feeding of feral animals policy and use non-toxic pest management measure such as traps to reduce the impacts to humans. | | As needed | 23-24 |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| Invasive and Pest Species Mgmt | 2 | 2.5 | 2.5.4 | Update the ISMP every five years to ensure that the plan reflects changes in pest populations and current management issues. | | Every 5 years | 25-26 |
| Invasive and Pest Species Mgmt | 2 | 2.5 | 2.5.5 | Develop a biosecurity plan to support invasive and pest species management efforts. | | | |
| Wetlands Mgmt | 2 | 2.6 | 2.6.1 | Comply with the CWA, NEPA and other applicable EOs and regulations when planning and completing construction activities. | | | |
| Restoration | 2 | 2.6 | 2.6.2 | Identify, inventory, and map areas at high risk for erosion in order of priority (i.e., road banks, unvegetated areas). Gathered data should then be entered into the AutoCAD/Geographical Information System (GIS) database and monitored to identify any new erosion problems. | | | |
| Restoration | 2 | 2.6 | 2.6.3 | Consult with the Natural Resources Conservation Service (NRCS) on conservation practices and assistance with prioritizing problem areas. | | | |
| Restoration | 2 | 2.6 | 2.6.4 | Monitor revegetation efforts annually. | | Annual | 23-24 |
| Restoration | 2 | 2.6 | 2.6.5 | Establish monitoring for erosion base-wide as increasing temperatures and intensity of precipitation may increase rates of soil loss. | | | |
| Stormwater Mgmt | 2 | 2.6 | 2.6.6 | Implement the six control measures presented in the SWMP. | | | |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.1 | Maintain firebreak clearances and control vegetation monthly around all structures and utilities. | | | |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| Wildland Fire Mgmt; Training | 2 | 2.7 | 2.7.2 | Implement the WFMP and train personnel accordingly. | | As needed | 23-24 |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.3 | Support firefighting efforts conducted by Federal, state, and city/county organizations. | | As needed | 23-24 |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.4 | Maintain the Mutual Aid Agreement for firefighting resources between the Federal Fire Department on O'ahu and the City and County of Honolulu. | | As needed | 23-24 |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.5 | Ensure that all water storage tanks and systems are properly filled and maintained to support interagency wildfire prevention, mitigation, and suppression activities. Also, pursue the development of an aboveground helicopter dip tank. | | As needed | 23-24 |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.6 | Continue to provide water to cattle in the nearby areas to reduce fuel use and support wildfire pre-suppression. | | As needed | 23-24 |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.7 | Avoid accidental ignitions at the installation by following safety requirements, including restrictions to outdoor activity when grass is curing or cured, as indicated by live herbaceous fuel moisture below 100%. | | As needed | 23-24 |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.8 | Develop signs describing the dangers of wildland fires for visitors. | | | |
| Wildland Fire Mgmt | 2 | 2.7 | 2.7.9 | Continue road maintenance and improvements where necessary to ensure that access roads sustain their purpose. | | As needed | 23-24 |
| Training | 3 | 3.1 | 3.1.1 | Conduct detailed survey protocols and establish timelines for their completion to ensure that KPSFS personnel maintain the most current data available concerning the resources they are managing. | | | |
| GIS | 3 | 3.1 | 3.1.2 | Conduct a review of past survey data, incorporate this data into the GIS and compare current survey data to baselines to assess temporal trends in population | | | |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| | | | | and habitat conditions. Coordinate efforts with the USFWS, DOFAW, and other local experts. | | | |
| All | 3 | 3.1 | 3.1.3 | Incorporate biological survey data into the INRMP as they are collected during annual reviews. | | | |
| Invasive and Pest Species Mgmt | 3 | 3.2 | 3.2.1 | Survey the perimeter fence yearly or more frequently as needed, and plan for yearly efforts to maintain the fence to prevent incursions of additional pest species. | | Annual, as needed | 23-24 |
| Invasive and Pest Species Mgmt | 3 | 3.2 | 3.2.2 | Survey for predator and nonnative species activity and quantify the scale of damage or population levels for each species. | | | |
| Invasive and Pest Species Mgmt | 3 | 3.2 | 3.2.3 | Continue to coordinate with the USFWS, the USDA-WS program, and the DOFAW for on-going control on the installation and adjacent lands. | | | |
| All | 3 | 3.3 | 3.3.1 | Periodically review the Comprehensive Wildlife Conservation Strategy. It is available online at http://dlnr.hawaii.gov/wildlife/cwcs/ | | | |
| All | 3 | 3.3 | 3.3.2 | Coordinate with DOFAW to insure management actions on the installation support the goals of the Comprehensive Wildlife Conservation Strategy. | | | |
| T&E Species Mgmt | 3 | 3.4 | 3.4.1 | As part of the annual INRMP review, determine if new species have been listed in the vicinity of KPSFS as federally threatened or endangered (T&E) species or state-protected species. If new species have been added that could occur, plan for a survey of the base to determine presence or usage of resources. | | Annual, as needed | 23-24 |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| T&E Species Mgmt | 3 | 3.4 | 3.4.2 | Conduct an updated survey of potentially occurring federally listed T&E species. Given the extent of the 1996 survey, this effort need not be extensive and should focus only on a reconnaissance of the potential habitats on the installation where newly listed species of concern might occur. | | | |
| T&E Species Mgmt | 3 | 3.4 | 3.4.3 | Incorporate findings into relevant planning documents and the INRMP as part of the annual review. | | | |
| T&E Species Mgmt | 3 | 3.4 | 3.4.4 | Conduct regular surveys to monitor the status of the ko'oko'olau population, develop a monitoring plan capable of tracking population trends, and use the data to develop specific management actions to benefit the species. | | As needed | 23-24 |
| T&E Species Mgmt | 3 | 3.5 | 3.5.1 | Conduct a botanical survey for listed plant species when disturbance to unmodified areas is proposed to assess potential impacts. | | | |
| T&E Species Mgmt | 3 | 3.5 | 3.5.2 | Mark the boundary area around listed plants with flagging conducted by a surveyor. Buffer distances for various activities (similar to those described in https://www.fws.gov/media/plant-avoidance-and-minimization-measures-may-2023) should be established. | | | |
| T&E Species Mgmt | 3 | 3.5 | 3.5.3 | When activities are required within these buffer distances, USFWS consultation is required. Impacts can be reduced by placing temporary fencing or barriers as far from affected plants as practicable. | | As needed | 23-24 |
| T&E Species Mgmt | 3 | 3.5 | 3.5.4 | Inspect all personnel, equipment, and supplies that are brought into project sites for seeds, organic matter, or other contaminants to prevent the introduction of invasive or nonnative species. | | | |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| T&E Species Mgmt | 3 | 3.5 | 3.5.5 | Provide maps and incorporate into project planning and/or brief installation personnel on the location of ko'oko'olau. | | | |
| All | 4 | 4.1 | 4.1.1 | Include ecosystem management justification in direction provided by the environmental office on all land management projects. | | | |
| Outreach | 4 | 4.1 | 4.1.2 | Develop educational materials that describe ecosystem management, natural resources, and operational policies for use in training permanent and visiting units to ensure that maintenance and other personnel who work independently of environmental personnel are aware of and able to comply with ecosystem management principles. | | | |
| Outreach | 4 | 4.1 | 4.1.3 | Distribute educational materials on ecosystem management and the installation's commitment to it to personnel and visitors. | | | |
| Outreach | 4 | 4.2 | 4.2.1 | Establish a Watchable Wildlife bird and whale-watching site at the installation to increase recreation and education opportunities. Erect interpretive signs that include information on birds that commonly occur in the area, an explanation and diagrams of wind dynamics near coastal bluffs, and information on whale migration patterns and whale species that can be seen from the bluff, and native plant species that occur on the nearby rock outcroppings. Install a safety rail and a picnic table. | | | |
| Outreach | 4 | 4.2 | 4.2.2 | Evaluate the existing natural areas for development of recreational opportunities such as hiking, bird watching, photography, and nature appreciation. | | | |
| Outreach | 4 | 4.3 | 4.3.1 | Evaluate the public access protocol for compatibility with the military mission and safety. | | | |

Table 10-1. Annual Work Plans for 2022–2026.

| Resource Category | Goal | Objective | Project Number | Description | Priority | Occurrence | FY |
|---|---|---|---|---|---|---|---|
| Outreach | 4 | 4.4 | 4.4.1 | Educate site personnel & visitors about the presence of invasive and nonnative plant species on the installation, the potential for them to spread to and from adjacent lands, and the legal requirements to control those species. | | | |
| All | 4 | 4.4 | 4.4.2 | Ensure grazing animals on the adjacent property do not enter the installation by surveying fencelines annually and reporting maintenance needs to the Rancher. | | | |

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Table 10-2. Natural resources standard titles by PB28 Code (excluding CZT/CZC titles).

| INRP | MMA | T&E | MNRA | WTLD |
|---|---|---|---|---|
| P&F, CN | Mgt, Species | Mgt, Habitat[1] | Compliance Public Notification | Mgt, Wetlands/FloodPlains |
| Interagency/Intraagency, Government, Sikes Act | Interagency/Intraagency, Government, Sikes Act | Mgt, Species | Plan Update, Other | Monitor Wetlands |
| Interagency/Intraagency, Government, Sikes Act, Conservation Law Enforcement Officer (CLEO) | Outsourced Environmental Services, CN | Mgt, Invasive Species | Recordkeeping, Other | Interagency/Intraagency, Government, Sikes Act |
| Outsourced Environmental Services, CN | Supplies, CN | Mgt, Nuisance Wildlife | Outreach | Outsourced Environmental Services, CN |
| Supplies, CN | Supplies, CN, CLEO | Interagency/Intraagency, Government, Sikes Act | | |
| Supplies, CN, CLEO | Vehicle Leasing, CN | Interagency/Intraagency, Government, Sikes Act, CLEO | | |

Table 10-2. Natural resources standard titles by PB28 Code (excluding CZT/CZC titles).

| INRP | MMA | T&E | MNRA | WTLD |
|---|---|---|---|---|
| Equipment Purchase/Maintain, CN | | Outsourced Environmental Services, CN | | |
| Vehicle Leasing, CN | | Supplies, CN | | |
| Vehicle Fuel & Maintenance, CN | | Supplies, CN, CLEO | | |
| Mgt, Wildland Fire | | Equipment Purchase/Maintain, CN | | |
| Plan Update, INRMP | | Vehicle Leasing, CN | | |
| Plan Update, Other | | Vehicle Fuel & Maintenance, CN | | |
| Mgt, Habitat | | Plan Update, Other | | |
| Mgt, Species | | Environmental Services, CN | | |
| Mgt, Invasive Species | | | | |
| Mgt, Nuisance Wildlife | | | | |
| Recordkeeping, Other | | | | |
| Environmental Services, CN | | | | |

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# 11.0 REFERENCES

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- Sikes Act
- eDASH Natural Resources Program Page
- Natural Resources Playbook
- DoDI 4715.03, *Natural Resources Conservation Program*
- AFI 32-1015, *Integrated Installation Planning*
- AFI 32-10112, *Installation Geospatial Information and Services (IGI&S)*

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# 12.0 ACRONYMS

## *12.1 Standard Acronyms (Applicable to all installations)*

- eDASH Acronym Library
- Natural Resources Playbook—Acronym Section
- U.S. EPA Terms & Acronyms

## *12.2 Installation Acronyms*

| | |
|---|---|
| **°F** | Degrees Fahrenheit |
| **AECOS** | AECOS, Inc. (Environmental Consultants) |
| **AFCEC** | Air Force Civil Engineer Center |
| **AFI** | Air Force Instruction |
| **AFMAN** | Air Force Manual |
| **AFPD** | Air Force Policy Directive |
| **AMSL** | Above mean sea level |
| **AOC** | Area of Concern |
| **AR** | Army Study Guide |
| **BASH** | Bird/Wildlife Aircraft Strike Hazard |
| **BMP** | Best Management Practices |
| **CC** | Commander |
| **CE** | Civil Engineer |
| **CECOS** | Naval Civil Engineer Corps Officers School |
| **CEMML** | Center for the Environmental Management of Military Lands |
| **CERCLA** | Comprehensive Environmental Response, Compensation, and Liability Act |
| **CFR** | Code of Federal Regulation |
| **CLEO** | Conservation Law Enforcement Officer |
| **CWA** | Clean Water Act |
| **CZ** | Environmental Directorate |
| **DEQPPM** | Defense Environmental Quality Program Policy Memorandum |
| **Det 3, 21 SOPS** | Detachment 3, 21st Space Operations Squadron |
| **DLNR** | Department of Land and Natural Resources |
| **DoD** | Department of Defense |
| **DoDI** | Department of Defense Instruction |
| **DOFAW** | Division of Forestry and Wildlife |
| **DOH** | Department of Health |
| **EE** | Ecological Economics |
| **EIAP** | Environmental Impact Analysis Process |
| **EMP** | Environmental Management Plan |
| **EMS** | Environmental Management System |
| **EO** | Executive Order |
| **ERP** | Environmental Restoration Program |
| **ESA** | Endangered Species Act |
| **FEMA** | Federal Emergency Management Agency |

| | |
|---|---|
| **FGDC** | Federal Geographic Data Committee |
| **FY** | Fiscal year |
| **GIS** | Geographic Information Systems |
| **GSU** | Geographically Separated Unit |
| **HAR** | Hawai'i Administrative Rule |
| **HM** | Hazardous Materials |
| **HOTDAYS** | Number of days per year over 90 °F |
| **IAW** | In accordance with law |
| **ICRMP** | Integrated Cultural Resource Management Plan |
| **INRMP** | Integrated Natural Resource Management Plan |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IPM** | Integrated Pest Management |
| **IRP** | Installation Restoration Program |
| **KPSFS** | Ka'ena Point Space Force Station (renamed 16 June 2021 from Ka'ena Point Satellite Tracking Station) |
| **MBTA** | Migratory Bird Treaty Act |
| **MS4** | Municipal Separate Storm Sewer System |
| **NAR** | Natural Area Reserve |
| **NAVFAC** | Navy Facilities Engineering Command (United States) |
| **NEPA** | National Environmental Policy Act |
| **NFRAP** | No Further Response Action Planned |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NPDES** | National Pollutant Discharge Elimination System |
| **NRCS** | Natural Resources Conservation Service |
| **NRHP** | National Register of Historic Places |
| **NRM** | Natural Resource Manager |
| **O&M** | Operations and Maintenance |
| **OPR** | Office of Primary Responsibility |
| **PA** | Public Affairs Office |
| **P.L.** | Public Law |
| **POC** | Point of Contact |
| **POL** | Petroleum, Oil, and Lubricants |
| **PRECIP** | Annual Average Precipitation |
| **RCP** | Representative Concentration Pathway |
| **SCN** | Satellite Control Network |
| **SDSFIE** | Spatial Data Standards for Facilities, Infrastructure, and Environment |
| **SWCA** | SWCA Environmental Consultants |
| **SWMP** | Storm Water Management Plan |
| **T&E** | Threatened and Endangered Species |
| **TAVE** | Annual Average Temperature |
| **TMAX** | Annual Average Maximum Temperature |
| **TMIN** | Annual Average Minimum Temperature |
| **U.S.** | United States |
| **USACE** | United States Army Corps of Engineers |

| | | |
|---|---|---|
| **USAF** | United States Air Force |
| **U.S.C.** | United States Code |
| **USDA** | United States Department of Agriculture |
| **USDA-WS** | United States Department of Agriculture (Animal and Plant Health Inspection Services)-Wildlife Services |
| **USEPA** | United States Environmental Protection Agency |
| **USFWS** | United States Fish and Wildlife Service |
| **USSF** | United States Space Force |
| **USGS** | United States Geological Survey |
| **UST** | Underground Storage Tank |
| **WFMP** | Wildland Fire Management Plan |
| **WRCC** | Western Regional Climate Center |

# 13.0 DEFINITIONS

## *13.1 Standard Definitions (Applicable to all USAF installations)*

- Natural Resources Playbook—Definitions Section

## *13.2 Installation Definitions*

- **Biological Diversity**—The variety of life forms, the ecological roles they perform, and the genetic variability they contain within any defined time and space.
- **Cooperative Agreement—**A written agreement between a USAF Installation and one or more outside agencies (federal, state, or local) that coordinates planning strategies. It is a vehicle for obtaining assistance in developing natural resources programs.
- **Critical Habitat—**Any air, land, or water area (excluding existing synthetic structures or settlements that are not necessary to the survival and recovery of a listed species) and constituents thereof that the USFWS has designated as essential to the survival and recovery of an endangered or threatened species or a distinct segment of its population.
- **Cropland—**Land primarily suitable for producing farm crops, including grain, hay, and truck crops.
- **Ecosystem Diversity—**The number, relative proportions, and interactions among communities within an ecosystem; landscape diversity can then be the composition of and interactions among ecosystems across a defined landscape.
- **Ecosystem Management—**An approach to natural resources management that focuses on the interrelationships of ecological processes linking soils, plants, animals, minerals, climate, water, and topography. Managers view such processes as a living system that affects and responds to human activity beyond traditional commodity and amenity uses. They also acknowledge the importance of ecosystem services such as water conservation, oxygen recharge, and nutrient recycling.
- **Endangered Species—**Any plant or animal listed or proposed for listing as threatened or endangered by the Federal government or state governments.
- **Exotic Species—**Any plant or animal not native to a region, state, or country. (This definition excludes certain game species that have become established, such as pheasants.)
- **Featured Species—**A fish or wildlife species whose habitat requires fish or wildlife management (including coordination, multiple-use planning, direct habitat improvements, and cooperative programs) on a unit of land or water. Also refers to a tree species that the forest management plan cites as having value for wood fiber production. The plan usually specifies one or more featured tree species along with one or more associated species to meet multiple-use management objectives.
- **Fish—**Fresh, and saltwater finfish.
- **Floodplains—**Lowland or flat areas adjoining inland and coastal waters, including flood-prone areas on offshore islands, that have a 1 percent or greater chance of flooding in any given year.
- **Game—**Any species of fish or wildlife for which state or federal laws and regulations prescribe seasons and bag or creel limits.
- **Habitat—**An area that provides the environmental elements of air, water, food, cover, and space necessary for a given species to survive and reproduce.
- **Highly Erodible Soils—**Soils that, because of their physical properties or slope, the NRCS identifies as being highly susceptible to wind or water erosion.
- **Improved Grounds—**Grounds on which personnel annually plan and perform intensive maintenance activities. These are developed areas of an installation that have lawns and landscape plantings that require intensive maintenance. They usually include the cantonment, parade ground, drill fields, athletic areas, golf courses (excluding roughs), cemeteries, and housing areas.

- **Land Diversity—**The composition of and interactions among ecosystems across a defined landscape.
- **Land Management Unit—**The smallest land management division that planners use in developing specific strategies to accomplish natural resources management goals. Land management units might correspond to grazing units on agricultural outleased land, stands or compartments on commercial forest lands, various types of improved grounds (for example, athletic fields, parks, yards in family housing, or landscaped areas around administrative buildings), or identifiable semi-improved grounds (for example, airfield areas, utility rights-of-way, or roadside areas).
- **Land-Use Regulation—**A document that prescribes the specific technical actions or land use and restrictions with which lessees, permittees, or contractors must comply. It derives from the grazing or cropland management plan and forms a part of all outleases, land use permits, and other contracts.
- **Multiple-Use—**The integrated, coordinated, and compatible use of various natural resources to derive the best benefit while perpetuating and protecting those resources.
- **Multiple-Use and Sustained Yield Management—**The care and use of natural resources so as to best serve the present and future needs of the U.S. and its people without impairing the productivity of the land and water.
- **Natural Resources Management Professional—**A person with a degree in the natural sciences who manages natural resources on a regular basis and receives periodic training to maintain proficiency in that job.
- **NO FUNDS Service Contract—**An agreement by which a party performs a land management service for a consideration other than funds. Such a contract exists, for example, when a party hired to establish, control, or remove vegetative cover or growth agrees to take payment for the service in the form of the growth that results.
- **Outdoor Interpretation—**Observing and explaining the history, development, and significance of our natural heritage and natural resources.
- **Outdoor Recreation Resources—**Land and water areas and associated natural resources that provide, or have the potential to provide, opportunities for outdoor recreation for current and future generations.
- **Parcours—**Physical fitness trails created for jogging and calisthenics. They are usually in wooded areas and are about 1.5–2 miles long. Numerous exercise stations along the route direct the participants through various exercises.
- **Procurement Contract—**An agreement by which the government agrees to pay a contractor to establish, control, or remove vegetative cover or growth for land management purposes. This contract may not extend beyond the period for which funding for the service is available.
- **Recreation Carrying Capacity—**The level of recreational use that an area can sustain without damage to the environment.
- **Rotation A**ge—The planned number of years between the regeneration of a forest stand and its final cutting at a specified stage of maturity.
- **SALES Service Contract—**An agreement by which the contractor pays the Government for crops, crop residue, or grazing privilege incidental to control or removal of vegetative growth for land management purposes. Sales contracts cover a period of one to five years.
- **Semi-Improved Grounds—**Grounds where personnel perform periodic maintenance primarily for operational and aesthetic reasons (such as erosion and dust control, bird control, and visual clear zones). These usually include grounds adjacent to runways, taxiways, and aprons; runway clear zones; lateral safety zones (AFR 86-14); rifle and pistol ranges; picnic areas; ammunition storage areas; antenna facilities; and golf course roughs.
- **Special Natural Area—**Areas on bases that contain natural resources that warrant special protection efforts. Special Natural Areas can include botanical areas, ecological reserves, geological areas, riparian zones, scenic areas, and zoological reserves. A Special Natural Area

designation in an INRMP is a temporary status that is applicable for the period covered by the INRMP, and can be rescinded by order of the Base or Wing Commander. Such areas will be reassessed if the military mission requirements of the base change, during any base realignment or closure action involving the property, or if the property becomes excess and requires disposal.

- **Species Diversity—**The number and proportion of species composing a natural community.
- **Stewardship—**The management of installation resources with the goal of maintaining or increasing the resource's value indefinitely into the future.
- **Threatened Species—**Those federally or state-listed species of flora and fauna that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range and that have been designated for special protection and management pursuant to the Endangered Species Act or state statues.
- **Unimproved Grounds—**Grounds not classified as improved or semi-improved and usually not mowed more than once a year. These include weapons ranges; forest lands; cropland and grazing lands; lakes, ponds, and wetlands; and areas in airfields beyond the safety zones.
- **Urban Forests—**Planted or remnant native tree species existing within urbanized areas such as parks, tree-lined residential streets, scattered tracts of undisturbed woodlands, and cantonment areas.
- **Urban Wildlife—**Wildlife that habitually live or periodically survive in an urban environment on improved or semi-improved grounds.
- **Watchable Wildlife Areas—**Areas identified under the Watchable Wildlife Program as suitable for passive recreational uses such as bird watching, nature study, and other non-consumptive uses of wildlife resources.
- **Wildlife-Carrying Capacity—**The maximum density of wildlife that a particular area or habitat can carry on a sustained basis without deterioration of the habitat.

# 14.0 APPENDICES

## *14.1 Standard Appendices*

### *14.1.1 Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.*

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.

| **Federal Public Laws and Executive Orders** | |
|---|---|
| National Defense Authorization Act of 1989, Public Law (P.L.) 101-189; Volunteer Partnership Cost-Share Program | Amends two Acts and establishes volunteer and partnership programs for natural and cultural resources management on DoD lands. |
| Defense Appropriations Act of 1991, P.L. 101-511; Legacy Resource Management Program | Establishes the "Legacy Resource Management Program" for natural and cultural resources. Program emphasis is on inventory and stewardship responsibilities of biological, geophysical, cultural, and historic resources on DoD lands, including restoration of degraded or altered habitats. |
| EO 11514, *Protection and Enhancement of Environmental Quality* | Federal agencies shall initiate measures needed to direct their policies, plans, and programs to meet national environmental goals. They shall monitor, evaluate, and control agency activities to protect and enhance the quality of the environment. |
| EO 11593, *Protection and Enhancement of the Cultural Environment* | All federal agencies are required to locate, identify, and record all cultural resources. Cultural resources include sites of archaeological, historical, or architectural significance. |
| EO 11987, *Exotic Organisms* | Agencies shall restrict the introduction of exotic species into the natural ecosystems on lands and waters which they administer. |
| EO 11988, *Floodplain Management* | Provides direction regarding actions of federal agencies in floodplains, and requires permits from state, territory and federal review agencies for any construction within a 100-year floodplain and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for acquiring, managing and disposing of federal lands and facilities. |
| EO 11989, *Off-Road vehicles on Public Lands* | Installations permitting off-road vehicles to designate and mark specific areas/trails to minimize damage and conflicts, publish information including maps, and monitor the effects of their use. Installations may close areas if adverse effects on natural, cultural, or historic resources are observed. |
| EO 11990, *Protection of Wetlands* | Requires federal agencies to avoid undertaking or providing assistance for new construction in wetlands unless there is no practicable alternative, and all practicable measures to minimize harm to wetlands have been implemented and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of federal lands and facilities; and (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, including but not limited to |

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.

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| | water and related land resources planning, regulating, and licensing activities. |
| EO 12088, *Federal Compliance with Pollution Control Standards* | This EO delegates responsibility to the head of each executive agency for ensuring all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the U.S. Environmental Protection Agency (USEPA) authority to conduct reviews and inspections to monitor federal facility compliance with pollution control standards. |
| EO 12898, *Environmental Justice* | This EO requires certain federal agencies, including the DoD, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations. |
| EO 13112, *Invasive Species* | To prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. |
| EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* | The USFWS has the responsibility to administer, oversee, and enforce the conservation provisions of the Migratory Bird Treaty Act, which includes responsibility for population management (e.g., monitoring), habitat protection (e.g., acquisition, enhancement, and modification), international coordination, and regulations development and enforcement. |
| **United States Code** | |
| Animal Damage Control Act (7 U.S.C. § 426-426b, 47 Stat. 1468) | Provides authority to the Secretary of Agriculture for investigation and control of mammalian predators, rodents, and birds. DoD installations may enter into cooperative agreements to conduct animal control projects. |
| Bald and Golden Eagle Protection Act of 1940, as amended; 16 U.S.C. 668-668c | This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act. |
| Clean Air Act, (42 U.S.C. § 7401– 7671q, July 14, 1955, as amended) | This Act, as amended, is known as the Clean Air Act of 1970. The amendments made in 1970 established the core of the clean air program. The primary objective is to establish federal standards for air pollutants. It is designed to improve air quality in areas of the country which do not meet federal standards and to prevent significant deterioration in areas where air quality exceeds those standards. |
| Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Superfund) (26 U.S.C. § 4611–4682, P.L. 96-510, 94 Stat. 2797), as amended | Authorizes and administers a program to assess damage, respond to releases of hazardous substances, fund cleanup, establish clean-up standards, assign liability, and other efforts to address environmental contaminants. Installation Restoration Program guides cleanups at DoD installations. |

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.

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| Endangered Species Act (ESA) of 1973, as amended; P.L. 93-205, 16 U.S.C. § 1531 *et seq.* | Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Under this law, no federal action is allowed to jeopardize the continued existence of an endangered or threatened species. The ESA requires consultation with the USFWS and the NOAA Fisheries (National Marine Fisheries Service) and the preparation of a biological evaluation or a biological assessment may be required when such species are present in an area affected by government activities. |
| Federal Aid in Wildlife Restoration Act of 1937 (16 U.S.C. § 669–669i; 50 Stat. 917) (Pittman-Robertson Act) | Provides federal aid to states and territories for management and restoration of wildlife. Fund derives from sports tax on arms and ammunition. Projects include acquisition of wildlife habitat, wildlife research surveys, development of access facilities, and hunter education. |
| Federal Environmental Pesticide Act of 1972 | Requires installations to ensure pesticides are used only in accordance with their label registrations and restricted-use pesticides are applied only by certified applicators. |
| Federal Land Use Policy and Management Act, 43 U.S.C. § 1701–1782 | Requires management of public lands to protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological resources and values; as well as to preserve and protect certain lands in their natural condition for fish and wildlife habitat. This Act also requires consideration of commodity production such as timbering. |
| Federal Noxious Weed Act of 1974, 7 U.S.C. § 2801–2814 | The Act provides for the control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health. |
| Federal Water Pollution Control Act (Clean Water Act [CWA]), 33 U.S.C. §1251–1387 | The CWA is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Primary authority for the implementation and enforcement rests with the USEPA. |
| Fish and Wildlife Conservation Act (16 U.S.C. § 2901–2911; 94 Stat. 1322, PL 96-366) | Installations encouraged to use their authority to conserve and promote conservation of nongame fish and wildlife in their habitats. |
| Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*) | Directs installations to consult with the USFWS, or state or territorial agencies to ascertain means to protect fish and wildlife resources related to actions resulting in the control or structural modification of any natural stream or body of water. Includes provisions for mitigation and reporting. |
| Lacey Act of 1900 (16 U.S.C. § 701, 702, 32 Stat. 187, 32 Stat. 285) | Prohibits the importation of wild animals or birds or parts thereof, taken, possessed, or exported in violation of the laws of the country or territory of origin. Provides enforcement and penalties for violation of wildlife related Acts or regulations. |
| Leases: Non-excess Property of Military Departments, 10 U.S.C. § 2667, as amended | Authorizes DoD to lease to commercial enterprises federal land not currently needed for public use. Covers agricultural outleasing program. |

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.

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| Migratory Bird Treaty Act 16 U.S.C. § 703–712 | The Act implements various treaties for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful without a valid permit. |
| National Environmental Policy Act of 1969, as amended; P.L. 91-190, 42 U.S.C. § 4321 *et seq.* | Requires federal agencies to utilize a systematic approach when assessing environmental impacts of government activities. Establishes the use of environmental impact statements. NEPA proposes an interdisciplinary approach in a decision-making process designed to identify unacceptable or unnecessary impacts on the environment. The Council of Environmental Quality (CEQ) created Regulations for Implementing the National Environmental Policy Act [40 CFR Parts 1500–1508], which provide regulations applicable to and binding on all federal agencies for implementing the procedural provisions of NEPA, as amended. |
| National Historic Preservation Act, 16 U.S.C. § 470 *et seq.* | Requires federal agencies to take account of the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). Provides for the nomination, identification (through listing on the NRHP), and protection of historical and cultural properties of significance. |
| National Trails Systems Act (16 U.S.C. § 1241–1249) | Provides for the establishment of recreation and scenic trails. |
| National Wildlife Refuge Acts | Provides for establishment of National Wildlife Refuges through purchase, land transfer, donation, cooperative agreements, and other means. |
| National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd–668ee) | Provides guidelines and instructions for the administration of Wildlife Refuges and other conservation areas. |
| Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001–13; 104 Stat. 3042), as amended | Established requirements for the treatment of Native American human remains and sacred or cultural objects found on federal lands. Includes requirements on inventory, and notification. |
| Rivers and Harbors Act of 1899 (33 U.S.C. § 401 *et seq.*) | Makes it unlawful for the USAF to conduct any work or activity in navigable waters of the U.S. without a federal permit. Installations should coordinate with the U.S. Army Corps of Engineers (USACE) to obtain permits for the discharge of refuse affecting navigable waters under NPDES and should coordinate with the USFWS to review effects on fish and wildlife of work and activities to be undertaken as permitted by the USACE. |
| Sale of certain interests in land, 10 U.S.C. § 2665 | Authorizes sale of forest products and reimbursement of the costs of management of forest resources. |
| Soil and Water Conservation Act (16 U.S.C. § 2001, P.L. 95-193) | Installations shall coordinate with the Secretary of Agriculture to appraise, on a continual basis, soil/water-related resources. Installations will develop and update a program for furthering the conservation, protection, and enhancement of these resources consistent with other federal and local programs. |

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.

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| Sikes Act (16 U.S.C. § 670a–670l, 74 Stat. 1052), as amended | Provides for the cooperation of DoD, the Departments of the Interior (USFWS), and the State Fish and Game Department in planning, developing, and maintaining fish and wildlife resources on a military installation. Requires development of an INRMP and public access to natural resources and allows collection of nominal hunting and fishing fees.<br>NOTE: AFMAN 32-7003 sec 3.11. INRMP Implementation. In accordance with DoDI 4715.03, use professionally trained natural resources management personnel with a degree in the natural sciences to develop and implement the installation INRMP. (T-0). 3.11.1. Outsourcing Natural Resources Management. As stipulated in the Sikes Act, the Office of Management and Budget Circular No. A-76, *Performance of Commercial Activities*, does not apply to the development, implementation and enforcement of INRMPs. Activities that require the exercise of discretion in making decisions regarding the management and disposition of government-owned natural resources are inherently governmental. When it is not practicable to utilize DoD personnel to perform inherently governmental natural resources management duties, obtain these services from federal agencies having responsibilities for the conservation and management of natural resources. (T-0). |
| **DoD Policy, Directives, and Instructions** | |
| DoD Instruction 4150.07 *DoD Pest Management Program* dated 29 May 2008 | Implements policy, assigns responsibilities, and prescribes procedures for the DoD Integrated Pest Management Program. |
| DoD Instruction 4715.1, *Environmental Security* | Establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This instruction also ensures environmental factors are integrated into DoD decision-making processes that could impact the environment, and are given appropriate consideration along with other relevant factors. |
| DoD Instruction (DoDI) 4715.03, *Natural Resources Conservation Program* | Implements policy, assigns responsibility, and prescribes procedures under DoDI 4715.1 for the integrated management of natural and cultural resources on property under DoD control. |
| OSD Policy Memorandum, 17 May 2005—*Implementation of Sikes Act Improvement Amendments: Supplemental Guidance Concerning Leased Lands* | Provides supplemental guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD. The guidance covers lands occupied by tenants or lessees or being used by others pursuant to a permit, license, right of way, or any other form of permission. INRMPs must address the resource management on all lands for which the subject installation has real property accountability, including leased lands. Installation commanders may require tenants to accept responsibility for performing appropriate natural resource management actions as a condition of their occupancy or use, but this does not preclude the requirement to address the natural resource management needs of these lands in the installation INRMP. |

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.

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| OSD Policy Memorandum, 1 November 2004— *Implementation of Sikes Act Improvement Act Amendments: Supplemental Guidance Concerning INRMP Reviews* | Emphasizes implementing and improving the overall INRMP coordination process. Provides policy on scope of INRMP review, and public comment on INRMP review. |
| OSD Policy Memorandum, 10 October 2002— *Implementation of Sikes Act Improvement Act: Updated Guidance* | Provides guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD and replaces the 21 September 1998 guidance Implementation of the Sikes Act Improvement Amendments. Emphasizes implementing and improving the overall INRMP coordination process and focuses on coordinating with stakeholders, reporting requirements and metrics, budgeting for INRMP projects, using the INRMP as a substitute for critical habitat designation, supporting military training and testing needs, and facilitating the INRMP review process. |
| **USAF Instructions and Directives** | |
| 32 CFR Part 989, as amended, and AFI 32-7061, Environmental Impact Analysis Process (EIAP) | Provides guidance and responsibilities in the EIAP for implementing INRMPs. Implementation of an INRMP constitutes a major federal action and therefore is subject to evaluation through an Environmental Assessment or an Environmental Impact Statement. |
| AFI 32-1015, *Integrated Installation Planning* | This publication establishes a comprehensive and integrated planning framework for development/redevelopment of Air Force installations. |
| AFMAN 32-7003, *Environmental Conservation* | Implements AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities;* DoDI 4715.03, *Natural Resources Conservation Program*; and DoDI 7310.5, *Accounting for Sale of Forest Products*. It explains how to manage natural resources on USAF property in compliance with federal, state, territorial, and local standards. This manual also implements AFPD 32-70 and DoDI 4710.1, *Archaeological and Historic Resources Management.* It explains how to manage cultural resources on USAF property in compliance with federal, state, territorial, and local standards. |
| AFI 32-10112 *Installation Geospatial Information and Services (IGI&S)* | This instruction implements Department of Defense Instruction (DoDI) 8130.01, Installation Geospatial Information and Services (IGI&S) by identifying the requirements to implement and maintain an Air Force Installation Geospatial Information and Services program and Air Force Policy Directive (AFPD) 32-10 Installations and Facilities. |
| AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities* | Outlines the USAF mission to achieve and maintain environmental quality on all USAF lands by cleaning up environmental damage resulting from past activities, meeting all environmental standards applicable to present operations, planning its future activities to minimize environmental impacts, managing responsibly the irreplaceable natural and cultural resources it holds in public trust and eliminating pollution from its activities wherever possible. AFPD 32-70 also establishes policies to carry out these objectives. |

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP.

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| Policy Memo for Implementation of Sikes Act Improvement Amendments, HQ USAF Environmental Office (USAF/ILEV) on 29 January 1999 | Outlines the USAF interpretation and explanation of the Sikes Act and Improvement Act of 1997. |

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3579 ***14.2 Installation Appendices***

3580 *14.2.1 Appendix B. KPSFS Natural Resources Revised Database*

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| DOCUMENT NAME | DATE | LOCATION |
|---|---|---|
| **Plans** | | |
| Erosion and Sedimentation Control Manual | Unknown | Unknown |
| Hazardous Waste Management Plan | August 2014 | Det 3, 21 SOPS CE, CEO, CEV, etc. |
| Installation Comprehensive Plan | In Progress | Det 3, 21 SOPS CE |
| Installation Master Plan - Utility Drawings | Unknown | Det 3, 21 SOPS CE |
| Integrated Cultural Resources Management Plan | January 2014 | Det 3, 21 SOPS CEV |
| Invasive Species Management Plan | Feb 2013 | Revision in progress, Det 3, 21 SOPS CEV |
| Jurisdictional Wetlands Evaluation and Assessment Report | NA | NA |
| Outdoor Recreation Plan | NA | NA |
| Resource Inventory Report | April 1996 | Det 3, 21 SOPS CEV |
| Storm Water Pollution Prevention Plan (Management Plan) | September 2013 | Det 3, 21 SOPS CEV |
| **AFIs / Federal Regulations** | | |
| AFMAN 32-1053; Integrated Pest Management | 6 August 2019 | |
| AFI 32-7060; Interagency and Intergovernmental Coordination for Environmental Planning | 25 March 1994 | |
| AFI 32-7061; Environmental Impact Analysis Process | 24 January 1995 | |
| AFI 32-7064; Integrated Natural Resources Management | 22 July 1994 | |
| AFMAN 32-7003; Environmental Conservation | 20 April 2020 | |
| AFM 32-7081; Forest Management Manual | 1 May 1998 | |

| DOCUMENT NAME | DATE | LOCATION |
|---|---|---|
| AFI 32-7084; ACUZ Program Manager's Guide | 1 March 1999 | |
| Clean Water Act (CWA); P.L. 95-217, as amended | 1977 | |
| Conservation Programs on Military Reservations; Sikes Act Improvement Amendments (P.L. 105-85) | 1997 | |
| DODI 4700.4; Natural Resources Management Program | 24 January 1989 | |
| Endangered Species Act; 16 U.S.C. 1531 *et seq.* | 1973 | |
| Executive Order 11514; Protection and Enhancement of Environmental Quality | 24 May 1977 | |
| Executive Order 11988; Floodplains Management | 24 May 1977 | |
| Executive Order 11990; Wetlands Management | 24 May 1977 | |
| Federal Fish and Wildlife Permit for Migratory Bird Depredation | 1995 | |
| Federal Insecticide, Fungicide, and Rodenticide Act as amended; 7 U.S.C. 136 *et seq.* | 1982 | |
| Federal Land Policy and Management Act; 43 U.S.C. 1701 | 1976 | |
| Federal Noxious Weed Act; 7 U.S.C. 2809 *et seq.* | 1974 | |
| Fish and Wildlife Conservation Act; P.L. 96-366, 16 USC 2901 | 1979 | |
| Fish and Wildlife Coordination Act; 16 U.S.C. 661 *et seq.* | | |
| Migratory Bird Conservation Act; PL 89-699, 16 U.S.C. 715 | 1965 | |
| National Environmental Policy Act 42 U.S.C. 4341 | 1970 | |
| Forest Management; Title 10 U.S.C. 2665 | | |
| Secretary of the Air Force Order 780.1 Wetlands | | |
| Secretary of the Air Force Order 790.1 Floodplains | | |
| Soil and Water Conservation Act; P.L. 95-193, 16 U.S.C. 2001 | 1977 | |

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14.2.2 *Appendix C. Species Recorded at KPSFS (1996 Resource Inventory Report Data)*

The survey report will be attached to the final plan

*14.2.3 Appendix D. Watershed Protection/ Storm Water Management Plan*

The Storm Water Management Plan is located in the KPSFS environmental files

*14.2.4 Appendix E. KPSFS Natural Resource Assessment Report (2015)*

The survey report will be attached to the final plan

*14.2.5 Appendix F. Kuaokala Ridge Biological Resource Survey (2019)*

The survey report will be attached to the final plan

### *14.2.6 Appendix G. Environmental Assessment Portions*

# Environmental Assessment

This section of the document assesses known, potential, and reasonably foreseeable environmental consequences related to implementing the INRMP and managing natural resources at KPSTS. See **Table 1-3** in **Section 1.7.2** for a roadmap indicating NEPA analysis and the corresponding INRMP sections.

**Section 6.1** addresses implementation of the No Action Alternative that reflects the continuation of existing baseline conditions as described in **Sections 3 and 4**. **Section 6.2** presents potential effects in the context of the scope of the Proposed Action and in consideration of the affected environment. This assessment presents resource areas adapted from the resources described in **Sections 3 and 4** , as well as resource areas requiring assessment pursuant to 32 CFR 989 *Environmental Impact Analysis Process,* such as socioeconomics and environmental justice. It also considers implementation of the selected management measures in their entirety (as presented in **Sections 4** and **6**, and **Appendix J**). Cumulative effects are discussed in **Section 6.3**. Implementation of the INRMP (i.e., the Proposed Action) is KPSTS's preferred alternative. A summary of the potential environmental consequences associated with the No Action Alternative and the Proposed Action is also presented in **Section 6.3**. A summary of the FONSI is presented in **Section 6.4**.

An Alternative Action was considered during the screening process, but was not carried forward for further analysis because it was not ecologically sound or compatible with the requirements of the military mission. **Section 4** provides a description of the goals and objectives used to develop management measures for each resource area's issues and concerns and the rationale for why certain management measures were selected. Therefore, the analytical framework supporting each resource area is not repeated in this section.

As discussed in **Section 1.4**, the KPSTS INRMP is a "living" document that focuses on a 5-year planning period based on past and present actions. Short-term management practices included in the plan have been developed without compromising long-range goals and objectives. Because the plan will be modified over time, additional environmental analyses could be required as new management measures are developed for the long term (i.e., beyond 5 years).

**No Action Alternative**

Adoption of the No Action Alternative would mean that KPSTS's INRMP would not be implemented and current natural resources management practices would continue "as is." Existing conditions and management practices would continue, and no new initiatives would be established.

Potential consequences associated with the No Action Alternative are discussed in this section for each resource area. **Section 6.3** summarizes the analysis of potential consequences for the No Action Alternative and compares them to the Proposed Action. As shown, no significant adverse effects would be expected. Under the No Action Alternative, the environmental conditions at KPSTS would not benefit from the management measures associated with implementing the proposed INRMP.

Expected consequences of the No Action Alternative for each resource area are presented in the following paragraphs:

*Affected Environment* – Minor adverse effects on the general environmental conditions of KPSTS would be expected under the No Action Alternative. Without the implementation of component

plans and attachments as described in this INRMP to manage the natural resources at KPSTS, certain resources would be vulnerable to degradation.

*Climate* – No effects on climate would be expected.

*Air Quality* – Negligible adverse effects would be expected. The primary concern regarding air quality and potential environmental effects pertains to increases in pollutant emissions; exceedance of NAAQS and other Federal, state, and local limits; and impacts on existing air permits. No emissions-producing equipment other than diesel-powered generators, which are regulated by a Hawaii DOH permit, is utilized at KPSTS. KPSTS monitors the permit conditions and has maintained compliance, submitted its required periodic reports, and has been inspected by the Hawaii DOH with no violations found (USAF 2008d).

*Noise* – No effects would be expected. The primary concern regarding noise and potential environmental effects pertains to increases in sound levels, exceedances of acceptable land use compatibility guidelines, and changes in public acceptance (e.g., noise complaints). Potential effects are precluded by the fact that current natural resources management actions do not involve activities that would affect noise conditions. Existing noise levels would not change. Therefore, there would be no effects regarding noise levels or sound quality as a result of implementation of the No Action Alternative.

*Topography, Geology, and Soils* – Minor adverse effects would be expected. KPSTS has activities and plans in place to reduce soil erosion; however, without additional actions needed for effective control of soil erosion and enhancement of sediment retention, impacts on the topography, geology, and soils associated with erosion and sedimentation on KPSTS would be expected to continue and possibly increase with future construction and land use changes driven by safety issues and mission changes.

*Water Resources* – No effects would be expected. There are no water resources on KPSTS.

*Wetlands* – No effects would be expected. There are no wetlands on KPSTS.

*Floodplains* – No effects would be expected. There are no floodplains on KPSTS.

*Riparian Habitat* – No effects would be expected. There is no riparian habitat on KPSTS.

*Terrestrial Ecosystems* – Minor adverse effects would be expected. Under the No Action Alternative, there would be no formal plan of action to conserve terrestrial habitat conditions and diversity on a regional basis in light of land conversions necessitated by mission safety requirements.

*Fauna* – Minor adverse effects would be expected. The No Action Alternative does not specify mechanisms to ensure regional biodiversity through specific actions aimed at maintaining habitat on the installation.

*Endangered, Threatened, and Rare Species* – No effects would be anticipated as no such species are known to reside on KPSTS.

*Land Use* – Minor adverse effects would be expected. The No Action Alternative does not accommodate land use conversions necessitated by changes in missions.

*Facilities* – Minor adverse effects would be expected. The No Action Alternative does not provide natural resources conservation efforts aimed specifically at construction of new facilities, leaving the land surface around those facilities and, therefore, the facilities themselves, at risk.

*Hazardous and Toxic Materials* – No effects would be expected. Hazardous and toxic materials would continue to be handled in accordance with Federal laws and AFIs, including the Resource Conservation and Recovery Act (RCRA); the FIFRA; the Toxic Substances Control Act (TSCA); and AFI 32 4002, Hazardous Material Emergency Planning and Response Program. Therefore, no adverse effects regarding the generation of hazardous and toxic materials would be expected under the No Action Alternative.

*Socioeconomic Resources* – No effects would be expected. Under the No Action Alternative, typical changes in population, housing, and economic conditions would continue. Potential effects are precluded by the fact that the No Action Alternative does not involve activities that change existing socioeconomic resources.

*Environmental Justice* – No effects would be expected. The primary concern regarding environmental justice and potential environmental effects pertains to disproportionately high and adverse consequences to minority, low-income communities, or children. The No Action Alternative in itself does not create any advantage or disadvantage for any group or individual, and is not expected to create disproportionately high or adverse human health or environmental effects on minority or low-income populations or communities surrounding the installation. The installation would address, however, any project-specific issues regarding disproportionate adverse health or environmental effects on minority, low-income groups, or children should they arise, and would use best environmental management practices to ensure compliance with applicable regulatory requirements. Therefore, there would be no effects as a result of implementation of the No Action Alternative.

*Cultural Resources* –No adverse effects would be expected. The No Action Alternative in itself does not lead to any actions that have the potential to significantly affect cultural resources, tribal resources, tribal rights, or Native Hawaiian lands, which is the threshold consideration of 27 Oct 99 Annotated DOD American Indian and Alaska Native Policy for analysis of effects on Native Americans.

In summary, the analysis of existing (i.e., baseline) conditions identifies no significant adverse environmental concerns, for the conservation, management, or restoration of natural resources. However, the No Action Alternative would conflict with KPSTS's underlying need to meet mission requirements and comply with environmental regulations and policies. Therefore, implementation of the No Action Alternative is not the preferred alternative.

**Proposed Action (Preferred Alternative)**

Potential consequences associated with the Proposed Action are discussed in this section for each resource area described in **Section 6**. **Section 6.3** summarizes the analysis of potential consequences for the Proposed Action and compares them to the No Action Alternative (i.e., baseline or existing conditions). Potential environmental consequences associated with implementation of the revised INRMP would result in either no effects or beneficial effects for each resource area, with the exception of air quality where minor adverse effects might be expected. Compared to the No Action Alternative, environmental conditions at KPSTS would be conserved or improved as a result of implementing the proposed INRMP revision. Therefore, implementing the revised INRMP (i.e., the Proposed Action) is the preferred alternative.

The potential effects that would be expected as a result of implementation of the Proposed Action for each resource area are presented in the following paragraphs:

*Affected Environment* – Beneficial impacts on the general environmental conditions of KPSTS would be expected from implementation of the Proposed Action.

*Climate* – No effects on climate would be expected.

*Air Quality* – Negligible adverse effects would be expected. The primary concern regarding air quality and potential environmental effects pertains to increases in pollutant emissions, exceedance of NAAQS, and impacts on existing air permits. No emissions-producing equipment other than diesel-powered generators, which are regulated by a Hawaii DOH permit, is utilized at KPSTS. KPSTS monitors the permit conditions and has maintained compliance, submitted its required periodic reports, and has been inspected by the Hawaii DOH with no violations found.

*Noise* – No effects would be expected. The primary concern regarding noise and potential environmental effects pertains to increases in sound levels, exceedances of acceptable land use compatibility guidelines, and changes in public acceptance (e.g., noise complaints). However, potential effects are precluded by the fact that the Proposed Action does not involve activities that would impact noise conditions, such as changes in military equipment, increase in the number or location of personnel, construction of new facilities or modification of existing facilities, or increase or change in military operations. Therefore, there would be no effects on noise levels or sound quality as a result of implementing the Proposed Action.

*Topography, geology, and soils* – Beneficial effects would be expected. By implementing additional activities to reduce soil erosion and enhance sediment retention, impacts on topography, geology, and soils associated with erosion and sedimentation control at KPSTS would be minimized. Monitoring of soil conditions on the installation to identify potential problem areas, the implementation of conservation measures in areas where exposure of soils is necessary, and, when possible, the avoidance of activities likely to result in erosion would minimize potential impacts on the topography, geology, and soil resources at KPSTS.

*Water Resources* – Beneficial effects would be expected. Efforts associated with erosion and sediment control would reduce the potential for water quality degradation downstream of the installation.

*Wetlands* – No effects would be expected. There are no wetlands on KPSTS.

*Floodplains* – No effects would be expected. There are no floodplains on KPSTS.

*Riparian Habitat* – No effects would be expected. There is no riparian habitat on KPSTS.

*Terrestrial Ecosystems* – Beneficial effects would be expected. From the perspective of habitat, implementation of the Proposed Action would result in improved terrestrial habitat conditions for wildlife by providing terrestrial habitat protection.

*Fauna* – Beneficial effects on wildlife species would be expected on a regional basis. Implementation of the Proposed Action would result in conservation of habitat on the installation.

*Endangered, Threatened, and Rare Species* – No effects would be anticipated as no such species are known to reside on KPSTS.

*Land Use* – Beneficial impacts would be expected. The Proposed Action provides specific guidance on the conservation of ecosystem function in light of required land use conversions.

*Facilities* – Beneficial impacts would be expected. The Proposed Action includes development of revegetation plans designed to protect disturbed lands around newly constructed facilities, and therefore the integrity and function of the facilities themselves.

*Hazardous and Toxic Materials* – No effects would be expected. Hazardous and toxic materials would continue to be handled in accordance with Federal laws and AFIs, including the RCRA, FIFRA, TSCA, and AFI 32-4002. Thus, no adverse effects regarding the generation of hazardous and toxic materials would be expected under the Proposed Action.

*Socioeconomic Resources* – No effects would be expected. The primary concern regarding potential effects on socioeconomic resources pertains to changes in population, housing, and economic conditions. Potential effects are precluded by the fact that the Proposed Action does not involve any activities that would contribute to changes in socioeconomic resources. Therefore, there would be no effects on socioeconomic resources as a result of implementing the Proposed Action.

*Environmental Justice* – No effects would be expected. The primary concern regarding environmental justice and potential environmental effects pertains to disproportionately high and adverse consequences to minority or low-income. Implementation of the Proposed Action in itself would not create any advantage or disadvantage for any group or individual. The proposed INRMP is not expected to create disproportionately high or adverse human health or environmental effects on minority or low-income populations or communities surrounding KPSTS. The installation would address, however, any project-specific issues regarding disproportionate adverse health or environmental effects on minority, low-income groups, or, children should they arise, and would use best environmental management practices to ensure compliance with applicable regulatory requirements. Therefore, there would be no effects as a result of implementing the Proposed Action.

*Cultural Resources* – No effects would be expected. The Proposed Action incorporates the most current data relative to the nature and location of cultural resources on the base, and therefore, its implementation would not lead to any actions that have the potential to significantly affect cultural resources, tribal resources, tribal rights, or Indian lands for which the threshold of consideration is 27 Oct 99 Annotated DOD American Indian and Alaska Native Policy.

These findings are consistent with the goals of the natural resources management program to maintain ecosystem viability and ensure the sustainability of desired military training conditions. The nature of the management measures recommended by the revised INRMP, if implemented, would directly and positively affect the health and condition of natural resources at KPSTS.

### Cumulative Effects

A cumulative effect is defined as an effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place locally or regionally over a period of time.

Implementation of the INRMP would result in a comprehensive natural resources management strategy for KPSTS that represents compliance, restoration, prevention, and conservation; improves the existing management approach for natural resources on the installation; and meets legal and policy requirements consistent with national natural resources management philosophies. Implementation would be expected initially to improve existing environmental conditions at KPSTS, as shown by the potential for beneficial effects in **Table 6-1** and as described in **Section 6.2**. Over time, adoption of the Proposed Action would enable KPSTS to achieve its goal of maintaining ecosystem viability and ensuring sustainability of desired military conditions.

Future development is possible at KPSTS and the Proposed Action was developed to counteract adverse effects that development might have on local and regional natural resources. Although development can be expected to continue outside of KPSTS, cumulative adverse effects on these resources would not be expected when added to the effects of activities associated with the proposed management measures contained in the revised INRMP.

Table 14-1. Summary of Potential Environmental Consequences

| Resource Area/Environmental Condition [a] | Environmental Consequence | |
|---|---|---|
| | **No Action Alternative** | **Proposed Action** |
| Affected Environment | Minor Adverse | Beneficial |
| Climate | None | None |
| Air Quality | Minor Adverse | Minor Adverse |
| Noise | None | None |
| Topography | Minor Adverse | Beneficial |
| Geology | Minor Adverse | Beneficial |
| Soils | Minor Adverse | Beneficial |
| Water Resources | None | None |
| Wetlands | None | None |
| Floodplains | None | None |
| Riparian Habitat | None | None |
| Terrestrial Ecosystems | Minor Adverse | Beneficial |
| Fauna | Minor Adverse | Beneficial |
| Endangered, Threatened, and Rare Species | No Effect | No Effect |
| Land Use | Minor Adverse | Beneficial |
| Facilities | Minor Adverse | Beneficial |
| Hazardous and Toxic Materials | None | None |
| Socioeconomic Resources | None | None |
| Environmental Justice | None | None |
| Cultural Resources | None | None |

Note: [a] Resource areas presented in this column are adapted from the resources described in **Sections 3** and **4**, as well as those resource areas requiring assessment pursuant to 32 CFR 989, *Environmental Impact Analysis Process*.

**FONSI**

Implementation of the Proposed Action would result in either no effects, minor adverse effects, or short- and long-term beneficial effects on identified resources and areas of environmental concern. Based on the results of the EA, it is determined that implementation of the Proposed Action would have no significant direct, indirect, or cumulative impacts on the quality of the natural or human environment. Implementation of the INRMP would be expected to improve existing conditions at the KPSTS as shown by the potential for beneficial effects. The Proposed Action would enable the KPSTS to continue to achieve its goal of maintaining ecosystem viability and ensuring sustainability of desired military training conditions. Because there would be no significant environmental impacts resulting from implementation of the Proposed Action, an Environmental Impact Statement is not required and will not be prepared. See the inside the cover page of the INRMP for a signed copy of the FONSI.

### *14.2.7 Appendix H. Fauna List*

Table 14-2. Fauna Species Referenced in INRMP

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Hawaiian honeycreeper ('Apapane) | *Himatione sanguinea* |
| band-rumped storm petrel (‘akē‘akē) | *Hydrobates castro* |
| Black francolin | *Francolinus francolinus* |
| Black-footed albatross (ka'upu) | *Phoebastria nigripes* |
| Cattle egret | *Bubulcus ibis* |
| Common myna | *Acridotheres tristis* |
| Common peafowl | Pavo cristatus |
| Common waxbill | *Estrilda astrild* |
| Domestic cat | *Felis domesticus* |
| Domestic dogs | *Canis lupus familiaris* |
| Erckel’s francolin | *Pternistis erckelli* |
| feral goats | *Capra hircus* |
| feral pigs | *Sus scrofa* |
| Great frigatebird (‘Iwa) | *Fregata minor palmerstoni* |
| Grey-backed tern (pakalakala) | *Onychoprion lunatus* |
| Hawaiian ‘elepaio | *Chasiempis sandwichensis ibidis* |
| Hawaiian hoary bat (‘ōpe‘ape‘a) | *Lasiurus cinereus semotus* |
| Hawaiian monk seal (ilio-holo-i-ka-uaua) | *Monachus schauinslandi* |

Table 14-2. Fauna Species Referenced in INRMP

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Hawaiian petrel (‘ua‘u) | *Pterodroma sanwichensis* |
| Hawaiian short-eared owl (pueo) | *Asio flammeus sandwichensis* |
| House finch | *Haemorhous mexicanus* |
| 'I’iwi | *Drepanis coccinea* |
| Japanese bush warbler | *Horornis diphone* |
| Japanese white-eye | *Zosterops japonicus* |
| Java sparrow | *Padda oryzivora* |
| Laysan albatross, moli | *Phoebastria immutabilis* |
| Mongoose | *Herpestes auropunctatus* |
| Newell’s shearwater (a‘o) | *Puffinus auricularis newelli* |
| Northern cardinal | *Cardinalis cardinalis* |
| Northern mockingbird | *Mimus polyglottus* |
| O’ahu 'Elepaio | *Chasiempis sandwichensis gayi* |
| O’ahu tree snail (kāhuli) | *Achatinella mustelina* |
| Pacific golden-plover (kolea) | *Pluvialis fulva* |
| Rat | *Rattus* spp. |
| Red junglefowl (moa) | *Gallus gallus* |
| Red-billed leiothrix | *Leiothrix lutea* |
| Red-crested cardinal | *Paroaria coronata* |
| Red-tailed tropicbird (Koa 'e'ula) | *Phaethon rubricauda* |
| Red-vented bulbul | *Pycnonotus cafer* |
| Ring-necked pheasant | *Phasianus colchicus* |
| Rock pigeon | *Columba livia* |
| Ruddy turnstone ('Akekeke) | *Arenaria interpres* |
| Saffron finch | *Sicalis flaveola* |
| Sanderling (Hunakai) | *Calidris alba* |
| Scaly-breasted Munia | *Lonchura punctulata* |
| Sooty tern ('ewa 'ewa) | *Onychoprion fuscatus* |
| Spotted or lace-necked dove | *Streptopelia chinensis* |

Table 14-2. Fauna Species Referenced in INRMP

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Wandering tattler ('Ulili) | *Tringa incana* |
| Warbling white-eye | *Zosterops japonicas* |
| Wedge-tailed shearwater (ua 'u kani) | Puffinus pacificus |
| White tern (Manu-o-ku) | *Gygis alba* |
| White-rumped shama | *Copsychus malabaricus* |
| white-tailed tropicbird (Koa'e 'ula) | *Phaethon lepturus dorotheae* |
| Wild turkey | *Meleagris gallopavo* |
| Zebra or barred dove | *Geopelia striata* |

2 *14.2.8 Appendix I. Flora List*

Table 14-3. Flora Species Referenced in INRMP

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| ‘Akoko | *Chamaesyce celastroides* var. *kaenana* |
| ‘Āwiwi | *Schenkia sebaeoides* |
| African tuliptree | *Spathodea campanulata* |
| Alahe’e | *Psydrax odorata* |
| Albizia | *Falcatria moluccana* |
| Angularfruit ma’oloa | *Neraudia angulata* |
| Aweoweo | Chenopodium oahuense |
| Bermuda grass (manienie) | *Cynodon dactylon* |
| Brackenridge’s rosemallow (ma'o hau hele) | *Hibiscus brackenridgei* |
| Broomsedge | *Andropogon virginicus* |
| Buffelgrass | *Cenchrus ciliaris* |
| Canada cocklebur | *Xanthium strumarium* var. *canadense* |
| Candelabra Aloe (panini 'awa'awa) | *Aloe arborescens* |
| Christmas berry | *Schinus terebinthiflius* |
| Cinderella weed | *Synedrella nodiflora* |
| Comb bushmint | *Hyptis pectinata* |

Table 14-3. Flora Species Referenced in INRMP

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Common maidenhair ('iwa'iwa kahakaha) | *Adiantum capillus-veneris* |
| Corkystem passionflower (huehue haole) | *Passiflora suberosa* |
| Creeping indigo | *Indigofera spicata* |
| Creeping mistflower (hamakua pamakani) | *Ageratina riparia* |
| Florida hopbush (‘A’ali’i) | *Dodonaea viscosa* |
| Formosan koa | *Acacia confusa* |
| Giant toad plant | *Stapelia gigantea* |
| Golden crown-beard | *Verbesina encelioides* |
| Guinea grass | *Urochloa maxima* |
| Hawai’i hawthorn (eluehe) | *Osteomeles anthyllidifolia* |
| Hawai’i lady’s nightcap | *Bonamia menziesii* |
| Hawai’i scaleseed | *Spermolepis hawaiiensis* |
| Hedge (Spiny tree) Cactus | *Cerus hildamannianus* |
| Hoary abutilon | *Abutilon incanum* |
| 'Ilima | *Sida fallax* |
| Ironwood | *Casuarina equisetifolia* |
| Java plum | Syzygium cumini |
| Javanese flatsedge ('ehu'awa) | *Cyperus javanicus* |
| Kaala rockwort (kulu'i) | *Nototrichium humile* |
| Kaua’i spurge | *Euphorbia haeleeleana* |
| Kāwelu | *Eragrostis variabilis* |
| Ko’oko’olau | *Bidens* cf. *amplectens, Bidens torta* |
| Koa haole | *Leucaena leucucephala* |
| Lantana | *Lantana camara* |
| Little spurflower (‘ala’ala wai nui wahine) | *Plectranthus parviflorus* |
| Maui chaff-flower ('ewa hinahina) | *Achyranthes splendens* var. *rotundata* |
| Molasses grass | *Melinis minutiflora* |

Table 14-3. Flora Species Referenced in INRMP

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Naio | Myoporum sandwicense |
| Narrow-leaved plantain (laukahi) | *Plantago lanceolata* |
| Nehe | *Melanthera tenuifolia* |
| O'ahu chewstick | *Gouania vitifolia* |
| O'ahu cowpea | *Vigna owahuensis* |
| O'ahu riverhemp (ohai) | *Sesbania tomentosa* |
| O'ahu wormwood ('ahinahina) | *Artemisia australis* |
| Perennial soybean | *Neonotonia wightii* |
| Pili | Heteropogon contortus |
| Pine | *Pinus* spp. |
| Pitted beardgrass | *Bothriochloa pertusa* |
| Sacramento burr | *Triumfetta semitriloba* |
| Silk oak | *Grevillea robusta* |
| Smoothfruit chewstick | *Gouania meyenii* |
| Sourbush | *Pluchea carolinensis* |
| Sprawling schiedea | *Schiedea hookeri* |
| Sticky flatsedge (pu'uka'a) | *Cyperus trachysanthos* |
| Strawberry guava (waiwi) | *Psidium cattleianum* |
| Swollen fingergrass (mau'u-lei) | *Chloris barbata* |
| Torrid panicgrass (kakonakona) | *Panicum torridum* |
| Triangleleaf lipfern ('iwa'iwa) | *Doryopteris decipiens* |
| Tropical Almond (kamani-haole) | *Terminalia catappa* |
| Wahine noho kula | *Isodendrion pyrifolium* |
| Waianae Range hala pepe | *Pleomele forbesii* |
| Waianae Range schiedea | *Schiedea kealiae* |
| Wedelia | *Sphagneticola trilobata* |
| Wild leadwort ('ilie'e) | *Plumbago zeylanica* |

Table 14-3. Flora Species Referenced in INRMP

| Common Name (Hawaiian Name) | Scientific Name |
|---|---|
| Hawaiian honeycreeper (‘apapane) | *Himatione sanguinea* |

# 15.0 ASSOCIATED PLANS

***15.1 Tab 1—Wildland Fire Management Plan (WFMP)***

***15.2 Tab 2—Integrated Cultural Resources Management Plan (ICRMP)***

***15.3 Tab 3—Invasive Species Management Plan***