U. S. AIR FORCE INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Maui Space Surveillance Complex and Remote Maui Experiment Site

(See INRMP signature pages for plan approval date)

ABOUT THIS PLAN

This installation-specific Environmental Management Plan (EMP) is based on the U.S. Air Force's (AF) standardized Integrated Natural Resources Management Plan (INRMP) template. This plan is a cooperative agreement between the installation and applicable Sikes Act cooperating agencies to document how natural resources will be managed. Where applicable, external resources, including Air Force Instructions (AFIs); AF Playbooks; federal, state, local and Final Governing Standards (FGS); and biological opinion and permit requirements, as applicable, are referenced.

Certain sections of this INRMP begin with standardized, AF-wide "common text" language that address AF 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 AF-wide common text sections are installation sections. The installation sections contain installation-specific content to address state, local and installation-specific requirements. Installation sections are unrestricted and are maintained and updated by AF environmental Installation Support Teams (ISTs) and/or installation personnel.

NOTE: The terms 'Natural Resources Manager', 'NRM' and 'NRM/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.

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DOCUMENT CONTROL

Record of Review – The INRMP is updated not less than annually, or as changes to natural resource management and conservation practices occur, including those driven by changes in applicable regulations. In accordance with (IAW) the Sikes Act and AFI 32-7064, *Natural Resources Management*, the INRMP is required to be reviewed for operation and effect not less than every five years. Annual reviews and updates are accomplished by the base Natural Resources Manager (NRM), and/or an Installation Support Team 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 NR Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of the United States Fish and Wildlife Service (USFWS), state fish and wildlife agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signature to the Annual INRMP Review Summary, the collaborating agency representative asserts concurrence with the findings. Any agreed updates are then made to the document, at a minimum updating the work plans. Following update, the installation NRM obtains approval signatures on the updated document.

INRMP APPROVAL/SIGNATURE PAGES

Update Register

Page Number	Update #	Date Changed
1 - end	1	January 11, 1999
1 - end	2	April 15, 2002
1 - end	3	May 1, 2003
1 - end	4	June 3, 2004
1 - end	5	December 27, 2006
1 - end	6	September 2009
1 - end	7	June 2012
1 – end	8	September 2015

Update Notes

Update 1, January 11, 1999

Minor rewrite incorporating the USFWS and AFCEE review comments and various name changes. More extensive USFWS and AFCEE comments to be incorporated in next major rewrite (est. 2000).

Update 2, April 15, 2002

Minor update designed to incorporate review comments from the Hawaii Department of Land and Natural Resources and to ensure that the INRMP is in full accordance with AFI 32-7064.

Update 3, May 1, 2003

Minor update designed to incorporate review comments from AFRL/RD.

Update 4, June 3, 2004

Minor updates to include reference to Pest Management Plan. Removed appendixes.

Update 5, December 27, 2006

Minor updates to include reference to Sikes Act and September 2005 Petrel report

Update 6, September 2009

Major reformatting to follow recommended outline provided by AFI 32-7064.

Update 7, June 2012

Reformatting to follow AFI 32-7064 and incorporate recent survey data and incorporate the Sikes Act Improvement Act requirements.

Update 8, December 2015

Reformatting to follow revised Air Force template and update to include 2015 RME Biological survey results.

Maui Space Surveillance Complex and Remote Maui Experiment Site

The signatures below represent the mutual agreement of the United States Air Force, U.S. Fish and Wildlife Service, and the Hawaii Department of Land and Natural Resources that this Integrated Natural Resources Management Plan has been prepared in accordance with all applicable authorities, statutes, and regulations pertaining to the conservation and management of natural resources on these sites.

ANDREW J. EMERY, Lt Col, USAF
Installation Commander
AFRL Det 15/Maui Research Site

7/13/2016
Date

See next page.

Mary M. Abrams, Ph.D.
Field Supervisor
Pacific Islands Fish and Wildlife Office
US Fish and Wildlife Service

Date

See next page.

Suzanne D. Case
Chairperson
Hawaii DLNR

Date

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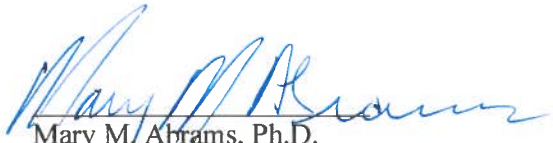
_____ _____

Lt Col Andrew J Emery, USAF — Date
AFRL/DET 15 Installation Commander



6 July 2016

Mary M. Abrams, Ph.D. — Date
Field Supervisor
Pacific Islands Fish and Wildlife Office
US Fish and Wildlife Service

_____ _____

Suzanne D. Case — Date
Chairperson
Hawaii DLNR

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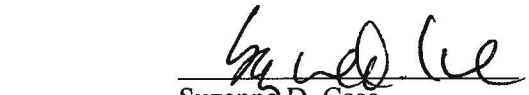

Suzanne D. Case — 7/4/16 Date
Chairperson
Hawaii DLNR

Annual Review and Coordination Page

The purpose of the annual review is to establish and maintain regular communications with the appropriate federal, state, and installation organizations to address issues concerning implementation of the INRMP. At a minimum, this shall include an annual review of the INRMP by the installation in coordination with USFWS and State DLNR. The annual review will be certified by the installation or wing commander or designee.

The annual review verifies that: (1) all "must fund" projects and activities have been budgeted for and implementation is on schedule; (2) all required trained natural resources positions are filled or are in the process of being filled; (3) projects and activities for the upcoming year have been identified and included in the INRMP (Note: an updated project list does not necessitate revising the INRMP if the goals and objectives remain unchanged); (4) all required coordination with USFWS and DLNR has occurred; and (5) any significant changes to the installation's mission requirements or its natural resources have been identified.

Record of Annual Review			
Date	**Reviewer**	**Agency**	**Comments/Updates Submitted?**

EXECUTIVE SUMMARY

The purpose of an Integrated Natural Resources Management Plan (INRMP) is to "assist the installation commander with the conservation and rehabilitation of natural resources consistent with the use of the installation to ensure the readiness of the Armed Forces" (AFI 32-7064). This INRMP will guide the protection and management of all natural resources at the Air Force Research Laboratory (AFRL)/Detachment 15 (DET 15), Maui Space Surveillance Complex (MSSC) and Remote Maui Experiment Site (RME). It will also ensure compliance with all directives, policies, and guidelines set forth by the United States Air Force (USAF) and Department of Defense (DoD) as well as all state and federal laws. This plan contains goals, practices, and guidelines for the management of natural resources. It provides descriptions of the physical and biotic environments at the MSSC and RME and discusses how the USAF mission may affect these resources. The implementation of the INRMP will benefit the USAF because it provides guidance for the management and conservation of natural resources that will maintain or improve the diversity of native species, avoid the introduction of invasive species to the fragile ecosystem, and minimize the impact on natural resources and the USAF mission at the MSSC and RME. The INRMP will provide a framework for the Installation Commander to implement management of natural resources in accordance with the military mission.

The implementation of these goals will not require significant changes in management direction of the installation locations. The successful implementation of these goals will improve the natural environment for all users of the area by promoting biological diversity, protecting threatened and endangered species, and maintaining a balanced and healthy ecosystem for the implementation of any specific construction projects or actions that might impact this plan, the appropriate environmental impact analysis (Environmental Impact Statement [EIS]/Environmental Assessment [EA]/or Categorical Exclusion [CATEX]) will be performed, as required by the National Environmental Policy Act (NEPA) and 32 CFR 989, *Department of the Air Force, Environmental Impact Analysis Process*.

The USAF proposes to implement this INRMP, which supports the management of natural resources. The purpose of the INRMP is to carry out the set of resource-specific management measures, which would enable AFRL Det 15 to effectively manage the use and condition of natural resources within these locations. Implementation of this INRMP would support the USAF's continuing need to ensure the safety and efficiency of the mission, while practicing sound resource stewardship and complying with environmental policies and regulations.

Goals of this INRMP are:

Goal 1: Comply with the Sikes Act Improvement Act of 1997, and the Sikes Act Reauthorization Act of 2013, as amended and the Air Force Instruction (AFI 32-7064) Integrated Natural Resources Management, as updated;

Goal 2: Foster an atmosphere of coordination and cooperation with the U.S. Fish and Wildlife Service (USFWS), Haleakalā National Park Service (NPS), and Hawaii Department of Land and Natural Resources (DLNR) to inventory, map and preserve endangered species on or near the site;

Goal 3: Ensure populations of threatened and endangered species on or near the site are protected and managed in compliance with the Endangered Species Act of 1973, as amended (ESA);

Goal 4: Prevent the introduction of or the spread of invasive species to the summit area (MSSC)

and at RME in accordance with the NPS requirements;

Goal 5: Support resource conservation through ground maintenance programs and plans, when and where possible;

Goal 6: Increase the awareness, appreciation and conservation of natural resources on MSSC and RME.

This INRMP is not an environmental document prepared to satisfy requirements of NEPA. Prior to implementation of land disturbance type actions, or other proposed projects, the Environmental Impact Analysis Process (EIAP) will be performed, per NEPA, to determine environmental impacts.

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 United States Air Force. 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 Air Force adaptability in all environments. The Air Force has stewardship responsibility over the physical lands on which installations are located to ensure all natural resources are properly conserved, protected, and used in sustainable ways. The primary objective of the Air Force natural resources program is to sustain, restore and modernize natural infrastructure to ensure operational capability and no net loss in the capability of AF lands to support the military mission of the installation. The plan outlines and assigns responsibilities for the management of natural resources, 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 base personnel. The Sikes Act is the legal driver for the INRMP.

1.1 Purpose and Scope

The Integrated Natural Resources Management Plan (INRMP) is a road map for ecosystem and natural resources management at the MSSC and RME. The plan integrates the management of natural resources with the USAF mission and reflects an interdisciplinary approach to ecosystem management. As stated in AFI 32-7064, the INRMP is prepared "to assist the installation commander with the conservation and rehabilitation of natural resources consistent with the use of the installation to ensure the readiness of the Armed Forces."

The purpose of this plan is to:

- Describe the current status and desired future conditions of natural resources at MSSC and RME;
- Document decisions regarding management, use, and protection of natural resources;
- Communicate resource management planning and decision-making information in a way that is useful to installation managers, contractors, Federal, State and local agencies and the general public; and
- Provide information to serve as a baseline for measuring future changes and impacts to the installation's natural resources.

The INRMP presents a description of land use, land management practices, and natural resource management activities at the MSSC and RME sites. Maps, ownership data, and other information on land specific to the installations are included. Such documentation ensures continuity in the context of periodic replacement of personnel, and it allows identification of local land treatment measures that reflect compliance with regulatory requirements.

1.2 Management Philosophy

The INRMP will be integrated and coordinated with the site's environmental plans and other planning documents to ensure that mission activities of R&D/O&M related to the DET 15 mission are conducted consonant with sound ecosystem management for the protection of biodiversity while ensuring conservation. Maintaining ecosystem integrity promotes good stewardship by protecting existing biodiversity while ensuring lasting use of the installation. This plan establishes general goals for

management, use, and protection of existing natural resources and specific goals for protecting threatened and endangered species in the area.

As an interdisciplinary document, the INRMP incorporates guidance from multiple resources: environmental assessments performed at the installation, environmental management plans, the US Fish and Wildlife Service (USFWS); State of Hawaii laws; Air Force regulations and instructions; the MSSC lease agreement between the Board of Regents of the University of Hawaii (UH) and the United States of America for AFRL property at Haleakalā; the RME license agreement with the Haleakalā Ranch Company; Haleakalā National Park, National Park Service (NPS); the University of Hawaii (UH) Haleakalā High Altitude Observatory Site Management Plan (HOMP); and information gathered from existing plans and documents related to natural resource management.

At a minimum, the natural resource management strategies described in this plan will be reviewed on an annual basis and updated every five (5) years by the AFRL/RD and DET 15 Environmental Safety and Occupational Health Council (ESOHC.) Threatened and endangered species management and grounds maintenance are management strategies required for the MSSC and RME..

1.3 Authority

This INRMP has been developed, and will be implemented, through the authority found in various laws, regulations, policies, directives, and agreements including the following:

Installation-Specific Policies (including State and Local Laws and Regulations)	
Public Laws	• Sikes Act, 16 U.S.C. 670 et seq. • National Environmental Policy Act of 1969, 42 U.S.C. 4321 et seq. • Endangered Species Act of 1973, 16 U.S.C. 1531 et seq. • Federal Land Policy and Management Act of 1976, 43 U.S.C. 1701 et seq. • Migratory Bird Treaty Act of 1918, 16 U.S.C. 703-712 et seq.
State of Hawaii	• Hawaii Administrative Rules (HAR), Chapter 13: Department of Land and Natural Resources (DLNR)
Department of Defense	• DoDI 4715.3 Natural Resources Conservation Program (February 2011) • DoDM 4715.03 Integrated Natural Resources Management Plan (INRMP) Implementation Manual (December 2013)
Air Force Instructions and Policy Directives	• AFI 32-7064, Integrated Natural Resources Management (18 November 2014) • AFI 32-7065, Cultural Resources Management (19 Nov 2014) • AFPD 32-70, Environmental Quality • AFI 32-7062, Air Force Comprehensive Planning • AFI 32-1021, Planning and Programming of Facility Construction Projects
Contract	• SOW for IROSS Research and Development and Site Infrastructure, 2006-2012 • Host Maintenance Contract, WCFS, 2012-2017

1.4 Integration with Other Plans

This INRMP was prepared in consultation with and is consistent with other MSSC and RME plans. Documents consulted included:

- MSSS Integrated Cultural Resources Management Plan (ICRMP), 2010-2015
- MSSC, Remote Maui Experiment Site and MHPCC Integrated Pest Management Plan, December 2014
- MSSC, RME, and All Other Det 15 Locations, Hazardous Waste Management Plan (HWMP), January 2015

The MSSS ICRMP identifies the cultural resources, including both historic and archaeological resources at the MSSC and RME sites. The ICRMP includes an inventory of archaeologic sites located adjacent to MSSC and one historic building that is eligible for National Registration. Additionally, the ICRMP identifies cultural resource compliance-related issues unique to MSSC and procedures for consultation and management of potential conflicts or contingencies.

The Integrated Pest Management Plan provides a snapshot of AFRL/Det 15 pest management operations at the MSSC and RME sites. It identifies specific insect, rodent, and invasive plant species and acceptable methods for controlling each pest at each site.

The MSSC HWMP describes the actions and procedures necessary to ensure compliance with all applicable federal, state, and local laws and regulations related to hazardous waste management, reporting, and pollution prevention..

2.0 INSTALLATION PROFILE

Office of Primary Responsibility	The AFRL/DET 15 Installation Commander 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/POC	Ms. Michelle Hedrick, 505-846-4574, michelle.hedrick.1@us.af.mil
State and local regulatory POCs (Include agency name for Sikes Act cooperating agencies)	-Robyn Thorson, US Fish and Wildlife Service, Region 1 -Hawaii Department of Land and Natural Resources
Total acreage managed by installation	7.8
Total acreage of wetlands	0
Total acreage of forested land	0
Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)	None.
NR Program Applicability (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 Program ☑Threatened and endangered species ☑ Invasive species ☐ Wetlands Protection Program ☐ Grounds Maintenance Contract/SOW ☐ Forest Management Program ☐ Wildland Fire Management Program ☐ Agricultural Outleasing Program ☑ Integrated Pest Management Program ☐ Bird/Wildlife Aircraft Strike Hazard (BASH) Program ☑ Coastal Zones/Marine Resources Management Program ☑ Cultural Resources Management Program

2.1 Installation Overview

2.1.1 Location and Area

AFRL/DET 15 performs research and development of technologies to enhance the AF situational awareness of objects in space. DET 15 has three main complexes that support this research; the Maui High Performance Computing Center (MHPCC), MSSC and RME which are all located on the island of Maui, Hawaii, (Figure 1). DET 15's parent command, AFRL/RD is headquartered at Kirtland Air Force Base (AFB), New Mexico. It is recognized as the DOD's center of expertise for lasers, high-power microwaves, and other directed energy technologies.

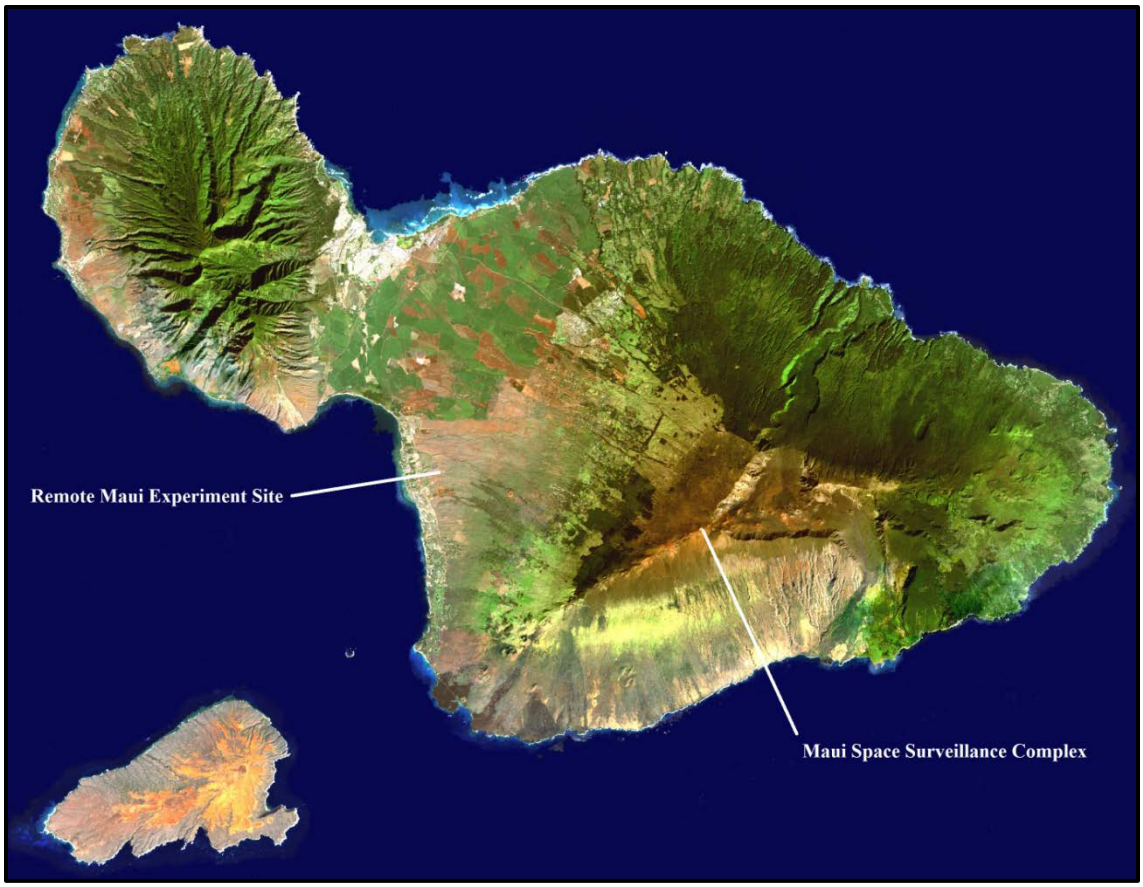

Figure 1: Location map of MSSC and RME on the Island of Maui

Maui High Performance Computing Center (MHPCC), Kihei – Maui Hawaii. The MHPCC Defense Supercomputing Resource Center (DSRC), established in 1993, is managed by AFRL/DET 15. The MHPCC is one of five U.S. Department of Defense (DoD) supercomputer sites using high performance computing system that allocate more than 70 million computational hours annually to the DSRC, Research, Development, Test and Evaluation community is a national resource at the forefront of High Performance Computing Chartered to support a diverse base of DoD and other government users, the MHPCC DSRC is facilitating the collaborations needed to solve tomorrow's complex computational problems today.

The MHPCC facility, (Figure 2) is located on the Island of Maui, Hawaii at Kihei within the Maui Research and Technology Park (MRTP.) The facility is approximately 31,760 gross square feet and sits on 2.7 acres with paved parking, and landscaping surrounding the facility. Grounds maintenance for this facility is managed by MRTP and is not subject to management under this INRMP.

Figure 2: The MHPCC Facility, located in the Maui Research and Technology Park in Kihei, HI houses the Det 15 Headquarters Offices

Maui Space Surveillance Complex (MSSC), Haleakalā - Maui Hawaii. The Air Force MSSC is located on the Island of Maui, Hawaii, at the 10,000 foot elevation of the summit of Haleakalā, the eastern and larger of two volcanic masses that form the island. Ownership and management of the MSSC was transferred from the Air Force Space Command (AFSPC) to the Air Force Materiel Command (AFMC), AFRL/RD in 2000. The MSSC is a state-of-the-art electro-optical complex combining operational satellite tracking facilities with a research and development facility. It operates three DET 15 telescopes 24 hours a day, 7 days a week. The facility performs vital advanced space surveillance operations, including space object identification. Due to year-round viewing conditions and a relatively stable climate, the facility routinely performs deep space observing operations and has the capability of projecting lasers into the atmosphere.

The MSSC has three main facilities; the Maui Space Surveillance System (MSSS) building that includes the three Space Command Ground-based Electro Optical Deep Space Surveillance (GEODSS) system GEODSS telescope towers that track satellites and obtain data; the Butler building that houses the operations and maintenance equipment and personnel; and the Advanced Electro-Optical System (AEOS) facility that contains the 3.6m telescope, the mirror coating facility and laboratories; is located within the Haleakalā High Altitude Observatory site (HO).

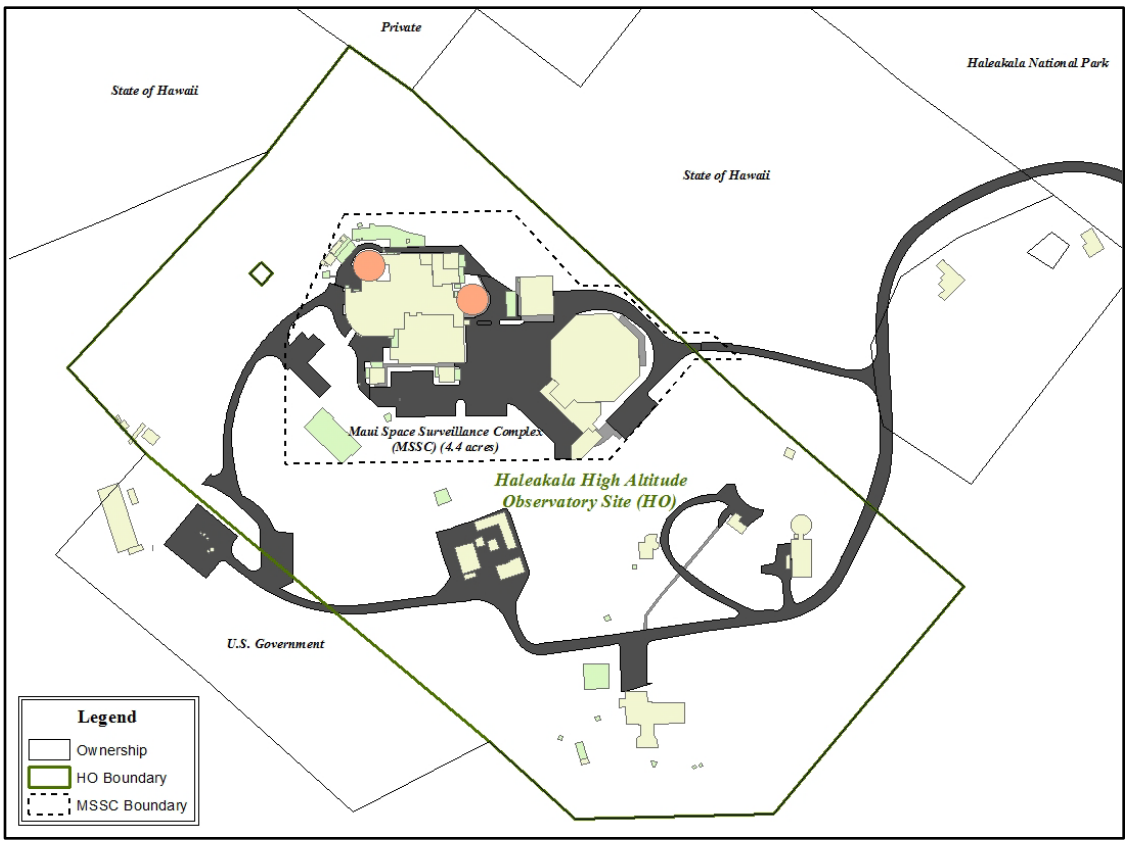

Figure 3: The MSSC consists of 4.4 acres and is located within the Haleakalā Observatory (HO) site ceded to the University of Hawaii by the State of Hawaii.

AFRL hosts University of Hawaii and other visiting experimenters at the MSSC. The HO site is an 18-acre parcel of land ceded to the University of Hawaii (UH) in 1961 through State of Hawaii Executive Order 1987 (Figure 3). MSSC comprises approximately 4.4 acres of land leased by the United States of America Air Force and owned by the University of Hawaii. The site, constructed in 1965, is currently under the jurisdiction of the AFRL. MSSC is adjacent to the boundary of Haleakalā National Park and the Kula Forest Reserve. The HO parcel resides in the General subzone of the State Conservation District, the management of which is regulated by State of Hawaii Revised Statutes and the UH Long Range Development Plan (LRDP).

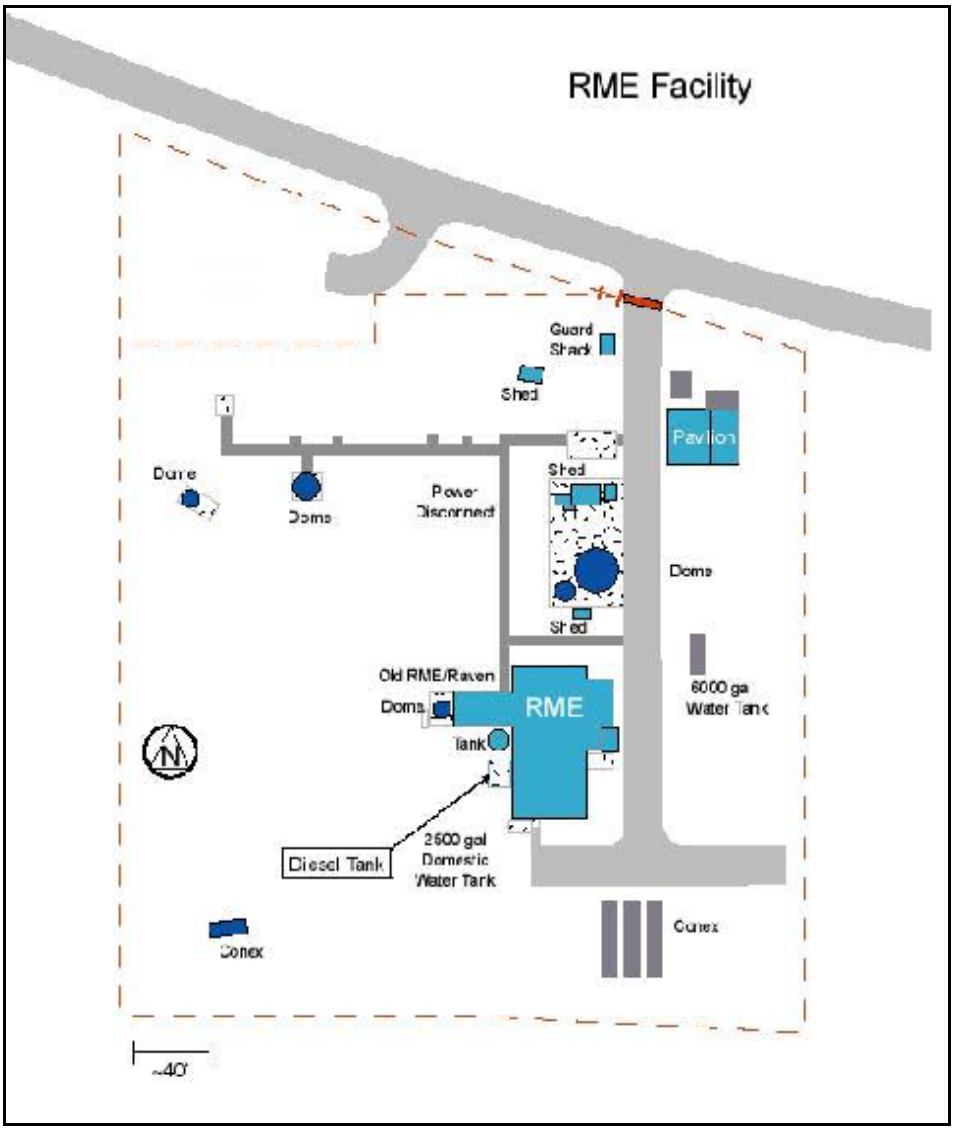

Figure 4: RME Site is leased from a privately-owned ranch located in Kihei, HI approximately one mile east of the MHPCC.

Remote Maui Experiment (RME), Kihei - Maui Hawaii. An adjunct facility, the RME site is a 3.4 acre Air Force site leased from Haleakalā Ranch (a privately-owned ranch). The site is located near the Maui Research and Technology Park and MHPCC in Kihei (at sea level.) The surrounding ranch property is maintained primarily as an active cattle operation.

In 1982 a receiving station was constructed in Kihei at the newly constructed Relay Mirror Experiment facility (RME). The RME site was used to test a program that could demonstrate that a laser beam could be accurately relayed from earth to an orbiting satellite and then back to a target on the ground. Although this experiment is no longer performed the renamed Remote Maui Experiment (RME) is still used for laboratory research to support space situational awareness technology efforts. The RME facility currently houses administrative personnel, optics, and electronics laboratory space. The RME site plan shown in Figure 4 is surrounded by a 10-foot high chain link perimeter fence and contains sparse vegetation. The ground within the site is mostly covered with a four-inch course of lava rock.

Both the MSSC and RME sites are leased and licensed parcels, respectively, owned by non-federal entities. The MSSC parcel is leased from the University of Hawaii, and the RME site is licensed from Haleakalā Ranch. As a result, the Air Force is obligated to comply with the terms and conditions of each agreement and any associated Federal or State environmental laws and guidance documents and implementing the natural resource management activities identified in the INRMP.

Installation/GSU Location and Area Descriptions

Base/GSU Name	Main Use/Mission	Acreage	Addressed in INRMP?	Describe NR Implications
[Maui High Performance Computing Center]	Main Det 15 Headquarters Offices and High Performance Computing Center	2.7	*No*	The MHPCC Building is located in the Maui Research and Technology Park with paved parking and landscaping managed under a MRTP contract.
[Maui Space Surveillance Complex]	The MSSC is a state-of-the-art electro-optical complex combining operational satellite tracking facilities with a research and development facility. It operates three DET 15 telescopes 24 hours a day, 7 days a week. The facility performs vital advanced space surveillance operations, including space object identification.	4.4	Yes	Endangered and threatened species of animals: Hawaiian dark-rumped petrels (*Pterodroma phaeopygia sandwichensis*), Hawaiian goose (*Branta sandvicensis*), Hawaiian hoary bat (*Lasiurus cinereus semotus*); and Hawaiian Yellow-faced (*Hylaeus sp*) bee and plants: Silversword (*Argyroxiphium sandwicense var. macrocephalum*) have been identified as living near and within the MSSC compound.
[Remote Maui Experiment (RME) Site]	Laboratory research site supporting space situational awareness technology R&D efforts	3.4	Yes	The endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) and Blackburn's sphinx moth (*Manduca blackburn*) have been identified in the area adjacent to RME. Other NR management consists of pest control within RME buildings and control of non-native weeds on the site.

2.1.2 Installation History

MSSC. The MSSC has been used for space surveillance and electro-optical research for over forty years. Construction by the USAF began in 1963 and initial site operations started in 1965. The MSSC has been used continuously ever since by various hosts and tenants (ARPA, DARPA, SAC, NORAD, AFSC, AFSPC, and AFMC). The original leasehold was 2.5 acres and subsequent additions have brought the total leased area for the MSSC to approximately 4.4 acres.

RME. In 1988 a receiving station was also constructed in Kīhei at the newly completed Relay Mirror Experiment (RME) facility. The site was designed to demonstrate and evaluate the ability to transmit low power lasers over long distances via relay satellites and ground stations. The program consisted of two separate facilities: a ground-based laser source system and an experiment scoring and control center (ESCC). In 2000 the site was renamed Remote Maui Experiment Site to support the multiple tests that included RF receiving, a radar transmitter and the Raven telescope. Not a specific telescope configuration, Raven is, instead, the concept of combining commercially available components and integrating them into a system supporting specific requirements or missions.

2.1.3 Military Missions

The MSSC conducts space surveillance and research for the U.S. Department of Defense. The operations are performed in the three GEODSS telescope towers, two telescopes of MSSS and the 3.6m telescope in AEOS.

There are two missions performed at the MSSC. The first is to perform research and development of optical acquisition, tracking, measurement, and propagation technologies for laser beam control and imaging applications involving satellites and other objects in support of the Air Force Research Laboratory, Optics Division (AFRL/RDS). The unique location for electro-optical instrumentation at the summit of Haleakalā provides significant capabilities for deep space surveillance, the second mission. The MSSC and GEODSS missions are operated primarily by contractor personnel.

The RME site is used to support various AFRL experiments in the areas of optical and laser technology research and development. The site provides a line of sight to the MSSC for experiments requiring extended ranges and facilities to support ground to space technology developments.

The MSSC and RME is a branch of the Air Force Research Laboratory, Directed Energy Directorate headquartered on Kirtland AFB, NM. The Branch Commander's office is located in the MHPCC Building in Kihei.

Listing of Tenants and NR Responsibility

Tenant Organization	NR Responsibility
GEODSS at MSSC	*The AFRL Det 15 Commander is responsible for ensuring natural resources management and compliance for GEODSS activities.*

2.1.4 Surrounding Communities

There are no communities in the immediate vicinity of the MSSC site. The nearest community is the rural town of Kula, which is located approximately five miles northwest of the installation and approximately twenty miles by road. In 2010, Kula had an estimated population of approximately 10,000 people.

The RME site is located on the east side of the town of Kihei across from the Pi'ilani Highway. Kihei is situated on the southwestern coast of Maui and was historically noted for its dry, dusty and hot days with typically less than 8-10 inches of rain annually. However, Kihei has become a top tourist destination with its numerous shopping malls and miles of beaches. The town currently has a resident population of approximately 25,000 people.

2.1.5 Local and Regional Natural Areas

The most significant natural areas that are within the vicinity of the MSSC site are the Haleakalā National Park and several nearby state forest preserves. Established in 1916, Haleakalā National Park protects over 30,000 acres of land on the island of Maui. Within the park, over 24,000 acres of land are designated as wilderness, and this land is managed and protected under the Wilderness Act of 1964. The park contains a number of diverse ecosystems across its landscape which rises from sea level to over 10,000 feet in elevation. These landscapes include alpine aeolian, subalpine shrub lands, rainforest, dry forest, and stream ecosystems.

Haleakalā is the largest and easternmost of the volcanic complexes that make up Maui. Maui is the second largest island of the Hawaiian Archipelago at 726 square miles, the second youngest island, and the second highest island. Haleakalā is the world's largest dormant shield volcano made up of thousands of thin (average 15 feet thick) basaltic lava flows. Each island of the Hawaiian chain is the summit of a huge volcanic mountain rising 15,000 feet from the ocean floor to sea level. The Hawaiian Archipelago is 2,000 miles from the nearest continent and 500 miles from any other land. The Hawaiian chain forms a southeast trending line roughly 1,500 miles long. The Hawaiian Islands are in a sub-tropical climate, lying between the equatorial zone and the mid-latitude zone at latitudes of 19 - 22 degrees North.

2.2 Physical Environment

2.2.1 Climate

The MSSC site is located on the summit with an altitude of 10,000 feet elevation in a zone that is subject to greater seasonal temperature variations than the lower slopes of Haleakalā or most other areas in Hawaii. Temperatures may fluctuate by thirty degrees or more from night to day, and daytime temperatures generally range from as high as 73 degrees F in the summer to below 20 degrees F in the winter (Western Regional Climate Center 2012). The colder Winter temperatures combined with moist air sometimes result in frost, hail, snow, or sleet. At the summit annual rainfall totals average approximately 39 inches per year. The MSSC is above the inversion layer of the atmosphere much of the time. The air is generally clear and visibility is generally clear depending on the weather.

4.1.2. The climate of the RME site, located at approximately 280 feet above sea level, is mild and characterized by air temperatures that vary minimally. Located on the leeward side of Maui, Kihei is dry and hot with a total annual rainfall of approximately 8-10 inches. High temperatures throughout the year average between 81 and 90 degrees F, with the highest temperatures occurring in August. Similarly, low temperatures do not fluctuate greatly and average between 62 and 67 degrees F.

2.2.2 Landforms

The MSSC site is wholly contained within Pu'u Kolekole. The Kolekole volcanic center is located in East Maui on the southwest rift of Haleakalā, adjacent to the deeply eroded and spectacular summit depression. Geological field studies describe the HO property as an asymmetric volcanic cone whose slopes are steeper at the western and northwestern sides, while the eastern and southern slopes are gentler. Much of the northern slope — most of which is occupied by the MSSC — is flattened and had been

disturbed. The central crater of Kolekole is described as a flattened bowl of ponded ankaramite lava, spatter and pyroclastic ejecta (KC Environmental, Inc. 2010).

The installation is situated at 10,000 feet above sea level on the north-northwest edge of a truncated cone-shaped hill. The hill is approximately 2,000 feet wide at the base, 600 feet high and 900 feet wide across the top. To the northwest of the site there is a very steep down-slope, with rocky slopes surrounding the rest of the facility.

RME is located east of the Pi'ilani Highway on Haleakalā ranch land in Kihei and is east of the Maui Research & Technology Park and Maui High Performance Computing Center. RME is located at sea level and is surrounded by dry grasses (buffelgrass), low rocky ridges and shallow gullies. The soil is stony silty clay loam (volcanic rock), 3-25% slope which covers hard igneous bedrock. The soil has moderate permeability, medium runoff and severe erosion. Very little vegetation grows at site, with the exception of non-native weeds.

2.2.3 Geology and Soils

The Haleakalā shield volcano's most recent eruption occurred sometime between the years 1790 and 1793AD, along the southwest major rift zone on the mountain near the base of the southwestern slope. The flows are several miles wide and were the last eruptions of the Hana volcanic series, characterized by cinder cones and lava along the southwest rift and slopes of the mountain. The MSSC is built on the prehistoric cinder and lava eruptions of the preceding eruptive phase, termed the Kula series (Kolekole cinder cone). The substrate beneath the facility consists of about 100 feet of alkalic pyroclastic cinders blown out of a vent roughly 300 feet west of MSSC. It is a mixture of ash, cinders, pumice and lava, which are black, red, yellow, brown, or variegated in color. Deeper beneath MSSC are inter-bedded ankaramite basalt lava flows in the cinder cone.

Poorly sorted pyroclastic debris and lava belonging to volcanic activity from the most recent eruptive phase characterize the materials at the summit of Haleakalā. As a result, soil development is very poor to non-existent, and even the finest clastic material is nearly devoid of organic content. This area of the summit can support only a sparse distribution of hardy plants.

The geology and soils of the RME site consist of alluvium, dune sand, colluviums, mudflow deposits, and lagoonal deposits (University of Hawaii, Department of Geography 1983). The soils are classified as WID2 – Waiakoa is extremely stony, silty clay loam 3 to 25 percent slopes, eroded (USDWS Web Soil Survey 2012). Most of the RME site has been covered in 4 inches of crushed lava rock.

2.2.4 Hydrology

Because the cinders are extremely porous there are no permanent surface water flows on or near the MSSC. During rain events, most of the runoff generated at the MSSC is diverted by culverts and pipes into the infiltration basin located in the southwestern corner of the site. This basin also receives runoff from portions of the HO site to the east and south of the MSSC boundary. A portion of the runoff from the MSSS roof and the support building's entire roof drain into an underground system that is piped to a percolation basin on the north side of the MSSC. The nearest ground water aquifer is located approximately 5.5 miles southeast of the installation at an altitude of about 6,300 feet. There are no indications of sub-surface water within a 5-mile radius of the MSSC.

There is no surface water located at the RME. However, the nearest coast line is located approximately 2 miles west of the site. The groundwater body beneath the RME has been named as the Kamaole Acquifer by the State Commission on Water Resource Management. The elevation for groundwater is at 580 feet

(DEIS 2012). The entire area surrounding the RME is presently dry pastureland located on the slopes east of Pi'ilani Highway. This soil has moderate permeability, medium runoff and severe erosion hazard. Rainfall averages a scant 8-10 inches per year with the bulk falling during the winter months (Armstrong, 1983). This site lies in the driest part of Maui (Hobdy, 2008). .

2.3 Ecosystems and the Biotic Environment

2.3.1 Ecosystem Classification

Barren high mountain ecosystems such as the summit of Haleakalā are known as aeolian, which is fueled primarily by windblown organic material. In Hawaii this term applies to young non-weathered lava areas usually at high elevations. The MSSC site is located within an ecosystem that is classified as Hawaii alpine dwarf-shrub land (NatureServe 2012). This ecosystem generally occurs on dry alpine slopes of Maui from near 9835-11,150 feet elevation, sometimes extending down into the subalpine arid zones at 8,525 feet. The Summit is at 10,053 feet. The wet trade winds frequently do not rise above 6,233 feet in elevation, being suppressed by the tropical inversion layer, leaving upper slopes too dry to support wet vegetation. Annual rainfall is generally 30-49 in. and falls from October to March. Frost is frequent, even during summer months. Substrates are well-drained and gravelly and derived from cinder and ash, but they can include glacial moraine. Vegetation is typically characterized by scattered dwarf-shrubs (10-20%), grasses, forbs, ferns, lichens, and mosses.

RME is located in any area considered as Lowland dry grassland. This ecological system also includes coastal dry grasslands that occur beyond the immediate coastal effects of the sea with salt spray and salinity (dry stand). Annual precipitation is generally between 8-10 inches per year. Vegetation is characterized by open to dense grassland (NatureServe 2009).

The vegetation surrounding RME is currently dominated by two plant species; kiawe (*Prosopis pallida*) and buffelgrass (*Cenchrus ciliaris*), (Botanical and Fauna Survey, Hobdy 2008).

2.3.2 Vegetation

2.3.2.1 Historic Vegetative Cover

MSSC. The upper slopes of Haleakalā Crater were probably exploited for such resources as birds and bird feathers, logs for canoes and other purposes, and stone for adzes and sling stones. Shrubs and herbs used in medicine probably also were sought. Handy and Handy (1972, p. 276) comment on ancient Hawaiian land use in the area:

"Maui, despite the high mountains forming the west and east sections, had an even more extensive dry area than Hawai`i. All the country below the west and south slopes of Haleakalā, specifically Kula, Honua`ula, Kahikinui, and Kaupo, in old Hawaiian times depended on the sweet potato. The leeward flanks of Haleakalā were not as favorable for dry or upland taro culture as were the lower forest zones on the island of Hawai`i. However, some upland taro was grown, up to the altitude of 3000 feet".

The first recorded visit to Haleakalā by Europeans was probably in 1828, when three men associated with the Lahaina Mission made general observations on the resources found along the way, and produced the first description of the silversword (McGuire and Hammatt, p.30). In 1841, the U.S. Exploring Expedition sent a mapping team to Haleakalā—made up of Gerrit P. Judd, Lorrin Andrews and Joseph Drayton. In just 3 days Drayton sketched the first map of the crater. The team also noticed a bullock track near the summit—suggesting that there was continued usage of a trail across the crater for traversing to East Maui.

Figure 5: Kupaoa-Asteraceae (Dubautia menzeisii) is a Hawaiian native small shrub which grows within MSSC.

RME. In 1888, Edwin H. Bailey, Lorrin A. Thurston, W.H. Baily, and Henry P. Baldwin met in Honolulu and purchased the Maui ranch lands owned by Charles Alexander for $50,000. The resulting ranch included 33,817 acres with 400 to 500 acres set aside for corn cultivation. The land in and around RME area was historically used for ranching activities by Haleakalā Ranch Company. (MRTP FEIS 2013)

Originally this area would have been a dry native forest/shrubland with such trees as wiliwili (*Erythrina sandwicensis*), ‘ohe makai (*Reynoldsia sandwicensis*) and hao (*Rauvolfia sandwicensis*), shrubs such as ‘a’ali’i (*Dodonaea viscosa*), ma’o (*Gossypium tomentosum*), ‘ilima (*Sida fallax*) and grasses and vines such as pili (*Heteropogon contortus*), kalamalō (*Eragrostis atropioides*), huehue (*Cocculus orbiculatus*) and ‘āwikiwiki (*Canavalia pubescens*). The land surrounding RME has been used to graze livestock for the past 150 years. This type of land use has resulted in the gradual loss of native plant species and their replacement with hardy pasture grasses and weeds (Botanical and Fauna Survey for Maui Research and Technology Park [MRTP], Hobdy 2008).

2.3.2.2 Current Vegetative Cover

MSSC. Although the summit area and the land within the MSSC may appear to be devoid of plant life, botanical surveys have shown that both native and non-native species of plants occur throughout most of the area. In 2009, a total of 26 species of plants were found within the MSSC, of which 8 (31%) were native and 18 (69%) were non-native (Starr and Starr 2009). Given the predominantly disturbed nature of the site, the abundance of non-native species is to be expected.

The alpine dwarf-shrub land habitat that is characteristic of the area contains both widely spaced clumps of vegetation and individual plants. Native species located within the MSSC include:

1. Sparse representatives of kupaoa-Asteraceae (*Dubautia menzeisii*).
2. Grasses such as hairgrass-Poaceae (*Deschampsia nibrigena*) and
3. Hawaiian bentgrass-Poaceae (*Agrostis sandwicensis*).
4. Mountain pili (*Trisentum glomeratum*).
5. Common native herbs present include the tetramolopium (*Tetramolopium humile*).
6. The native (or endemic) Haleakalā silversword or ‘ahinahina (*Argyroxiphium sandwicense var. macrocephalum*), which is listed as a threatened species (see Section 5.4) under the ESA, is found within

the MSSC. As of 2012, there were more than 140 individual silverswords growing within the boundaries of the MSSC.

7. Ferns such as Iwa iwa-Aspleniaceae (*Asplenium adiantum-nigrum*) and
8. Maidenhair spleenwort-Aspleniaceae (*Asplenium trichomanes* subsp. *Densum*).

Non-native species that are found throughout the 18 acre HO site are primarily located within areas that have been previously disturbed. The following is a list of Non-native plant species found at MSSC:

1. Maui pamakani- asteraceae (*Ageratina adenophora*)
2. Thyme-leaved sandwort-caryophyllaceae (*Arenaria serpyllifoilia*)
3. Rescue grass- Poaceae (*Bromus catharticus*)
4. Hairy horseweed – Asteraceae (*Conyza bonariensis*)
5. Alfilaria, pin clover, storksbill – Geraniaceae (*Erodium cicutarium*)
6. Red fescue – Poaceae (*Festuca rubra*)
7. Hairy cat's ear – Poaceae (*Hypochoeris radicata*)
8. Sweet alyssum – Brassicaceae (*Lobularia maritime*)
9. Black medic – Fabaceae (*Medicago lupulina*)
10. Narrow-leaved plantain – Plantaginaceae (*Plantago lanceolata*)
11. Annual bluegrass - Poaceae (*Poa annua*)
12. Kentucky bluegrass – Poaceae (*Poa pratensis*)
13. Polycarpon – Caryophyllaceae (*Polycarpon tetraphyllum*)
14. Sheep sorrel – Polygonaceae (*Rumex acetosella*)
15. Sow thistle – Asteraceae (*Sonchus oleraceus*)
16. Common dandelion – Asteraceae (*Taraxacum officinale*)
17. Brome fescue – Poaceae (*Vulpia bromoides*)
18. Rat tail fescue – Poaceae (*Vulpia myuros*)

RME. RME consists primarily of concrete and crushed lava rock surfaces and no vegetative cover is actively maintained. A total of 27 plant species were found to be growing with the sparsely vegetated RME 3-acre fenced area; of these, only two were common indigenous plants: 'uhaloa and 'ilima. (Biological Survey at RME, 4 Mar 2015.) No listed or candidate plant species are currently found within the RME site.

Plant species surrounding the RME fenced in area include: kiawe (*Prosopis pallida*), haole koa (*Leucaena leucocephala*), ʻuhaloa (*Waltheria americana*), balloon plant (*Asclepias physocarpa*), paʻaila (*Ricinus communis*), Golden crown-beard (*Verbesina encelioides*), and ilima (*Sida fallax*).Vegetation is dominated by xerophytic flora including kiawe, lowland shrubs, and non-native grasses. (MRTP FEIS 2013) Other

vegetative cover located within the RME fence lines are identified in the Integrated Pest Management Plan (Haleakalā National Park, 15 Nov 13).

2.3.2.3 Turf and Landscaped Areas

MSSC has several concrete curbed "planter" boxes located around the MSSS facility filled with several inches of native lava rock. The parking area is concrete along the curb and gutters.

5.2.5.2. RME does not have any turfed or landscaped areas. There are a few concrete pads on site for equipment use and crushed lava rock covers the remaining surface area.

2.3.3 Fish and Wildlife

MSSC. The MSSC and HO sites have been surveyed for biological resources (Movements of Hawaiian Petrels near USAF Facilities, Fall 2004 and Spring 2005 ABR, Inc.; ATST botanical survey, December 2005 and July 2009 Starr and Starr; Biological Opinion USFWS for ATST June 15, 2011), on several occasions in conjunction with the development of new facilities and activities associated with major experiments. These have included several botanical and arthropod surveys, a radar and visual survey of the movements of Hawaiian dark-rumped petrels (*Pterodroma phaeopygia sandwichensis*), and annual monitoring of Haleakalā silverswords (*Argyroxiphium sandwicense var. macrocephalum*) within the MSSC site since 1998. All federally listed species at or near the site have been identified.

The diversity of insect fauna (arthropods) at the 18.1 acre HO site is less than what has been reported for adjacent, undisturbed habitat. This is due in part to the harsh climate, but more likely it is a result of the amount of ground disturbance that has occurred at the overall site. (HOMP, June 2010). Arthropod surveys have occurred on numerous occasions within the vicinity of the MSSC site (Medeiros and Loope 1994, Pacific Analytics, L.L.C., 2003, 2005, 2007, 2010, 2011 and 2012). The greatest number of species was identified during a 2003 survey (58 species), of which 29 species were endemic to Hawaii. They included the endemic wolf spider, endemic beetles, endemic moths (and larvae), flies, bees and wasps. Native species were found in comparatively low numbers, possibly due to past disturbances to the soils at the site. See Section 11 for a listing of references.

There is one endemic Candidate species of concern (76 FR 55170) that has been identified by the USFWS. The seven species of HawaiianYellow-faced bee (*H. anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps and H. mana*) have been identified as Candidate Species in accordance with the Endangered Species Act of 1973.

The species of Hylaeus are commonly know as yellow-faced bees or masked bees (See Figure 6) for their yellow-to-white facial markings. All of the Hylaeus species roughly resemble small wasps in appearance, due to their slender bodies and their seeming lack of setae (sensory hairs). However, Hylaeus bees have plumose (branched) hairs on the body that are longest on the sides of the thorax. To a discerning eye, it is these plumose setae that readily distinguish them from wasps (Michener 2000, p.55).

Figure 6: Yellow-Faced Bee (Hyaeus sp) on Silversword Flower at Haleakalā National Park and Hylaeus longiceps on Sesbania

Hawaiian Hylaeus species are grouped within two categories: Ground-nesting species that require relatively dry conditions, and wood-nesting species that are often found within wetter areas (Zimmerman 1972, p. 533; Daly and Magnacca 2003, p. 11). Nests of Hylaeus species are usually constructed opportunistically within dead twigs or plant stems, or other similarly small natural cavities under bark or rocks (i.e., they seek out existing cavities that they suit to their own needs). Like other Hylaeus, Hawaiian Hylaeus lack strong mandibles and other adaptations for digging and often use nest burrows abandoned by other insect species (Daly and Magnacca 2003, p. 9). 76 FR 55170 USFW

The Hawaiian Yellow-faced (*Hylaeus sp*) bee has been seen on the Dubautia and Pukiawe shrubs inside the Haleakalā National Park (Figure 6), (Pacific Analytics, L.L.C., May 2010; July 2011). Multiple species of these solitary bees, which belong to the only genus of native bees in Hawai'i, nest primarily or exclusively in the ground at this alpine site and this likely increases their vulnerability to predation or displacement by invasive nonnative Argentine ants. Because this ant was previously tied to large declines in nesting density of endemic yellow-faced bees (*Hylaeus* spp., family *Colletidae*) at Haleakalā, it was hypothesized that it could indirectly impact silversword reproduction by suppressing this key pollinator group (Krushelnycky, 2014, Reproductive Ecology of a Threatened Alpine Plant).

The cause of the sharp decline in H. facilis is not clear, but it is probably due to habitat loss. Dry areas on Oahu and Maui Nui (Lanai, Molokai, and Maui) have been especially hard- hit by the combination of feral ungulates (especially goats) and subsequent invasion by exotic plants, as well as direct human modification.

RME. In October 2012, the USFWS reviewed a draft report of a natural resource survey which was conducted by the US Navy Facilities, Pacific (USNAVFAC) on the land adjoining the west and east boundary the RME facility.

"Our files indicate that the endangered Hawaiian hoary bat (Lasiurus cinereus semotus) and Blackburn's sphinx moth (Manduca blackburni) may be present on the project site. Additionally, the threatened Newell's shearwater (Puffinus auricularis newelli) and endangered Hawaiian petrel (Pterodroma sandwichensis) may fly over the project area when traversing between the ocean and their mountainous breeding sites. The project site may also be occupied by one or more species of yellow faced bee (genus Hylaeus), five of are known to occur on Maui and are designated as federal Species of Concern (SOC). There is no proposed or designated critical habitat at the project site." See Appendix F for the entire e-mail correspondence.

A biological survey of the fenced RME site and a 2 mile radius was completed in January 2015. No threatened or endangered plant or animal species were observed at the RME site; however, Blackburn's sphinx moth eggs were found within the surrounding 2 mile survey area. Due to high mobility and wide-ranging movement, several other Threatened and Endangered species may occur within the 2 mile radius surveyed area, but they are not likely to occur within the RME site.

2.3.4 Threatened and Endangered Species and Species of Concern

MSSC. Habitat for three Threatened and Endangered (Federal and State) species and one threatened (Federal) species lies within the vicinity of the summit area of Haleakalā, and activities occurring at the MSSC have the potential to directly or indirectly impact all of them. The three endangered species include: the Hawaiian dark-rumped petrel (Figure 8), which nests in burrows located just outside the 18-acre HO parcel; the Hawaiian goose (*Branta sandvicensis*), which nests at lower altitudes but over-flies the summit; and the Hawaiian hoary bat (*Lasiurus cinereus semotus*), which has been sighted near the summit. As discussed in section 5.4.1.1., the threatened Haleakalā silversword (*Argyroxiphium sandwicense var. macrocephalum*) is the only federally listed species found within the MSSC site.

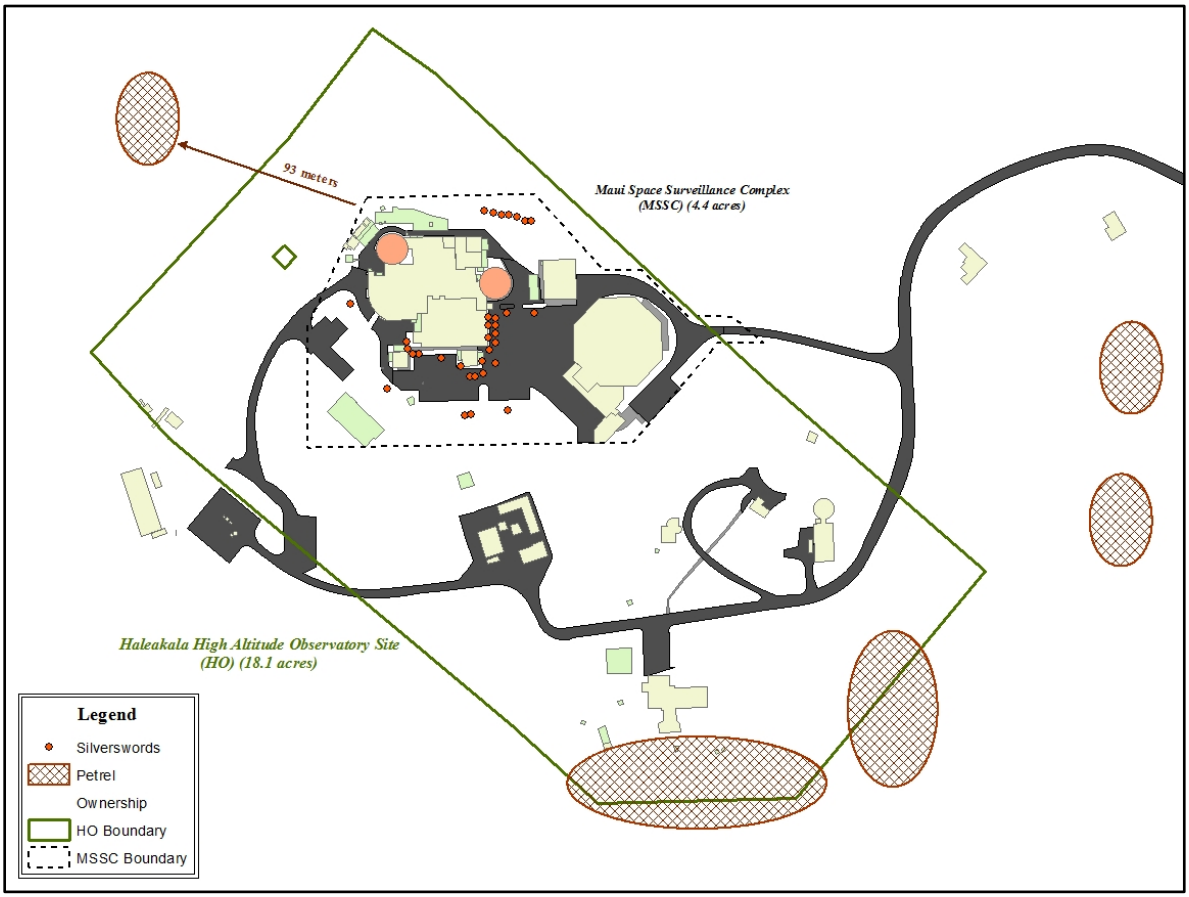

Figure 7: The endangered Hawaiian dark-rumped petrel and the threatened Haleakalā silversword are listed species occurring within the vicinity of the MSSC site.

The Haleakalā silversword (*Argyroxiphium sandwicense var. macrocephalum*) is the only federally listed Threatened species found within the MSSC site. Hawaiian petrels (Endangered - Federal) nest within 328

feet of the site. The two other Federally listed Endangered species known to occur in the area, the Hawaiian goose (*Branta sandvicensis*) located at around 9,000 feet elevation and Hawaiian hoary bat (*Lasiurus cinereus semotus*), are possible "visitors" to the summit area, but have never been recorded at the MSSC site. There are several Haleakalā silverswords of various growth stages that are scattered throughout the area (see Figure 7). Critical habitat has not been designated inside the boundary of the MSSC site for any of the federally listed species.

The Haleakalā silversword is adapted to the intense, ultraviolet-light and cold, dry atmosphere indicative of the summit environment (see Figure 8). The Haleakalā silversword generally flowers from June to September, with annual numbers of flowering plants varying dramatically from year to year. In 2011, which was an average flowering year, there were approximately 565 blooms out of the tens of thousands of plants found on Haleakalā. The largest flowering year was 1991, with over 6,000 blooms, and the lowest year was 1970 with no blooms (Starr and Starr 2011). The Haleakalā silversword was once more abundant on Haleakalā, but feral goats had severely reduced their numbers. Subsequent goat hunting and fencing of the park has allowed the Haleakalā silversword to recover. However, long-term monitoring plots established in 1982 continue to show a decline. The total number of live Haleakalā silverswords in the plots has dropped by 80% from 436 in 1982 to 86 in 2011 (Starr and Starr 2011).

Figure 8: Haleakalā Silversword (Argyroxiphium sandwicense var. macrocephalum.)

The Haleakalā silversword has a highly restricted distribution. It is only found growing at elevations above 6,900 feet on Haleakalā within the crater and outer slopes around the rim. It is a distinctive, globe-shaped rosette plant, with a dense covering of silver hairs that completely hide the leaf surface. Usually single-stemmed, with its sword-like, rigid, and succulent leaves are 5.9-15.8 inches long, 0.2-0.6 inches wide at the middle, and usually three-angled in cross section. The flowering stalk grows 1.6-9.8 feet tall and contains numerous flowering heads. Plants mature from seed to its final growth stage in approximately 15-50 years. The plant remains a compact rosette until it sends up an erect, central flowering stalk, sets seed, and dies. The Silversword comes from the Asteraceae (Asters) family.

Figure 9: Haleakalā Silversword photo and approximate locations at MSSC.

The MSSC site continues to support a small but stable population of Haleakalā silverswords primarily found within landscaped areas surrounding the MSSS building. These plants have been monitored and protected by the Air Force and their primary contractors at the site since approximately 1998. A Silversword location and inventory log is updated annually by the host environmental contractor and maintained by the Air Force. The log shows that the population has increased from a low of two plants in 1998 to a high of over 180 plants in 2010. Silversword plants are thriving in the landscaped planter boxes, utility access points near the facilities and on the north and south slopes of the facility boundaries. The successful seed propagation occurs in these areas due to; (1) facility protection from the harsh winds and climatic elements and (2) nutrient rich conditions. Surveys have been completed by the Air Force (Oct 2013, Jun 2014, and Jul 2015) to define plant location and track population trends. There were 128 plants in 2013, 127 plants in 2014, and 118 plants in 2015 located at the site. Personnel are required to stay on approved pathways and paved surfaces for all outdoor tasks and operations. When dealing with the large population of silversword plants located in utility access areas on the south side of the AMOS facility the AF works to avoid any disturbance to plants. The Air Force coordinates with USFWS and DLNR regarding silversword best management practices and has participated in some seed harvesting. Additionally, the AF complies with all environmental conditions set forth in the lease agreement between the University of Hawaii and the AF. See appendices E and F for the Silversword site plan locations and corresponding GPS coordinates.

Several introduced vertebrate species inhabit the general area of the MSSC site. These include the Indian chukar (*Alectoris chukar*), feral goat (*Capra hircus hircus*), roof rat (*Rattus rattus*), and Polynesian rat (*Rattus exulans*). The mongoose (*Herpestes auropunctatus*) is not a resident of the summit, but individuals sometimes visit the area. Some Hawaiian petrel mortality in the vicinity of the summit has

been attributed to rats and mongoose. Domestic cats and dogs sometimes are found in more vegetated areas of Haleakalā, but none have been observed on the MSSC site.

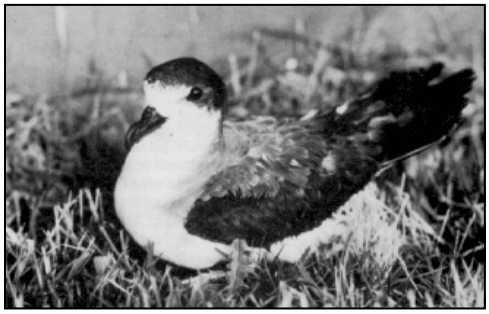

Figure 10: The Hawaiian dark-rumped petrel is an endangered species that nests in areas adjacent to the MSSC.

Hawaiian Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*). The endangered Hawaiian dark-rumped petrel is a seabird that was once endemic to all of the major Hawaiian Islands, including their lower elevations. The population was severely reduced as a result of hunting by man and predation by introduced mammals. Presently, petrels breed only on Maui in deep ground burrows that are generally excavated to 3 to 6 feet, but they can sometimes reach a length of 15 feet or more. The burrows are typically located at elevations above 8,200 feet, on both the inside and outside of Haleakalā Crater.

Petrels return from the ocean to pair, maintain burrows, and breed from February to March. The breeding pairs leave between late-March and late-April and return to lay a single egg from late- April through May. The adults leave the nest to forage before dawn and return after dusk, and they leave for various intervals during incubation, hatching, and fledging. The nestling and fledging periods extend through October.

A study was conducted in the fall of 2004 and the summer of 2005 to determine the movement patterns of Hawaiian petrels nesting near the summit of Haleakalā (ABR 2005). Both radar and visual sampling were used to establish more definitive data related to the spatial and temporal movement patterns and flight altitudes of petrels within the vicinity of the MSSC site. The following summarizes the information presented in this study:

- Movement rates of petrels in the vicinity of the Haleakalā National Park visitor's center were consistently higher than movement rates detected at the HO gate and the MSSC site
- More petrels fly to the crater after dark and more movement occurs in the Fall than in the Summer
- Night flight activity is sustained more consistently (e.g. longer hours after dark) during the Fall than in the Summer
- The directional flight patterns from the Crater are northeast to southwest
- 87% of the petrels fly faster than 30 mph with some flights reaching speeds of up to 49 mph
- More erratic (e.g. no straight line) and circling flying behaviors were observed in the Summer than in the Fall
- Petrels fly at higher altitudes in the Fall than in the Summer
- Fewer petrels were seen on the radar in the vicinity of the MSSC site than near the Crater because the Crater is much more active for breeding and displaying birds than is that part of the colony along the southwestern ridge (e.g., ridge on which the HO and MSSC are located)
- The Hawaiian petrel is a large petrel, approximately 16 in long with a wing span of 3 feet. Previously known as the dark-rumped petrel, the Hawaiian petrel has a dark gray head, wings, and tail, and a white forehead and belly. The Hawaiian petrel has a stout grayish-black bill that is

hooked at the tip, and feet that are pink and black (USFWS ATST Biological Opinion (BO) 2011, pg. 43).

They prefer to nest in alpine dry shrub land habitat, consisting of widely scattered shrubs with a total vegetative cover of less than 10%. The burrow is typically located on steep slopes, below large rocks, and in close proximity to vegetation such as shrubs (Brandt et al. 1995). Suitable nesting habitat does not exist within the MSSC site. However, a cluster of burrows is located less than 328 feet to the northwest and down-slope of the site (see Figure 7).

Figure 11: The Hawaiian Goose (Branta sandvicensis) is an endangered species that lives on the slopes of Haleakalā.

Hawaiian Goose (*Branta sandvicensis*.) The endangered Hawaiian goose or 'nene' lives on the slopes of Haleakalā and on the island of Hawaii. The Hawaiian goose does not migrate and generally nests from October to February. While once abundant, the population has declined as a result of habitat alteration, predation by humans, and introduced species. The Hawaiian goose did not occupy Maui for about sixty years until 1949, when an active breeding and reintroduction program was initiated. The first reintroduction on Maui occurred on July 26, 1962 when 35 Hawaiian geese were released in Haleakalā National Park.

The Hawaiian goose seems to be adaptable and is currently found at elevations ranging from sea level to almost 7,800 feet in a variety of habitats including nonnative grasslands (such as golf courses, pastures, and rural areas); sparsely vegetated, high elevation lava flows; cinder deserts; native alpine grasslands and shrublands; open native and nonnative alpine shrubland-woodland community interfaces; mid-elevation 2,300 to 3,900 feet native and nonnative shrubland; and early successional cinderfall. Historically, flocks moved between high-elevation feeding habitats to lowland nesting areas. Pairs mate for life and engage in relatively simple courtship displays in which the male attacks or threatens potential competitors, runs back to his mate, and calls loudly. (USFWS 2004).

The current Maui population is thought to be approximately 425 individuals with a population of 250-350 in the Haleakalā Park. Reports of Hawaiian geese occurring, either on the ground or in flight, outside the Park boundary constitute approximately 0.14 percent of the total occurrences recorded by the Park since 1988.

Of the Hawaiian goose occurrences reported outside the Park, most were from sites immediately below the Park in various locations in Kula; very few were observed along the road. Observations were made by both trained biologists and the public: thus, detailed location information was not available for all of the observations (NRAG 2010). While the Hawaiian goose has been known to fly over the area that will be within the proposed conservation/mitigation area defined by the US Fish and Wildlife Service, the summit area is outside the known feeding range of the bird (USFWS Biological Opinion for ATST).

Figure 12: Hawaiian Hoary Bat (Lasiurus cinereus semotus) Ope'ape'a (half-leaf.)

Hawaiian Hoary Bat (*Lasiurus cinereus semotus*.) The Hawaiian hoary bat is found on Hawaii Island, Maui, Oahu, Kauai and Molokai. The bat breeds on the lower slopes of Haleakalā. On the island of Hawaii, most observations have been from areas below 7,500 ft. elevation, although individuals have been recorded at elevations as high as 13,000 ft. On Maui, the bat breeds along the lower Haleakalā slopes. Bats have been detected near the Haleakalā National Park headquarters visitor center and Hosmer Grove (Frasher et al. 2007). Several sightings have been reported on Maui at various elevations with a few near the summit of Mount Haleakalā. Cold temperatures make it unlikely that the bat is a resident at the summit (Biological Assessment for BOLT, USAF, URS, 1988).

This nocturnal bat is the only native terrestrial mammal known to occur in the Hawaiian archipelago, although other bat species have been found in sub-fossil remains. Bats are known to depart the roost shortly before sunset and return before midnight (Recovery Plan USFWS 1998). Bats are most often observed foraging in open areas, near the edges of native and non-native forests, over both marine and fresh open water, and over lava flows. Bats have been observed feeding from 3 to 492 ft. above ground and water. Bats roost, give birth, and rear pups in woody plants greater than 15-ft tall. Bat-birthing and pup-rearing season occur from approximately May 15 through August 15. Roosting bats have been recorded from a variety of species including hala (*Pandanus tectorius*), kukui (*Aleurites moluccana*), pukiawe (*Styphelia tameiameaiae*), java plum (*Syzygium cumini*), ohia lehua (*Metrosideros polymorpha*), and Eucalyptus. Most of the available data suggests that this elusive bat roosts solitarily in the foliage among trees in forested areas. (USFWS Biological Opinion for ATST, Dr. Craig B. Foltz, June 2011).

Figure 13. Blackburn's Sphinx Moth (Manduca Blackburn.)

Blackburn's Sphinx Moth (*Manduca blackburni*.) The Blackburn's Sphinx Moth is an Endangered species in accordance with the Endangered Species Act of 1973, as amended (Act). The moth has been observed

from sea level to 5,000 ft. elevation. Most historical records were from coastal or lowland dry forest habitats in areas receiving less than 25 in of annual rainfall. It appears most common in Maui, where it was recorded Kahului, Spreckelsville, Makena, Wailuku, Kula, Lahaina and West Maui. Blackburn sphinx moth larvae feed on plants in the nightshade family (Solanaceae). The natural host plants are native trees within the genius *Nothocestrum* (aiea), on which the larvae consume leaves, stems, flowers and buds. However, many of the plants recorded for this species are not native to the Hawaiian Islands, and include *Nicotiana tabacum* (commercial tobacco), *Solanum melongena* (eggplant), *Lycopersicon esculentum* (tomato), and possibly *Datura stramonium* (Jimson weed).(USFWS68 FR 34761)

RME. There have Flora and Fauna biological surveys conducted surrounding RME, however, the RME site has not been formally surveyed by the U.S. Fish and Wildlife service. The National Park Service has identified eleven species of Flora growing at the RME site from pictures. The Flora identification from pictures was conducted 15 November 2013.

2.3.5 Wetlands and Floodplains

MSSC and RME do not have any associated wetlands or floodplains.

2.3.6 Other Natural Resource Information

Section 11, References, includes a list of biological survey reports performed in and around the MSSC and RME sites.

2.4 Mission Impacts on Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

The installation's small size and the extent of improved grounds limit the opportunities for there to be many natural resource management issues. However, these same factors also contribute to the difficulty in avoiding impacts to any listed or sensitive species that do exist on site.

The primary natural resource constraints to current and future installation missions and planning at the MSSC site are related to; (1) the conservation and protection of nearby Hawaiian petrel nesting sites, (2) the conservation and protection of the Haleakalā silversword population on site, and (3) preventing the inadvertent introduction of and spread of non-native species on Maui and at the summit area as a result of installation activities. The maintenance and further development of existing cooperative relationships with the USFWS, NPS, DLNR, and the University of Hawaii will help ensure that shared resources and expertise are utilized to minimize potential impacts to the mission.

2.4.2 Land Use

MSSC. Buildings, parking lots, generators, walkways, and storage tanks cover the majority (2.4 acres [55%]) of the land within the MSSC site. The remaining area (approximately 2 acres) is mostly semi-improved grounds that have been graded. The two primary buildings on the site include the GEODSS structure contiguous with the MSSS building and the Advanced Electro-Optical System (AEOS) facility. A support building, which is utilized for office, maintenance and fabrication purposes, is located between these other facilities.

RME. Structures located on the RME site consist of an 4,210 square-foot steel-framed, sheet metal sided and roofed experiment building, a wood frame gate house, a 100 square-foot antenna building, three small telescope domes, approximately 3-5' in diameter and less than 10' in height, a recreation building and

three metal shipping containers used for storage (Figure 3). Just to the north of the fenced area is an area of unfenced land that contains a small parking area.

2.4.3 Current Major Impacts

There are no known mission impacts that affect or may potentially affect natural resources at the MSSC or RME sites. The waste generated at both of the sites falls into two categories; 1) waste generated from maintenance operations (used oil from compressor drain off, engine oil changes, used telescope mount hydraulic oil, solvents used in parts and paint cleaning); and 2) hazardous waste generated from general research site operations. The total amount of hazardous waste generated at MSSC is classified as a Small Quantity Generator (SQG). The amount of hazardous waste generated at RME is small enough to be a Conditionally Exempt Small Quantity Generator (CESQG).

There are no major pollution concerns, permitted air or water pollution sources, noise pollution problems, or ground water contamination issues at either site. The AFRL Det 15 MSSC Hazardous Waste Management Plan (2014), which includes the RME, ensures protection of the environment and compliance with applicable environmental laws and regulations.

2.4.4 Potential Future Impacts

The future missions for the sites listed in this plan (MSSC and RME) are not projected to change. However, future construction or management activities may impact listed species or other natural resources in the vicinity of the summit. The Air Force will consult with the USFWS, NPS, DLNR, and the University of Hawaii prior to initiating any activities that may have affect listed species, in accordance with the Endangered Species Act (ESA.)

2.4.5 Natural Resources Needed to Support the Military Mission

The mission at the MSSC and RME sites are primarily supported through; 1) the availability of a stable land area for the operation and construction of facilities, and 2) an unobstructed view of the atmosphere at altitude provided by clean, dry air and minimal scattered light from surface sources.

3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The AF environmental program adheres to the Environmental Management System (EMS) framework and it's Plan, Do, Check, Act cycle for ensuring mission success. Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, U.S. Department of Defense Instruction (DoDI) 4715.17, *Environmental Management Systems*, AFI 32-7001, *Environmental Management*, and international standard, ISO 14001:2004, 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 managing associated risks, and instilling a culture of continuous 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 the table below. Specific natural resources management-related roles and responsibilities are described in appropriate sections of this plan.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Installation Commander	• LtCol Andrew Emery, AFRL/RDSM, 808-891-7701 • *The AFRL Det 15, a Branch under the AFRL Directed Energy Directorate (AFRL/RD) located on Kirtland AFB, NM, Commander has the lead responsibility for the implementation of this INRMP. The Commander receives environmental support from the AFRL/RD Test and Environmental Office.*
AFCEC Natural Resources Media Manager/Subject Matter Expert (SME)/ Subject Matter Specialist (SMS)	
Installation Natural Resources Manager/POC	Ms. Michelle Hedrick, AFRL/RDMT, Environmental Program Lead, 505-846-4574. Mr. Joseph Volza, Deputy Environmental Program Lead, 505-846-4050.
Installation Security Forces	Matthew Mitchell, AFRL/RDSMS, 808-891-7789
Installation Unit Environmental Coordinators (UECs); see AFI 32-7001 for role description	James Gardner, AFRL/RDSM, 808-891-7748
Installation Wildland Fire Program Manager	N/A
Pest Manager	James Gardner, AFRL/RDSM, 808-891-7748
Range Operating Agency	N/A
Conservation Law Enforcement Officer (CLEO)	N/A
NEPA/Environmental Impact Analysis Process (EIAP) Manager	Ms. Michelle Hedrick, AFRL/RDMT, Environmental Program Lead, 505-846-4574
National Oceanic and Atmospheric Administration (NOAA)/ National Marine Fisheries Service (NMFS)	N/A
US Forest Service	N/A
US Fish and Wildlife Service	Mary M. Abrams, Ph.D. Field Supervisor Pacific Islands Fish and Wildlife Office
Hawaii Department of Land and Natural Resources	Suzanne D. Case Chairperson Hawaii DLNR

5.0 TRAINING

AF 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

1. Natural resources awareness training is provided during in-processing of all new employees and visitors, to ensure that all personnel are aware of their role in the program and the importance of their participation to its success. The employee NR awareness training addresses all essential elements of the INRMP. AFRL/RD NR Managers and Installation UECs will continue their environmental management education via courses, seminars, and on-line training to maintain knowledge on current NR topics. Mandatory training for AFRL/NR Managers will include DoD Natural Resources Compliance course. .

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 (AFRIMS) records disposition schedule (RDS). 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

Records of Natural Resources Management Awareness Training are maintained by Det 15 Civil Engineering IAW Air Force Manual 33-363, Management of Records. Records and training certificates of completion for the AFRL/RD and Installation Environmental staff are kept as part of the bi-annual AFRL Continuing Education Unit (CEU) 80 hour training requirement.

6.2 Reporting

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

Installation Supplement –Reporting

The RDSM UEC will provide semi-annual reports to the installation NRM on status of INRMP Goals and Objectives. All NR incidents, suspected incidents, or concerns will be reported to the installation NRM within 5 working days of occurrence. The National Park and/or State Division of Forestry and Wildlife will be immediately notified and permitted to enter on to the site, if any sighting or grounding of endangered species such as nene, petrel, or bat occurs on MSSC property.

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

The INRMP is a living document that integrates all aspects of natural resources management along with the installations mission requirements. This plan must be considered when developing future projects and mission changes. Air Force AFRL DET 15 management will continue to work cooperatively with other agencies on an as-needed basis including the USFWS, State of Hawaii Government, DNLR, NPS, Haleakalā Ranch Company, UH, Site contractors, Maui Economic Development Board, other local county or city officials, neighbors and summit users.

7.1 Fish and Wildlife Management

Applicability Statement

This section **IS NOT** applicable to this installation.

Program Overview/Current Management Practices

The MSSC is located within the General Subzone of the State of Hawaii Conservation District that has been set aside for astronomical facilities. The USFWS has been consulted and concurred with the AF determination that the MSSC on Haleakalā qualifies under a Category I classification. Category I installations are those that have natural resources requiring protection and management, such as habitat for protected species, aquatic resources, or any habitat that is suitable for conserving and managing wildlife. Installations falling under this category typically require the preparation and implementation of an INRMP in accordance with AFI 32-7064.

The RME site is located on 3.5 acres of a licensed parcel from the Haleakalā Ranch on the dry coastal areas of south Maui at an elevation of 200 feet. Sparse scrub and trees inhabit the general area with no protected species on or near the site. Species of concern include the recently identified “yellow-faced bee” and the “black sphinx moth”. Rodents are a problem in these dry coastal areas and a pest contractor is utilized to mechanically control them. The herbicide (Roundup) is used to control weed growth. RME grounds personnel are trained be able to identify and avoid plant species that are food sources for the sphinx moth or yellow-faced bee.

7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

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

Program Overview/Current Management Practices

General public access is restricted for both the MSSC and RME sites. There is limited public access to two ahus, or rock shrines, at MSSC which are occasionally used by Native Hawaiians to perform religious ceremonies.

7.3 Conservation Law Enforcement

Applicability Statement

The MSSC maintains a 24 hour/7 day a week security presence. The main purpose of the security police at MSSC is to protect the government facility and resources. In the event of a NR violation, the security police would detain the offending party and contact local law enforcement.

The RME site maintains a fenced area, with access controlled via an electronic keypad code for access. RME depends upon local law enforcement for security.

Program Overview/Current Management Practices

Det 15 personnel receive NR and security practices training during site familiarization as part of its employee indoctrination program. In the event of a suspected NR violation, personnel are instructed to detain the person and contact local law enforcement.

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

Applicability Statement

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

Program Overview/Current Management Practices

The federally endangered Hawaiian petrel occupies burrows in cinder on the upper slopes of Haleakalā that are active year after year, since the birds return to the site of their birth. Petrels are night flying birds, leaving their burrows to search for food during nesting and fledgling seasons. The burrows closest to the MSSC site are located on the north slopes below the MSSC. The lease agreement with the Department of Land and Natural Resources (DNLR) and the Haleakalā High Altitude Observatory Site Management Plan (HOMP) will be taken into consideration along with all Federal, State and local laws and directives to ensure that the Hawaiian petrel habitat will be protected during any construction activities.

The federally threatened Haleakalā silversword occupies landscaped areas, other disturbed areas, and natural areas within and around the MSSC site (Figure 4, 5). Routine maintenance and construction activities within the site have the potential to affect this species. To minimize impacts to the species, the AF will either; 1) avoid conducting ground disturbing activities (e.g. any activity having an impact deeper than the soil's surface layer) within 6 feet of individual plants to minimize effects to their shallow, fibrous root system, or 2) if ground disturbing activities must occur within 6 feet of individual plants, the AF will implement mitigation as required by consultation with the USFWS and DLNR. Additionally, the AF will contact USFWS and/or DLNR personnel regarding the status of silversword population and blooming conditions on the MSSC property in the event seed harvesting can support propagation programs.

At this time no other species have been identified at either MSSC or RME as Threatened or Endangered, or species of concern.

Det 15 personnel are provided awareness training for Threatened and Endangered plant and animal species in and around MSSC and RME. Active management is limited to activities identified in the Integrated Pest Management Plan which consists of hand weeding areas for control of non-native, invasive plants.

7.5 Water Resource Protection

Applicability Statement

This section **IS NOT** applicable to this installation

Program Overview/Current Management Practices

The MSSC installation has three independent Class V injection wells (large capacity domestic septic systems) which collect non-industrial wastewater. The system is exempt from wastewater permits because it lies within an unincorporated area. The MSSC is also exempt from federal permitting requirements for storm water discharge associated with industrial activity. Federal regulations (40 CFR 122.26 (b) (14)) require permitting of storm water discharge at certain facilities based upon industrial classification and scope of industrial activity. This broad-based regulatory program encompasses many of the sources of storm water pollution that non-point source discharge programs were designed to address. The MSSC is exempted from regulatory control because the facility does not fit into any category of industrial activity that would have a significant impact to storm water quality.

RME has two toilets and accompanying sinks for domestic use. The RME wastewater system consists of a 2,000 gallon septic storage tank that is pumped regularly as needed by a commercial waste disposal company. The wastewater is transported to Wailuku where it is pumped into a manhole connected to the Kahului Publicly Owned Treatment Works (POTW).

The RME is exempted from regulatory control because the facility does not fit into any category of industrial activity that would have a significant impact to storm water quality.

7.6 Wetland Protection

Applicability Statement

This section **IS NOT** applicable to this installation

Program Overview/Current Management Practices

There are no wetlands in or adjacent to the MSSC or RME sites.

7.7 Grounds Maintenance

Applicability Statement

This section applies to AF installations that perform ground maintenance activities that could impact natural resources. This section **IS NOT** applicable to this installation.

Program Overview/Current Management Practices

The sparse vegetation of the site limits grounds maintenance to quarterly cleanup and removal of non-native invasive weeds growing around buildings and paved areas. Herbicides are not used at MSSC. Only hand weeding of non-native or invasive plants are allowed at MSSC which has been identified in the Integrated Pest Management Plan. This action is performed on a recurring work request quarterly. In addition, an annual Invasive Plant Control report is submitted by the USAF to the University of Hawaii, indicating how the HOMP is being implemented at MSSC to control invasive plant species. Personnel also participate in a semi-annual pickup of loose trash around the site.

There are no turfed areas or ornamental shrubs located within the RME site. Round up is used as an herbicide only on non-native invasive weeds. The non-native species have been identified in the Integrated Pest Management plan for visual reference.

7.8 Forest Management

Applicability Statement

This section **IS NOT** applicable to this installation

Program Overview/Current Management Practices

There are no forests at the MSSC or RME sites.

7.9 Wildland Fire Management

Applicability Statement

This section **IS NOT** applicable to this installation

Program Overview/Current Management Practices

There is no wildland fire management program for MSSC or RME, due to sparse vegetation around sites.

7.10 Agricultural Outleasing

Applicability Statement

This section **IS NOT** applicable to this installation

Program Overview/Current Management Practices

There is no agricultural outleasing at either MSSC or RME.

7.11 Integrated Pest Management Program

Applicability Statement

This section applies to AF 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

The Integrated Pest Management Plan for MSSC, RME, and MHPCC is included as Tab B. The IPMP identifies specific plant, animal and insect pests and the approved method of control at each site. The IPMP includes an Environmental Considerations section that discusses Endangered and Protected plant and animal species located on or near the MSSC and RME sites and specific procedures to prevent disturbance or harm to these species.

7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)

Applicability Statement

This section applies to AF 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

BASH Program is not required because there are no aircraft operations at either MSSC or RME sites.

7.13 Coastal Zone and Marine Resources Management

Applicability Statement

This section **IS** applicable to this installation

Program Overview/Current Management Practices

The State of Hawaii states that "Because there is no point of land more than 30 miles from the ocean, a definite land-sea connection exists throughout the state. So, designating the entire state as the CZM area was logical. What occurs on land, even on the mountains, will impact and influence the quality of the coastal waters and marine resources." Due to the small land areas and type of activities associated with MSSC and RME, no specific CZMR Management program requirements have been defined.

7.14 Cultural Resources Protection

Applicability Statement

This section applies to AF 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 Integrated Cultural Resources Management Plan covers the years 2010-2015 and is the primary tool for implementing the MSSC and RME cultural resources management program. The ICRMP has been reviewed and approved by the State of Hawaii Historic Preservation office. The plan is designed to complement other MSSC and RME plans, programs, and guidance, and presents information that will help Air Force and site personnel make informed decisions about the treatment of cultural resources under Air Force control. In accordance with Air Force Instruction (AFI) 32–7065 (June 2004), Cultural Resources Management Program, the ICRMP will be updated every 5 years, or sooner if circumstances substantively change. At a minimum, it will be reviewed annually and amended as needed, based on the most current version of AFI 32-7065.

There is one building in the MSSC that is eligible for inclusion in the National Register of Historic Places. No other buildings at MSSC or RME are recommended for inclusion in the National Register. Several archaeological sites have been recorded adjacent to the boundary of MSSC, but none have been identified on MSSC or RME. Haleakala is an integral part of the Hawaiian culture and is of ceremonial and traditional importance to the Native Hawaiian People. Haleakala has been determined eligible for inclusion in the National Register as a Traditional Cultural Property (TCP) through consultation between the National Science Foundation (NSF) and the Hawaii State Historic Preservation Officer (SHPO) under criterion A and criterion C. The Integrated Cultural Resources Management Plan (ICRMP) is included as Tab A, below.

7.15 Public Outreach

Applicability Statement

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

Program Overview/Current Management Practices

Det 15 complies with the University of Hawaii's Haleakala Observatory Management Plan and the ICRMP for performing public outreach and reviews of any proposed actions. Additionally, Det 15 conducts primary and secondary public school student tours of facilities several times a year, which includes discussions of NR issues. Det 15 employees and site visitors are provided with NR issues training as part of their site indoctrination.

7.16 Geographic Information Systems (GIS)

Applicability Statement

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

Program Overview/Current Management Practices

This section applies to all AF installations that maintain an INRMP. AFRL Det 15 is required to implement this element. The small size of the site has historically limited the use and application of a Geographic Information System (GIS) for the MSSC. However, given the occupancy of the site by Haleakalā silverswords and the general location of the site in relation to known Hawaiian petrel burrows, accurate mapping of installation natural resources, structures, utilities, topography, and storage facilities is of value to the Air Force and our partners. As part of this INRMP, GPS coordinates were incorporated in the Silversword inventory for their approximate location. See Appendix E for the inventory.

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. Also, in cases where off-installation land uses may jeopardize AF 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: Comply with the Sikes Act Improvement Act of 1997, and the Sikes Act Reauthorization Act of 2013, as amended and the Air Force Instruction (AFI 32-7064) Integrated Natural Resources Management, as updated;

Goal 2: Foster an atmosphere of coordination and cooperation with the U.S. Fish and Wildlife Service (USFWS), Haleakalā National Park Service (NPS), and Hawaii Department of Land and Natural Resources (DLNR) to inventory, map and preserve endangered species on or near the site;

Goal 3: Ensure populations of threatened and endangered species on or near the site are protected and managed in compliance with the Endangered Species Act of 1973, as amended (ESA);

Goal 4: Prevent the introduction of or the spread of invasive species to the summit area (MSSC) and at RME in accordance with the NPS requirements;

Goal 5: Support resource conservation through ground maintenance programs and plans, when and where possible;

Goal 6: Increase the awareness, appreciation and conservation of natural resources on MSSC and RME.

9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

9.1 Natural Resources Management Staffing and Implementation

- Revision of the INRMP entails the following specific coordination requirements:
- The USAF shall advise all appropriate internal and external stakeholders of the intent to revise the INRMP within thirty (30) days of starting such an action.
- The USAF shall notify the USFWS (Pacific Islands Field Office, Honolulu, Hawaii) and DLNR office of its intent to provide a draft INRMP for review and coordination at least sixty (60) days prior to delivering such document.
- The USAF shall send an initial draft INRMP to the USFWS (Pacific Islands Field Office, Honolulu, Hawaii) and the DLNR for review and comment. A copy of the forwarding letter shall be sent to the Sikes Act Coordinator at the USFWS Region 1 office for notification that the review process has begun.
- The USAF shall request written acknowledgement of receipt of the draft INRMP within fifteen (15) days of receipt.
- The USFWS field office will provide written comments to the USAF and furnish copies of the letter to the Sikes Act Coordinator at the USFWS Region 1 office to the State DLNR director's office and to the University of Hawaii lease holder.
- The State DLNR will provide written comments to the USAF and furnish copies of the letter to the Sikes Act Coordinator at the USFWS Region 1 Office.
- The USAF shall consider all comments received and send a final draft of the INRMP to the USFWS Region 1 office and the DLNR director's office with a letter documenting the actions taken on the draft comments. The USAF shall furnish a copy of the letter to the appropriate USFWS field office.

The USAF should request that the USFWS and the DLNR director provide written comments from all appropriate offices and divisions within sixty (60) days of receipt of the final draft INRMP unless the participants mutually agree upon a longer review period due to a particularly large or complex INRMP.

9.2 Monitoring INRMP Implementation

Success criteria were developed to evaluate the success of achieving INRMP goals and objectives. Specific criteria were developed for each project listed in the natural resources database with the purpose of tracking project progress.

9.3 Annual INRMP Review and Update Requirements

The INRMP is considered approved and compliant with the Sikes Act if signed by the appropriate representative from the USFWS and DLNR within the past five years. INRMP approval is sustained through the annual INRMP review and coordination process, and the INRMP is considered current until the annual review documents that an update is required, or concurrence is rescinded by notice from the USFWS or DLNR. Individual work plans will be updated every 2 years by the designated natural resources proponent. If major changes to the work plans occur, USFWS and DLNR will be informally

consulted. Annual coordination on the installation will remain with designated natural resources proponent. Annual updates and 2-year work plan updates will be approved by the designated natural resources proponent.

The INRMP requires review on an annual basis but must be updated at least once every five years, in accordance with DoDI 4715.03, *Natural Resources Conservation Program*, and AFI 32-7064, to ensure the achievement of mission goals, verify the implementation of projects, and establish any necessary new management requirements. This process involves installation natural resources personnel and external agencies working in coordination to review the INRMP.

If the installation mission or any of its natural resources management issues change significantly after the creation of the original INRMP, a major revision to the INRMP is required. The need to accomplish a major revision is normally determined during the annual review with USFWS and the appropriate State agencies. The NRM/POC documents the findings of the annual review in an Annual INRMP Review Summary and obtains signatures from the coordinating agencies on review findings. By signing the Annual INRMP Review Summary, the collaborating agency representatives assert concurrence with the findings. If any agency declines to participate in an on-site annual review, the NRM submits the INRMP for review along with the Annual INRMP Review Summary document to the agency via official correspondence and request return correspondence with comments/concurrence.

Draft INRMPs and any revisions will be coordinated through the ESOHC. The ESOHC will ensure that the INRMP, Integrated Cultural Resources Management Plan and Integrated Pest Management (IPM) Plan are mutually supportive and are not in conflict. The revised plan is approved by the installation commander. If a dispute arises in the course of a plan revision that cannot be resolved, then the DET 15 ESOHC will make a decision on the matter. All other site management plans are on file and available from AFRL/DET 15.

The USFWS, the State, and the NRM will conduct an Annual INRMP Review Meeting. This meeting takes place in person with respective representatives for each agency. Individuals may telephone or video call if they cannot attend in person. During this meeting the NRM updates the external stakeholders/parties with the end of the year execution report and coordinates future work plans and any necessary changes to management methods etc. All parties review the INRMP and begin preliminary collaborative work on updating the INRMP (new policies, procedures, impacts, mitigations, etc.) as applicable. Following completion of updates, to include internal AF review, the INRMP is staffed for signature.

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 AF framework. Priorities are defined as follows:

1. High: The INRMP signatories assert that if the project is not funded the INRMP is not being implemented and the Air Force 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.
2. 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 on Invasive Species. However, the INRMP signatories would

not contend that the INRMP is not be implemented if not accomplished within programmed year due to other priorities.

3. Low: Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the installation mission, and/or support long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

Annual Work Plans (Include Year)	**OPR**	**Funding Source**	**Priority Level**
1. MSSC and RME Listed Species Education Program – Staff and Contractors	Jim Gardner	Internal	MEDIUM
2. Annual MSSC Haleakalā Silversword Monitoring	Michelle Hedrick	Internal	MEDIUM
3. MSSC and RME Annual Non-native Plant Eradication	Jim Gardner	Internal	LOW

11.0 REFERENCES

11.1 Standard References (Applicable to all AF installations)

1. AFI 32-7064, *Integrated Natural Resources Management*
2. Sikes Act
3. eDASH Natural Resources Program Page
4. Natural Resources Playbook – a Internal AF reference available at https://cs1.eis.af.mil/sites/ceportal/CEPlaybooks/NRM2/Pages/

11.2 Installation References

- ABR, Inc. Environmental Research and Services (2005). Movement of Hawaiian Petrels near USAF Facilities Near the Summit of Haleakalā, Maui Island, Fall 2004 and Spring 2005,Prepared for USAF AFRL. September 2005.
- Argonne National Laboratory (1991). Environmental Compliance Assessment and Management Program (ECAMP), Preliminary Environmental Findings for Maui Space Surveillance Site, December 1991, Lakewood, CO.
- Argonne National Laboratory (1988). Environmental Compliance Assessment and Management Program (ECAMP), Candidate Environmental Findings for Maui Satellite Tracking Site. September 1988, Lakewood, CO.
- Bailey, Cathleen S. Natividad (2009). Seabird Inventory at Haleakalā Nation Park, Maui, Hawaii.
- Technical Report 164, Pacific Cooperative Studies Unit, University of Hawaii at Manoa
- Belt Collins Hawaii (1994). Environmental Impact Assessment for Advanced Electro-Optical System (AEOS) Telescope and Related Improvements at the MSSS, Haleakalā, Maui. Belt Collins Hawaii, Honolulu, Hawaii.
- Bhattacharji, S. (1991). Geologic Site Assessment in Science City Area, Haleakalā Summit Region, East Maui. Prepared for Rockwell Power Systems, Honolulu, HI.

- Chatters, J. C. (1991). Cultural Resources Inventory and Evaluation for Science City, Conducted for Expansion of the Maui Space Surveillance Site, Haleakalā, Maui, Hawaii. Prepared for U. S. Air Force Headquarters Space Systems Division. Pacific Northwest Laboratory, Richland, WA.
- Dames & Moore (1992). Preliminary Foundation and Geophysical Investigation Site Selection Study Proposed 4-Meter Telescope, Haleakalā, Maui, Hawaii. Honolulu, HI.
- Dames & Moore (1993). Final Report Ground Vibration Measurements During Soil Cement Test Paving MSSS Access Road Haleakalā, Maui, Hawaii. Honolulu, HI.
- Dames & Moore (1989). US Air Force Installation Restoration Program for Maui Satellite Tracking Site, Hawaii Final Preliminary Assessment, August 18, 1989.
- Dames & Moore (1989). U.S. Air Force Installation Restoration Program for Maui Satellite Tracking Site, Hawaii Final Remedial Action Plan for Site BB-1, SP-1 SP-2, November 17, 1989.
- Dames & Moore (1990). U.S. Air Force Installation Restoration Program for Maui Satellite Tracking Site, Hawaii Final Decision Document, March 9, 1990.
- Environmental Science & Engineering, Inc. (1991). Pre-survey Report Potable Water System Remediation. Prepared for Detachment 3, 18th Surveillance Squadron Headquarters, Air Force Space Command.
- Frasher, Heather, V. Parker-Geisman and G. R. Parish. 2007. “Hawaiian Hoary Bat Inventory in National Park on the Island of Hawai‘i, Maui and Moloka‘i.” Technical Report 140. Pacific Cooperative Studies Unit, University of Hawai‘i, Honolulu, Hawaii. 25 pp.(unpublished data).
- Furumoto, Augustine S. (1991). Seismic Risk of the Summit Area of Haleakalā Volcano. Report submitted to the Solar Group, University of Hawaii Institute for Astronomy, Honolulu, HI.
- Great ecology. (2015). Biological Survey of the Remote Maui Experiment (RME) Station. Wolf Creek Federal Services, Inc.
- Hawaii, State of (1951). Executive Order No. 1987, Setting aside land for public purposes. Krushelnycky, Paul D. Reproductive Ecology of a Threatened Alpine Plant February 2014, Volume 9, Issue 2, e88948 Massachusetts Institute of Technology, Lincoln Laboratory (1988). Environmental Assessment for Short-Wavelength Adaptive Techniques (SWAT) Measurement Program. Prepared for Rome Air Development Center, Maui, HI.
- Medeiros, A. C. and L. L. Loope (1994). A Review of the Arthropod Fauna at the Proposed Air Force Facility Construction Site at the Summit Area of Haleakalā Volcano, Maui, Hawaii. NRAG [Nene Recovery Action Group] 2010. "Take" of Nene from the Proposed ATST: A Discussion of the Nene Recovery Action Group, January 12, 2020.
- O'Brien & Gere (1993). Installation Restoration Program Action Plan, Maui Space Surveillance Site, Draft. Prepared for the U.S. Air Force Space Command, October 1993.
- Pacific Analytics, L.L.C., Arthropod Inventory and Assessment Haleakalā High Altitude Observatory Site Maui, Hawaii, Prepared for K.C. Environmental Co. Inc., July 2003
- Pacific Analytics, L.L.C., Programmatic Arthropod Inventory and Assessment Haleakalā High Altitude Observatory Site Maui, Hawaii, Prepared for K.C. Environmental Co. Inc., May 2010
- Pacific Analytics, L.L.C., Programmatic Arthropod Inventory and Assessment Haleakalā High Altitude Observatory Site Maui, Hawaii, Prepared for K.C. Environmental Co. Inc., July 2011
- Pacific Northwest Laboratory (1991). Programmatic Environmental Assessment, U.S. Air Force, Maui Space Surveillance Site, Haleakalā, Maui, May 1991.
- Service. [U.S. Fish and Wildlife Service] 1998. “Terrestrial Mammal, `Ōpe`ape`a or Hawaiian Hoary Bat, Lasiurus cinereus semotus. Species Status: Federally listed as Endangered, State listed as Endangered, State recognized as Indigenous (at the species level and Endemic at the

subspecies level) Nature Serve Heritage Rank G2/T2 –Species secure/Subspecies imperiled, Recovery Plan for the Hawaiian Hoary Bat– Service 1998".

- Service. [U.S. Fish and Wildlife Service] 2011. Biological Opinion for Construction and Operation of the Advanced Technology Solar Telescope (ATST) at the Haleakalā High Altitude Observatory Site, Maui, Hawaii (1-2-2011-1-0085)
- Service. [U.S. Fish and Wildlife Service] October 22, 2012. Correspondence from the USFWS on the "Indigenous Insects at Maui High Performance Computing Center Solar PV Site"
- Simons, T. R. (1985). Biology and behavior of the endangered Hawaiian Dark-Rumped Petrel. Condor 87:229-245.
- Starr, Forest & Kim. Starr Environmental. 2009. "Botanical Survey, Haleakalā Observatories, Island of Maui, Hawai'i. July 2009."
- Starr, Forest & Kim. Starr Environmental. 2005. "Botanical Survey, Haleakalā Observatories, Island of Maui, Hawai'i. December 2005."
- Starr, Forest & Kim. Starr Environmental. "Botanical Survey, University of Hawai'i, Haleakalā Observatories", Island of Maui, Hawai'i, November 2002.
- University of Hawaii Institute for Astronomy, Haleakala High Altitude Observatory Site Long Range Development Plan, January 2005.
- University of Hawaii Institute for Astronomy, Haleakalā High Altitude Observatory Site Management Plan (HOMP), June 8, 2010
- URS Consultants (1988). Biological Assessment for the BOLT Experiment on Maui, Hawaii. Prepared for the U. S. Air Force, Santa Barbara, CA.
- U. S. Air Force (1987a). Environmental Assessment, U. S. Air Force Relay Mirror Experiment. U.S. Air Force, Air Force Maui Optical Station, Maui, HI.
- U. S. Air Force (1987b). Biological Assessment for the U. S. Air Force Relay Mirror Experiment, U.S. Air Force Systems Command, Headquarters Space Division, Los Angeles, CA.
- U. S. Air Force (1988a). Environmental Assessment, U.S. Air Force BOLT Experiment. Air Force Maui Optical Station, Maui, HI.
- U. S. Air Force (1988b). U.S. Air Force Relay Mirror Experiment Supplement to Biological Assessment. U.S. Air Force Systems Command, Headquarters Space Division, Los Angeles, CA.
- U. S. Army Corps of Engineers (1980). Environmental Impact Assessment for Ground Electro-Optical Deep-Space Surveillance System (GEODSS) Project Mount Haleakalā, Maui. U.S. Army Corps of Engineers, Fort Shafter, HI.

12.0 ACRONYMS

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

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

12.2 Installation Acronyms

AFB	Air Force Base
AFI	Air Force Instruction

AFMC	Air Force Materiel Command
AFPD	Air Force Policy Directive
AFRL	Air Force Research Laboratory
AST	Aboveground storage tanks
BCE	Base Civil Engineer
CATEX	Categorical Exclusion
CE	Civil Engineer
DET	Detachment
DLNR	Department of Land and Natural Resources
DOD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
USAF	U.S. Air Force
EPA	Environmental Protection Agency
ESOHC	Environment, Safety, and Occupational Health Council
°F	Degrees Fahrenheit
GPS	Global Positioning System
HO	Haleakalā Observatories
HOMP	Haleakalā Observatories Management Plan
HWMP	Hazardous Waste Management Plan
INRMP	Integrated Natural Resources Management Plan
LRDP	Long Range Development Plan
NEPA	National Environmental Policy Act
NPS	National Parks Service
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
O&M	Operations and Maintenance
T&E	Threatened and Endangered
UH	University of Hawaii
U.S.	United States

USDA	U.S. Department of Agriculture
USC	U.S. Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

13.0 DEFINITIONS

13.1 Standard Definitions *(Applicable to all AF installations)*

- Natural Resources Playbook – Definitions Section

13.2 Installation Definitions

14.0 APPENDICES

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 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 (US EPA) authority to conduct

Federal Public Laws and Executive Orders	
	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, Exotic and 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 U.S. Fish and Wildlife Service (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.
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

Federal Public Laws and Executive Orders	
	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 US EPA.
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.
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 (NEPA), 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 Code of

Federal Public Laws and Executive Orders	
	Federal Regulations (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 United States 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 National Pollutant Discharge Elimination System (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.
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 Integrated Natural Resources Management Plan and public access to natural resources, and allows collection of nominal hunting and fishing fees. NOTE: AFI 32-7064 sec 3.9. Staffing. As defined in 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). 3.9.1. Outsourcing Natural Resources

Federal Public Laws and Executive Orders	
	Management. As stipulated in the Sikes Act, 16 U.S.C. § 670 et. seq., the Office of Management and Budget Circular No. A-76, Performance of Commercial Activities, August 4, 1983 (Revised May 29, 2003) 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.
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.
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

Federal Public Laws and Executive Orders	
	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	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 32-7062, Air Force Comprehensive Planning	Provides guidance and responsibilities related to the USAF comprehensive planning process on all USAF-controlled lands.
AFI 32-7064, Integrated Natural Resources Management	Implements AFPD 32-70, Environmental Quality; 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.
AFI 32-7065, Cultural Resources Management	This instruction 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.
AFPD 32-70, Environmental Quality	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.
Policy Memo for Implementation of Sikes Act Improvement Amendments, HQ USAF Environmental Office (USAF/ILEV) on January 29, 1999	Outlines the USAF interpretation and explanation of the Sikes Act and Improvement Act of 1997.

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Appendix B – Glossary of Terms

Acoustical Survey – Usage of Omnidirectional microphone system; a technology combining the acoustic properties of a pressure-zone microphone and an acoustic transformer. Sensitivity is increased because sound is reflected from a hard surface, creating a zone of increased sound pressure. The microphone also acts as an acoustic transformer, in which sound enters a large aperture and then is compressed into a smaller area, increasing sound pressure and thereby gain.

Biological Diversity - the variety of life forms, the ecological roles they perform, and the genetic variability they contain within any defined time and space.

Candidate Species – A candidate species is one for which the USFWS has on file sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened, but for which preparation and publication of a proposal is precluded by higher priority listing actions.

Critical Habitat – the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of the ESA, on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the ESA upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species.

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.

ESA - Endangered Species Act (ESA) of 1973 was passed by Congress. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service and the Commerce Department's National Marine Fisheries Service (NMFS).

Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. For the purposes of the ESA, Congress defined species to include subspecies, varieties, and, for vertebrates, distinct population segments.

Endangered Species – species which is in danger of extinction throughout all or a significant portion of its range

Endemic - Organisms that are native and confined to a certain region; be found ONLY in that location.

Habitat - an area that provides the environmental elements of air, water, food, cover, and space necessary for a given species to survive and reproduce.

Improved Grounds - grounds on which personnel annually plan and perform intensive maintenance activities. These are developed areas of an installation. They usually include the cantonment, parade ground, drill fields, athletic areas, golf courses (excluding roughs), cemeteries and housing areas, sidewalks, parking, roads and concrete pads.

Indigenous - Organisms that are native but can be found elsewhere.

Integrated Natural Resources Management Plan (INRMP) - a natural resources management plan based on ecosystem management that shows the interrelationships of the individual component plans as well as mission and land use activities affecting the basic land management plans.

Native: Organisms brought to a location without the help of man, such as by wind, wave and or birds.

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.

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; rifle and pistol ranges; picnic areas; ammunition storage areas; antenna facilities; and golf course roughs.

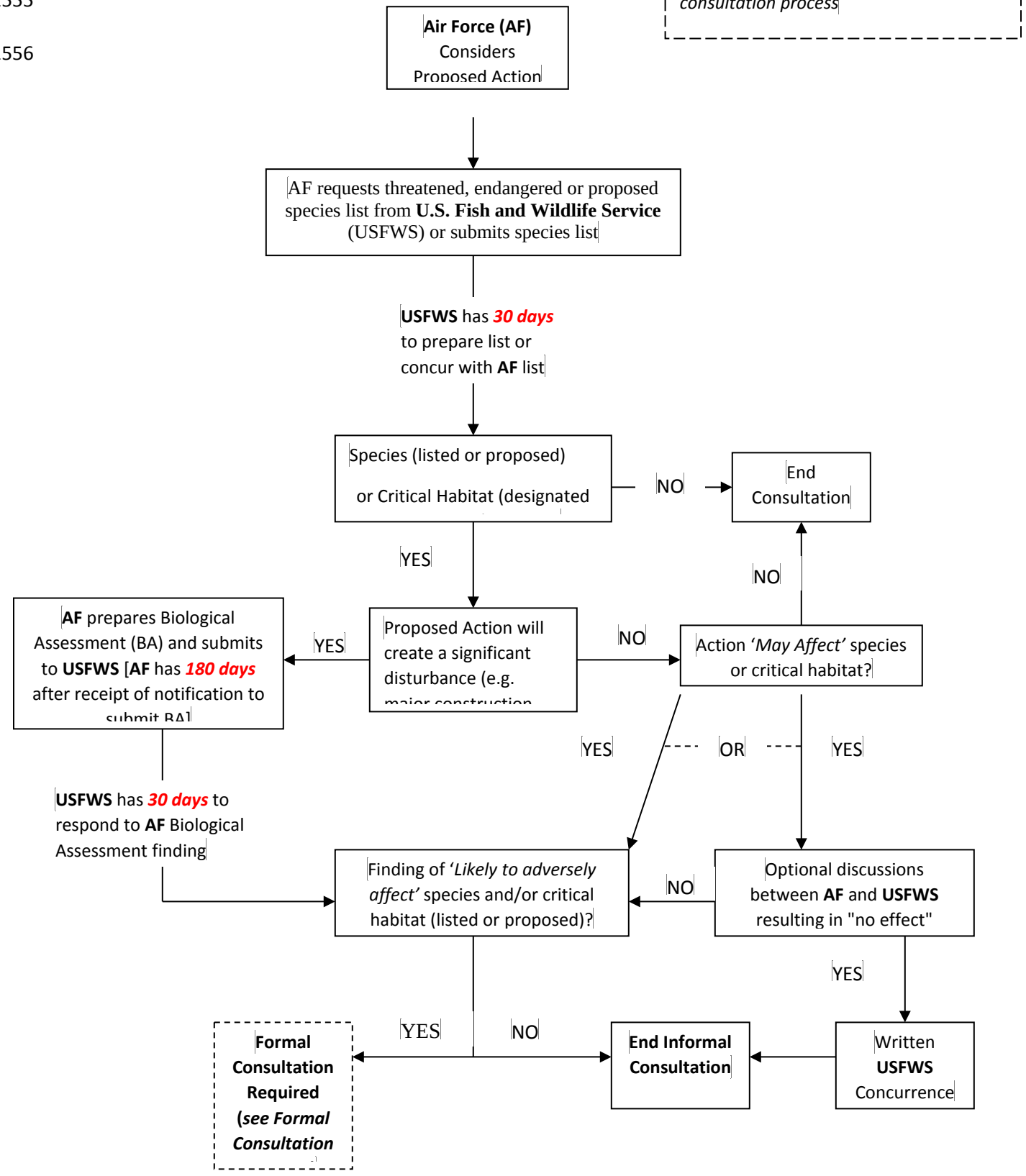
Threatened Species - species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

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 the airfield beyond the safety zones.

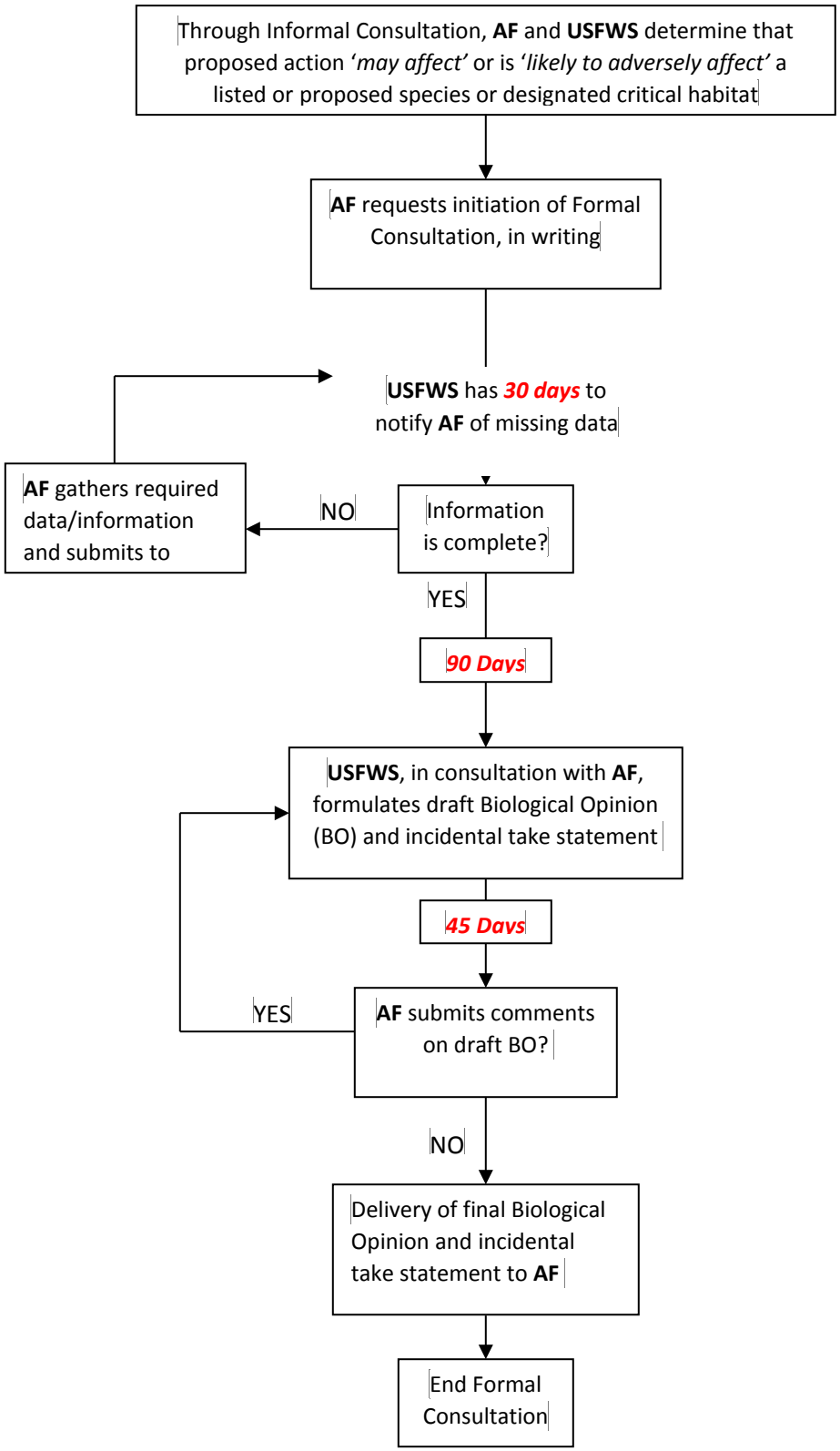
Appendix C – ESA Coordination Process

Informal Consultation Process

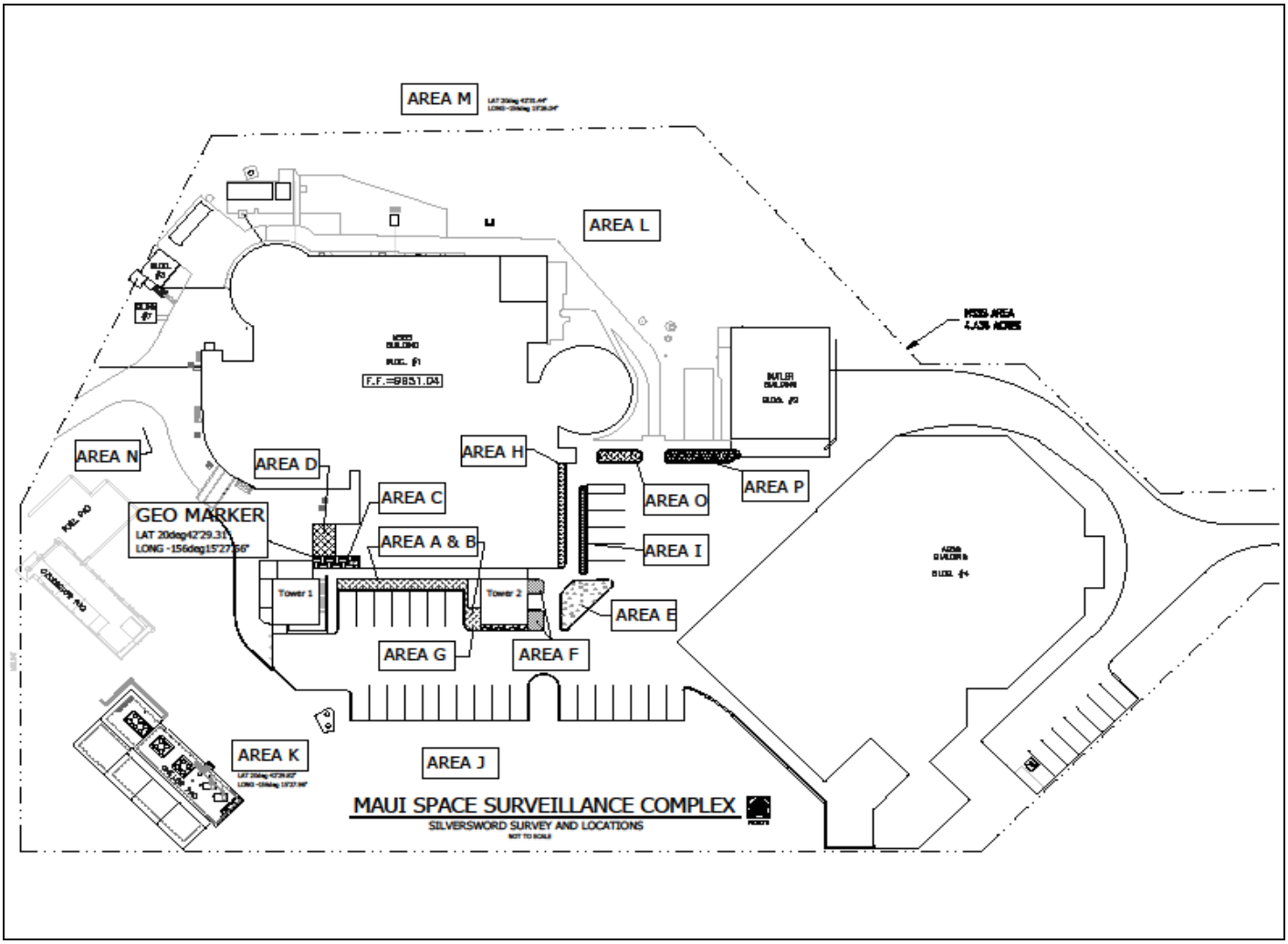
***NOTE*: Informal discussions with the local **USFWS** Ecological Services Field Office early on will help to expedite the consultation process*



Formal Consultation Process



Appendix D – MSSC Site plan with Silversword locations



1572 **Appendix E- MSSC Silversword GPS Survey and Inventory**

AREAS IDENTIFIED	***GPS COORDINATES: LONG=N, LAT=W***	***TOTAL #***	***SIZE IN DIAMETER OF SILVERSWORDS IN EACH AREA***	***DATE OF SURVEY***
AREA "A & B"	LONG 20°42'29.28" LAT -156°15'.27.6"	87	8 x 1", 11 x 2", 14 x 3", 5 x 4", 6 x 6", 5 x 8", 12 x 10", 3 x 12", 2 x 14", 1 x 16", 4 x 18", 1 x 20", 1 x 22", 4 Blooming; 5 dead	September 2013
AREA "A & B"		**77**	10 x 2", 13 x 3", 12 x 4", 5 x 5", 3 x 6", 14 x 8", 12 x 10", 4 x 12", 4 x 14", 1 x 16", 2 x 18", 1 x 20", 1 x 22", 1 x 28" ; 7 dead	**June 2014**
AREA "C"	LONG 20°42'29.46" LAT -156°15'.28.02"	1	1 x 12", 1 dead	September 2013
AREA "C"		**1**	**1 x 12", 1 dead**	**June 2014**
AREA "D"	LONG 20°42'29.46" LAT -156°15'.28.02"	0	2 dead	September 2013
AREA "D"		**7**	**3 x 1", 2 x 2", 1 x 3" 1 x 4"; 2 dead**	**June 2014**
AREA "E"	LONG 20°42'29.22" LAT -156°15'.26.64"	8	2 x 1", 2 x 2", 1 x 4", 1 x 32", 2 dead; both 3" dia	September 2013
AREA "E"		**6**	**1 x 2", 1 x 3", 2 x 4", 1 x 6", 1 x 32"**	**June 2014**
AREA "F"	LONG 20°42'29.10" LAT -156°15'.26.64"	9	2 x 1", 2 x 4", 3 x 6", 2 x 10"	September 2013
AREA "F"		**10**	**1 x 1", 1 x 2", 1 x 3", 2 x 6", 1 x 8", 1 x 12",1 x 13",1 x 14",1 x 15"; 1 dead**	**June 2014**
AREA "G"	LONG 20°42'29.22" LAT -156°15'.26.58"	2	1 x 10", 1 x 13"	September 2013

AREA "G"		**1**	**1 x 10"**	**June 2014**
AREA "H"	LONG 20°42'29.46" LAT -156°15'.26.88"	3	1 x 8", 1 mature, 1 baby; 2 dead	September 2013
AREA "H"		**1**	**1 x 12"; 1 dead**	**June 2014**
AREA "I"	LONG 20°42'29.64" LAT -156°15'.26.46"	3	3 x 6"-14"	September 2013
AREA "I"		**3**	**1 x 6", 1 x 12", 1 x 16"**	**June 2014**
AREA "J"	LONG 20°42'28.56" LAT -156°15'.26.52"	4	1 x 4", 1 x 10", 1 x 14", 1 x 18"	September 2013
AREA "J"		**5**	**1 x 3", 1 x 5", 1 x 10", 1 x 12", 1 x 26"; 1 dead**	**June 2014**
AREA "K"	LONG 20°42'29.82" LAT -156°15'.27.96"	1	1 x 22"	September 2013
AREA "K"		**1**	**1 x 26"**	**June 2014**
AREA "L"	LONG 20°42'29.88" LAT -156°15'.26.16"	2	1 x 10", 1 x 4"	September 2013
AREA "L"		**3**	1 x 4", 2 x 12"	**June 2014**
AREA "M"	LONG 20°42'29.22" LAT -156°15'.26.64"	5	1 x 6", 1 x 8", 1 x 16", 2 dead; 1 mature, 1 baby	September 2013
AREA "M"		**3**	1 x 3", 1 x 4", 1 x 8"	**June 2014**
AREA "N"	LONG 20°42'31.44" LAT -156°15'.26.04"	1	1 x 2.5'	September 2013
AREA "N"		**1**	**1 x 32"**	**June 2014**
AREA "O"	LONG 20°42'29.64" LAT -156°15'.26.46"	1	1 x 6"	September 2013
AREA "O"		**1**	**1 x 6"**	**June 2014**
AREA "P"	LONG 20°42'29.64" LAT -156°15'.26.46"	1	1 x 6"	September 2013
AREA "P"		**1**	**1 x 8"**	**June 2014**

Total	Alive:128	128	Dead: 14	September 2013
Total	**Alive: 127**	**127**	Dead: 13	**June 2014**

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Appendix F- Email from the USFWS

project is planned for an area within the historical range of the Blackburn's sphinx moth in Maui Nui or the Island of Hawaii (shown in Figures 8 through 12 of the Recovery Plan for Blackburn's sphinx moth (Service 2005, pp 21-25)) the following guidelines are examples of conservation measures that we may recommend for a specific project.

Blackburn's sphinx moth pupae may occupy the soil in the vicinity of larval host plants for a year or longer; therefore, close coordination with the Service, well in advance of ground-breaking, should be sought when a project has the potential to disturb habitat occupied by Blackburn's sphinx moth host plants. We recommend that a qualified biologist survey all project areas where disturbance of the ground or alteration of the vegetation may occur in addition to the area adjacent to these project areas for the presence native and non-native Blackburn's sphinx moth host plants. The locations and densities of the host plants should be mapped and the biologist should document the size and condition of the host plants, the presence of Blackburn's sphinx moth larvae, and any signs of larval feeding damage on plant leaves. We recommend these surveys for the Blackburn's sphinx moth and its potential host plants be conducted during the wettest portion of the year (usually November-April), approximately four to eight weeks following a significant rainfall event. In some cases, multiple surveys may be recommended.

Because adult Blackburn's sphinx moths may fly distances greater than 6 miles (10 kilometers) and range over large areas of the landscape, removal of Blackburn's sphinx moth host plants has the potential to adversely affect the moths. Projects should be sited to minimize impacts to the Blackburn's sphinx moth's native habitat. Loss of native and degraded Blackburn's sphinx moth habitat will need to be offset with implementation of projects to restore and conserve Blackburn's sphinx moth habitat on- or off-site. The Service can help the applicants identify the appropriate amount and location of offsetting restoration during project development.

Yellow Faced Bees

The following species of yellow faced bees may occur in the vicinity of the proposed project.

Anthricinan yellow-faced bee	Hylaeus anthracinus
Assimulans yellow-faced bee	Hylaeus assimulans
Easy yellow-faced bee	Hylaeus facilis
Longhead yellow-faced bee	Hylaeus longiceps
Hylaeus yellow-faced bee	Hylaeus hilaris

These species were petitioned to be listed on March 23, 2009 by the Xerces Society. The Service issued a 12-month petition finding on September 6, 2012 determining that the listing of the species is warranted by precluded. I have attached the federal register notice for this action below. Your draft report indicates the presence of Sida fallax (Ilima) and Waltheria indica (Uhaloa) on the project site. These two species may be host plants for yellow-faced bees. We recommend a qualified biologist conduct surveys for the these species on and in the vicinity of the host plants when the host plants are in bloom.

I hope this helps with your surveys and future project development. Please contact me or Ian Bordenave for further questions or concerns regarding this project and impacts to federally protected species.

Thanks again,

Michelle

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Michelle D. Bogardus
Fish and Wildlife Biologist
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ph: (808) 792-9473
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web page: http://www.fws.gov/pacificislands/

~~~~~~ <http://www.fws.gov/pacificislands/>

"Lee, Stephan G CIV NAVFAC PAC" <stephan.g.lee@navy.mil>

09/27/2012 09:48 AM To
<michelle_bogardus@fws.gov>
cc
Subject
FW: Indigenous Insects at Maui High Performance Computing Center Solar PV Site

Michelle,

I have the green light to proceed. I attached a draft report about natural resource surveys conducted at the Maui High Performance Computing Center (MHPCC) Photovoltaic (PV) Farm Proposed Sites at Kihei, Maui. Maps are in the report to give you an idea about the location of the sites.

Could you please look at the report and make an assessment regarding potential impacts to the insects we discussed as well as other species of concern and related critical habitat if applicable at this proposed project site on Maui? If there may be a potential issue in the vicinity, and you need more detailed maps or GIS data, please let me know. If you find that there will be potential issues, please let me know, so we can proceed formally.

Thank you for your guidance and assistance. If you need any additional information, please let me know.

Respectfully,
Stephan
Entomologist

Commander
Naval Facilities Engineering Command, Pacific (EV22)
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

Phone: (808) 472-1384
DSN: 472-1384
Fax: (808) 474-5419

-----Original Message-----
From: Toyama, Caroleen K CIV NAVFAC Pacific, EV2
Sent: Monday, September 24, 2012 9:32
To: Lee, Stephan G CIV NAVFAC PAC
Cc: Williams, Laura L CIV NAVFAC Pacific, EV

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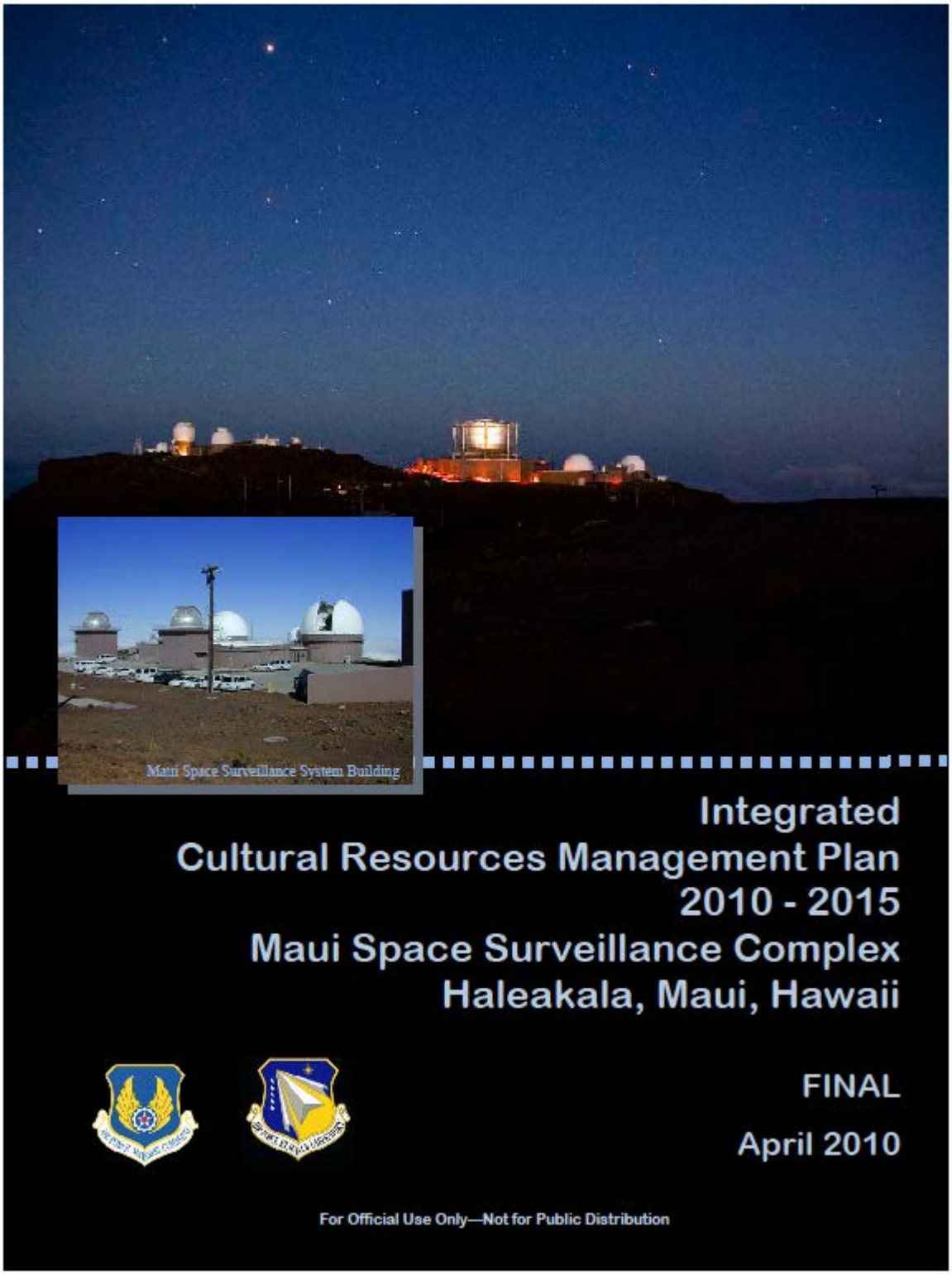
15.0 ASSOCIATED PLANS

Tab 1 – Integrated Cultural Resources Management Plan (ICRMP)
Tab 2 – Integrated Pest Management Plan (IPMP)



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INTEGRATED PEST MANAGEMENT PLAN

US Air Force Research Laboratory Directed Energy Directorate

Maui Space Surveillance Complex, Remote Maui

Experiment Site and MHPCC

December 2014

PREPARED BY:
USAF AFRL RDMT/DET 15
550 E. LIPOA PARKWAY
KIHEI, HAWAII 96753-6902
(808) 875-4500

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