FINAL

MARINE CORPS BASE HAWAII INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN UPDATE (2017 – 2021)

Marine Corps Base Hawaii
January 2017

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SIGNATURE PAGE

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670 *et seq*.) as amended and Marine Corps Order P5090.2A.

_____ _____

Sean Killeen
Colonel, USMC

Date

MARINE CORPS BASE HAWAII
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
Annual Review

This page is used to certify the annual review and coordination of this Integrated Natural Resources Management Plan with the United States Fish and Wildlife Service, NOAA Fisheries, and the Hawai'i Department of Land and Natural Resources, for Marine Corps Base Hawaii.

By their signatures below, the certifying official acknowledges that the annual review and coordination of the Integrated Natural Resources Management Plan has occurred for the specified year.

Year	Completion Date	Approving Official
2017		
2018		
2019		
2020		
2021	Update/Revision	

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APPENDICES[1]

[1] Appendix items that appear in *italics* are found only on the reference cd, not in hard copy.

ACRONYMS AND ABBREVIATIONS

AAV	Amphibious Assault Vehicle
ACP	Area Contingency Plan
AFS	Air Force Station
AFWA	Association of Fish and Wildlife Agencies
AIS	Aquatic Invasive Species
APHIS	Animal and Plant Health Inspection Service
ATV	All-Terrain Vehicle
BASH	Bird Aircraft Strike Hazard
BMP	Best Management Practice
CATEX	Categorical Exclusion
CCH	City and County of Honolulu
CECOS	Civil Engineer Corps Officers School
CEMP	Code of Environmental Management Principles
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CESU	Cooperative Ecosystem Studies Unit
CFR	Code of Federal Regulations
CG	Commanding General
CITES	Convention on International Trade in Endangered Species Fauna and Flora
CLB-3	Combat Logistics Battalion-3
CLEO	Conservation Law Enforcement Officer
CMC	Commandant Marine Corps
CO	Commanding Officer
COA	Course of Action
CRB	Coconut Rhinoceros Beetle
CWA	Clean Water Act of 1972
CY	Calendar Year
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act of 1972
DAR	Division of Aquatic Resources
DBEDT	Department of Business, Economic Development and Tourism, State of Hawai‘i
DLNR	Department of Land and Natural Resources, State of Hawai‘i
DOCARE	Division of Conservation and Resources Enforcement
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DOFAW	Division of Forestry and Wildlife
DoN	Department of the Navy
DPS	Distinct Population Segment

EA	Environmental Assessment
ECPSOP	Environmental Compliance and Protection Standing Operating Procedure
EFH	Essential Fish Habitat
EGIS	Environmental Geographic Information System
EIRB	Environmental Impact Review Board
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
ES	Environmental Security
ESA	Endangered Species Act
ESTCP	Environmental Security Technology Certification Program
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GAO	Government Accountability Office
GIS	Geographic Information System
GPS	Global Positioning System
HA	Hunting Area
HACO	Hawai‘i Area Counsel Office
HAR	Hawai‘i Administrative Rule
HDOA	Hawai‘i Department of Agriculture
HDOT	Hawai‘i Department of Transportation
HIARNG	Hawai‘i Army National Guard
HIDOH	Hawai‘i Department of Health
HISC	Hawai‘i Invasive Species Council
HQMC	Headquarters Marine Corps
HRS	Hawai‘i Revised Statutes
ICRMP	Integrated Cultural Resources Management Plan
IEL	Installation, Environment, and Logistics
INRMP	Integrated Natural Resources Management Plan
IPMP	Integrated Pest Management Plan
IR	Installation Restoration
ISMS	Invasive Species Management Study
ISWMP	Integrated Solid Waste Management Plan
IUCN	International Union for Conservation of Nature
IWFMP	Integrated Wildland Fire Management Plan
JBPHH	Joint Base Pearl Harbor-Hickam
KBRTF	Kaneohe Bay Range Training Facility
LCAC	Landing Craft Air Cushioned

MAG	Marine Aircraft Group
MARFORPAC	Marine Forces Pacific
MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
MCBH	Marine Corps Base Hawaii
MCCS	Marine Corps Community Services
MCDC	Mōkapu Central Drainage Channel
MCICOM	Marine Corps Installations Command
MCO	Marine Corps Order
MCTAB	Marine Corps Training Area Bellows
MEC	Munitions and Explosives of Concern
MEF	Marine Expeditionary Forces
MEU	Marine Expeditionary Units
MHI	Main Hawaiian Islands
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
MOU	Memorandum of Understanding
MOUT	Military Operations on Urban Terrain
MPD	Military Police Department
MRP	Munitions Response Program
MS4	Municipal Separate Storm Sewer System
MTR	Moving Target Range
NAVFAC	Naval Facilities Engineering Command
NDSA	Naval Defensive Sea Area
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service (alternatively NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWHI	Northwestern Hawaiian Islands
OHV	Off-Highway Vehicle
OISC	Oʻahu Invasive Species Committee
O&MMC	Operations and Maintenance Marine Corps
ORV	Off-Road Vehicle
O&T	Operations and Training
REVA	Range Environmental Vulnerability Assessments
RIMPAC	Rim of the Pacific Exercise
RTF	Range Training Facility
RTI	Regional Training Institute
SAIA	Sikes Act Improvement Act/Amendments
SARA	Superfund Amendments and Reauthorization Act
SERDP	Strategic Environmental Research and Development Plan
SOP	Standard/Standing Operating Procedure

SP&E	Strategic Plans and Engagement
STEP	Status Tool for Environmental Program
SWAP	State Wildlife Action Plan
SWMP	Storm Water Management Plan
TA	Training Area
T&E	Threatened and Endangered
TLF	Temporary Lodging Facility
UFP	Unified Federal Policy
UH	University of Hawai‘i
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USMC	United States Marine Corps
USPACOM	United States Pacific Command
WRF	Water Reclamation Facility
WMA	Wildlife Management Area

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SECTION 1
PREFACE

Marine Corps Base Hawaii (MCBH) is a busy military installation with rich biological diversity and unique natural resources that balances combat readiness and conservation through a rigorously implemented Integrated Natural Resources Management Plan (INRMP).

MCBH's INRMP implementation began in 2001 with a combined plan and environmental assessment (EA). This document is the third five-year INRMP Update, covering the period 2017-2021. The INRMP is a "living" document, continuously improving with completion of each action, stakeholder input, environmental response evaluation, annual progress review, and re-evaluation after each five year period. This INRMP Update documents progress made over the previous five years and presents management actions programmed over the next five years. It summarizes a broad array of management actions completed and planned across eight Course of Action components: INRMP Program Management and Implementation; Wildlife; Wetland; Watershed; Coastal and Marine Resources; Landscape Maintenance and Vegetation; Natural Resources-based Outdoor Recreation, Outreach, and Public Access; and Resource Information.

Since inception, the programmed management actions in MCBH's INRMP have been adequately funded and implemented in a timely and cost-effective manner. Table F1-1 summarizes the major funded INRMP actions and their cumulative total estimated value. The types of INRMP management actions show a strong supportive relationship among conservation, military training, and public interest objectives. This reflects Section 101(b)(1)(l) of the Federal Sikes Act, which states that each INRMP shall provide for "no net loss in the capability of military installation lands to support the military mission of the installation." 2006 U.S. Marine Corps (USMC) guidance on implementing INRMPs further states that "natural resources are not to be consumed by mission requirements, but sustained for mission requirements." To achieve this, "environmental programs and policies must protect the environment for the mission." Marine Corps Order (MCO) P5090.2A, Section 11102 states a clear responsibility for Marine Corps installations to manage natural resources under their stewardship to support the military mission, while conserving, preserving, protecting, rehabilitating, and enhancing these resources. Specifically, it states that "installation and unit commanders must work to guarantee continued access to our land, air, and water resources for realistic military training and testing by ensuring that the natural resources entrusted to the Marine Corps' care remain healthy and available for future generations."

Effective and efficient natural resources management through sustained INRMP implementation is one way that MCBH strives to support combat readiness while ensuring the protection of natural resources entrusted to our care. Favorable review received by MCBH's regulatory partners and public participation in INRMP implementation over the years helps testify to the success of MCBH's INRMP implementation, and will continue to be essential to its success.

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SECTION 2
EXECUTIVE SUMMARY

PURPOSE

MCBH encompasses approximately 4,500 acres across eight properties containing forest, wetland, coastal dune, marine, and urban environments. These habitats support nine Federally-listed[1] and two State-listed[2] threatened or endangered species – plant, birds, insect, and marine life; over 50 species of native and migratory birds[3] – resident and visiting; and six species that are on either Federal or State species of concern lists[4] – marine life and plants (Appendix C2). The Base hosts a number of tenant commands, support personnel, and military families. Protection of natural resources on MCBH properties is guided by this INRMP. It complies with the Sikes Act Improvement Act (SAIA) amendments of 1997 that require all military installations with significant natural resources to prepare, implement, and regularly review/update INRMPs. These plans must support "no net loss" in capability of the installations' lands and waters to support military readiness while complying with a suite of Federal laws governing natural resources management and stewardship, and public access to the same, subject to safety, environmental, and military security constraints (Appendix A3).

This INRMP is an *update* of the original 2001 MCBH INRMP/EA (Environmental Assessment) and the first two updates (2006 INRMP and 2011 INRMP), rather than a *revision*.[5] Management actions programmed and described in this plan cover a five-year time frame (2017 – 2021) (Appendix F2). Recurring actions or later phases of projects started in the time frame of previous INRMPs demonstrate sustained effort. INRMP implementation progress is reviewed annually, and the INRMP is revised or updated at least once every five years to ensure MCBH has a *compliant INRMP* (Appendix F1). A shift in natural resource management policy to allow hunting at MCBH required changes to the INRMP in 2013 that were issued in an INRMP Supplement.[6] The next INRMP review is programmed for fiscal year (FY) 2020 and will cover the time period 2022 – 2026.

The INRMP, and its required continuing review and update process, help ensure support of the Marine Corps' and MCBH's mission and vision by helping to maintain quality training lands and quality of life for the affected military population. It also complies with Federal laws and military directives to integrate military

[1] Federally endangered: 'ohai (*Sesbania tomentosa*); Hawaiian stilt (*Himantopus mexicanus knudseni*); Hawaiian moorhen (or gallinule) (*Gallinoula chloropus sandvicensis*); Hawaiian coot (*Fulica alai*); Hawaiian duck (koloa-like & hybrid) (*Anas wyvilliana*); Hawaiian Yellow-faced bee (*Hylaeus anthracinus*); Hawaiian monk seal (*Neomonachus schauinslandi*); Hawaiian Hawksbill sea turtle (*Eretmochelys imbricata*). Federally threatened: Hawaiian green sea turtle (*Chelonia mydas*). By default, any Federally-listed species receives the same status at the State level.

[2] State endangered: Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*) – O'ahu only; humpback whale (*Megaptera novaeangliae*).

[3] MCBH manages for resident populations of wedge-tailed shearwaters (*Ardenna pacifica*) and red-footed boobies (*Sula sula rubripes*).

[4] Federal: Inarticulated brachiopod (*Lingula reevii*); Irregular rice coral (*Montipora dilitata*). State: Blue rice coral (*Montipora flabellata*); Sandpaper rice coral (*Montipora patula*); Maiapilo (*Capparis sandwichiana*); Nama (*Nama sanwichensis*).

[5] See Appendix I for definitions of: INRMP Update, INRMP revision, Compliant INRMP, and Review for operation and effect, as found in the 2013 Tripartite MOU between DoD, USFWS, and AFWA (included as Appendix A6).

[6] The additions and changes identified in the INRMP Supplement were considered part of the MCBH INRMP and needed to be viewed in conjunction with the 2011 INRMP. Relevant changes are incorporated into this 2017 INRMP Update.

land use and natural resources management in a manner consistent with Federal and State stewardship requirements, while being responsive to host community and other stakeholder concerns.

COOPERATIVE PREPARATION

Per the SAIA, this INRMP is prepared in cooperation with the U.S. Fish and Wildlife Service (USFWS) and Hawai'i Department of Land and Natural Resources (DLNR). Since the INRMP also covers coastal and marine resources, the plan is also coordinated with National Oceanic and Atmospheric Administration (NOAA) Fisheries. Section 9 and Appendix G, H2, and H3 contain a record of coordination with these Sikes Act partners and other stakeholder agencies.

SCOPE

The INRMP covers three MCBH parcels on windward O'ahu in the Ko'olaupoko district: MCBH Kaneohe Bay on Mōkapu Peninsula, Marine Corps Training Area Bellows (MCTAB) in Waimānalo, and Waikane Valley Impact Area in Waikane Valley. On the leeward side, the INRMP covers Camp H.M. Smith in Halawa Heights, Pu'uloa Range Training Facility (RTF) on the 'Ewa coastal plain, and Pearl City Annex located on Pearl City peninsula.[7] Sections 4 and 6 contain information on these locations and their management environments.

MCBH follows an ecosystem and adaptive management approach involving execution of a suite of management actions within Course of Action (COA) areas across the full array of natural resources and MCBH geographic areas (Section 7). Section 3 contains details on the planning approach and structure of this INRMP, and the guidance followed in its preparation. Section 5 highlights laws, regulations, and guidelines relevant to natural resources management. The management actions are discussed in further detail in the COA, some of which have been slightly reorganized and/or renamed:

- 7.0 INRMP Program Management and Implementation
- 7.1 Wildlife Management
- 7.2 Wetland Management
- 7.3 Watershed Management
- 7.4 Coastal and Marine Resources Management
- 7.5 Landscape Maintenance and Vegetation Management
- 7.6 Natural Resources-based Outdoor Recreation, Outreach, and Public Access Management
- 7.7 Resource Information Management.

IMPLEMENTATION PROGRESS SINCE THE ORIGINAL 2001 INRMP/EA

November 2001 marks the beginning of MCBH INRMP implementation, when the INRMP was first published as a combined plan and EA– to guide MCBH's ecosystem-based approach to natural resource management, while supporting quality of life and 'no net loss' in training options. The plan was reviewed and concurred with by in-house stakeholders and the INRMP/Finding of No Significant Impact (FONSI) was signed off by the Base commander and distributed for public review and comment. Required regulator concurrence was received from USFWS, NOAA Fisheries, and Hawai'i DLNR. Documentation of the final concurrence and public notice process for INRMP/EA and FONSI completion/distribution is contained in Appendix H1, along with a copy of the signed FONSI (still in effect).

[7] Manana Housing Area and Molokai Training Facility do not contain significant natural resources and are minimally covered in the INRMP.

The MCBH INRMP has been updated at five year intervals with review and concurrence by Sikes Act partners. Annual progress reports, summarizing how management actions were addressed, provide an idea of how those actions will continue to be carried out, and demonstrate steady implementation of planned actions. Some actions were implemented ahead of schedule and some unforeseen opportunities were exploited. Some less critical management actions were deferred to address emergent priorities, budget shortfalls, or temporary staff shortages. Despite these variations, since 2001 steady progress has been made to implement the MCBH INRMP on time and within budget, with favorable annual reviews from Sikes Act partners (Appendix F1). Table F1-1 shows how discrete management projects, totaling about $15.2M in funds spent, have been conducted to fulfill INRMP commitments since 2001.

This INRMP Update contains details to clearly demonstrate MCBH's commitment to continue the same level of effort during the next five years (2017-2021) as in the first fifteen years of INRMP implementation (2002-2016). Since the existing level of INRMP program implementation is continuing, no revision to the National Environmental Policy Act (NEPA) analysis is required.

ACCOMPLISHMENTS DURING THE 2012-2016 TIME FRAME

Several major accomplishments, both personnel and project specific, since the 2011 INRMP are worthy of being highlighted.

- Operating with limited staff for much of the past five years, the Environmental Department's Conservation Division (Natural Resources section) continued MCBH's history of program accomplishments by winning back-to-back Secretary of Defense Environmental Awards [Natural Resources Conservation, Small Installation] for FY2011 and FY2013 (Section 9.3).
- A second Federal Conservation Law Enforcement Officer (CLEO) was hired in 2013, giving MCBH two full time CLEOs (Section 4.4.2).
- A shift in natural resource management policy that permitted hunting at MCTAB required an EA as well as information to be inserted in the INRMP to outline certain aspects of the recreational hunting program. An INRMP Supplement, prepared in 2013, was considered part of the 2011 INRMP; all relevant information has been incorporated into this INRMP Update (Section 6.2.4 and COA 7.6).
- A multi-year project to restore 1.5 acres of the Waimānalo Stream floodway on MCTAB was completed in December 2014. In addition to restoring watershed functioning, this restoration is expected to reduce flooding upstream in the Waimānalo community and at the adjoining Olomana Golf Course.
- A project initiated in 2002 to design, fabricate, and install four water cannons as a secondary fire suppression to protect a Federally-protected seabird colony of red-footed boobies from range fires was completed with modifications in 2016. The water cannon controls originally consisted of a wired system, but after a major mishap that damaged the wiring, the system was redesigned to be remotely controlled via a wireless radio frequency signal. An infrared camera was added to the project to monitor for hotspots and flare-ups on the range.
- After years of unauthorized access into Nu'upia Ponds Wildlife Management Area (WMA) by off-road vehicles, mountain bikes, individuals and units conducting physical training, and pets, 1,000 feet of new aluminum fencing and five gates were constructed in 2016 at the northern boundary of the WMA (north of Pa'akai Pond). The fence was installed to protect Endangered Species Act (ESA) plants and waterbirds, Migratory Bird Treaty Act (MBTA) protected shorebirds, and sensitive cultural sites and ancient Hawaiian remains.

CURRENT MANAGEMENT CHALLENGES

Natural Resources staff shortages, contracting limitations, recreational pressures, and high military operational tempo are among the things that pose challenges to adequately manage natural resources for which MCBH has stewardship responsibility. The Natural Resources division has had to scale back

outreach activities like tours and environmental service projects due to minimum staff and staff time. This has resulted in a lower rate of education and outreach activities, which is disconcerting due to the sensitive nature of MCBH's natural resources and an ever changing Base population – civilian and military, as well as visitors.

Increasing Base population and off-Base visitors, Base expansion, an increase in natural resources oriented recreational activities, increasing biosecurity threats, and climate change have all added pressure to the Base's natural resources – both on and off-shore. One of the biggest challenges facing the management of MCBH natural resources, recreation, and training is the threat of introducing a highly invasive and harmful organism, whether plant, animal, insect, or other vector, through intra- and inter-island and international movement of personnel and equipment. There are numerous examples of harmful introductions including cats (*Felis catus*) and mosquitos (avian malaria) on native birds; coconut rhinoceros beetle (CRB) (*Oryctes rhinoceros*) and erythrina gall wasp (*Quadrastichus erythrinae*) on native flora; mosquitos and their associated pathogens (dengue, Zika) on public health; and invasives like Devilweed and kiawe on the condition of training lands.

Due to the significant amount of construction occurring on Kaneohe Bay, the effects of lighting on seabirds and marine life is becoming more pronounced. Even though the Base is installing lighting fixtures that follow International Dark Sky guidelines, the significant glow on Base from these fixtures is negating this mitigation measure. In 2016 there was a 50% increase in the number of seabirds rescued during 'shearwater fall-out' season. More innovative measures will need to be incorporated into designs to limit the number of birds affected by light pollution while still ensuring safety and security are not compromised.

Another major challenge is climate change, and associated sea level rise. The effects of climate change will have serious impacts to MCBH coastal training areas, facilities, and the habitat of endangered species that MCBH manages and protects. Protection of coral reefs within MCBH jurisdictional waters is critical as they provide a mitigating buffer to destructive waves produced by storm surges that can penetrate inland. Assessing potential vulnerability and employing adaptive management will be essential to identifying proactive strategies to mitigate projected impacts.

The ability to partner with NOAA Fisheries and USFWS to monitor MCBH's shorelines for marine animals that come ashore; leverage volunteers, State organizations, and other Federal agencies to conduct invasive species surveys and perform control work; and the addition of another CLEO to provide better enforcement of natural and cultural resources laws have made some of these challenges manageable.

PROGRESS EXPECTED DURING THE 2017-2021 TIME FRAME

MCBH intends to continue INRMP implementation as described in Section 7 and Appendix F2. In addition to routine management actions, Natural Resources staff has 26 STEP projects planned for implementation over the next five years (Section 3.3.2).[8] Table F2-1 illustrates how funds will be invested for these projects across the COA. Site-specific environmental analyses, interagency consultations, and/or permit applications are required for many STEP projects (Table 2-1).

Details on the staff and funding to support INRMP implementation are presented in Sections 4 and 7.0 and Appendix F3. INRMP implementation will continue the investment of funding at current levels of staffing and materials support, and will take advantage of other opportunities (e.g., interagency partnering, community volunteer assistance, and securing supplemental funding sources) as possible.

[8] This does not include recurring funding identified in COA 7.0 for INRMP Program Management (e.g., staff, expenses, training), or the support for feral and nuisance animal control (COA 7.1).

As documented in the annual progress reports, there have been a number of events and actions that have influenced management action completion schedules, accelerating some, delaying others, and leading to additional projects programmed. Unforeseeable events, shifts in priorities, lack of funding, or contracting issues may occur over the INRMP implementation time frame that similarly influence planned management actions. Such changes will continue to be documented in annual progress reports and reviewed with regulators as required.

Table 2-1. MCBH INRMP Active and Programmed Projects Requiring NEPA/ESA Section 7 Consultations/USACE Permits (2017-2021)

STEP Number	Project Title	COA	Level of NEPA Required	ESA Sec 7 (Y/N)	Permits (Y/N)
HI2CONESC1044684205	Nu'upia Ponds WMA Endangered Species Observation Towers	7.1	CATEX	Y	N
HI2CONESC1045854222	Repair/Replace Nu'upia Ponds Footbridge	7.1	EA	Y	Sec 10
HI2CONONC1045674217	Repair / Replace Artificial Nesting Platforms for Migratory Birds in Ulupa'u Crater	7.1	CATEX	Y	N
HI2CONWLC1044744305	Nu'upia Hema Wetland Restoration	7.2	EA	Y	Y
HI2CONWLC1044754306	Salvage Yard Wetland Restoration	7.2	EA	Y	Y
HI3COMPLC2244054202	Pu'uloa Shoreline Erosion Repair Project	7.4	EA	Y	Sec 10
HI3CONFRC2243654204	Integrated Wildland Fire Management Plan	7.5	EA	Y	N

Note: Additional projects requiring NEPA, consultations, or permits may be programmed during this five year INRMP implementation period.

OTHER CONSIDERATIONS

The implementation of this INRMP will be consistent with other pertinent land use and natural resource-related plans, polices, and controls in the affected regions as described in Section 8. Section 9 describes how management actions in the INRMP will continue to achieve stakeholder participation in such areas as public involvement and outreach, interagency partnering, and cooperative conservation.

CONCLUSION

This updated INRMP fulfills the requirements of the SAIA, other pertinent laws, and military directives, including the requirements to sustain support of the Marine Corps and MCBH mission and vision and to preserve, protect, and enhance the inherent values of the natural resources held in the public trust and for the public interest on MCBH properties. This updated INRMP demonstrates how MCBH will continue to direct efforts toward an overall ecosystem management goal of improving the sustainability and native biological diversity of the ecosystems of which it is a part, while supporting MCBH's military mission. This goal-driven document shows how MCBH will manage its natural resources by adhering to specific objectives and management actions (Section 7). A set of standardized natural resource conservation metrics continues to be used to assess MCBH's natural resource management and INRMP implementation progress (Section 3.4). Working with Sikes Act partners, other military departments, outside organizations, volunteers, and others remains essential to successful natural resources management.

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SECTION 3
INTRODUCTION TO INRMP, PLANNING APPROACH, AND IMPLEMENTATION

3.1 PURPOSE OF PLAN AND UPDATE PROCESS

Per Department of Defense Instruction (DoDI) 4715.03, an INRMP is:

An integrated plan focused, to the maximum extent practicable, on **ecosystem-based management**[1] that shows the interrelationships of individual components of natural resources management (e.g., fish and wildlife, forestry, land management, outdoor recreation) to mission requirements and other land use activities affecting an installation's natural resources. INRMPs ensure natural resources conservation programs and military operations are integrated and consistent with stewardship and legal requirements through cooperation among Department of Defense (DoD), USFWS, NOAA Fisheries Service, and State fish and wildlife agencies.

DoDI 4715.03 instructs that:

INRMPs shall be prepared, maintained, and implemented for all installations and their associated range training facilities that contain significant natural resources for which DoD has authority for or control of natural resources management. INRMPs shall integrate information relevant to natural resources with all other installation and range planning documents. Each INRMP shall:

1. Incorporate the principles of ecosystem-based management.
2. Contain information needed to make appropriate decisions about natural resources management.
3. Maintain a relevant and updated baseline list of plant and animal species located at each installation for all pertinent taxonomic and regionally important groups.
4. Ensure that biologically or geographically significant or sensitive natural resources, such as ecosystems or species, are monitored and managed for their protection and long-term sustainability.
5. Ensure no net loss to the training and testing capability and capacity of the installation and range and enhance those capabilities to the maximum extent practicable.

An INRMP describes policies, programs, projects, and procedures to help ensure maintenance of quality military training lands and quality of life for the affected military population, while ensuring that land use and natural resources management are integrated and consistent with Federal and State stewardship requirements and responsive to host community concerns (Appendix A1). This INRMP covers all MCBH

[1] Ecosystem-based management is a goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural processes; is cognizant of nature's timeframes; recognizes social and economic viability within functioning ecosystems; is adaptable to complex and changing requirements; and is realized through effective partnerships among private, local, State, tribal, and Federal interests. Ecosystem-based management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole. (DoDI 4715.03).

properties with significant natural resources: MCBH Kaneohe Bay; MCTAB; Waikane Valley Impact Area; Camp Smith; Pu'uloa RTF; and Pearl City Annex (Sections 4 and 6).

MCBH's first INRMP was produced in 2001. Prior to this, the Base primarily produced plans and studies that focused on single natural resource issues. The original plan was the combined *MCBH Integrated Natural Resources Management Plan and Environmental Assessment (INRMP/EA)*, covering the first five years of INRMP implementation (2002-2006).[2] The 2001 INRMP/EA documented the history of natural resources management at MCBH from 1981-2001, described existing environmental conditions in-depth, and detailed planned program activities. It established that MCBH, through the INRMP, would continue to implement management actions at the same level of effort as during those preceding 20 years. In other words, there would be no significant change in the existing level and type of effort as outlined under the COA: Fish and Wildlife Management; Wetland Management; Watershed Management; Coastal and Marine Resources Management; Grounds Maintenance and Landscape Management; Quality of Life/Outdoor Recreation Management; and Resource Information Management.[3]

Two five year updates have been published since the original plan, continuing the same implementation framework: the first covering management activities from 2007 through 2011,[4] and the second covering management activities from 2012 through 2016.[5] The INRMP/EA and subsequent updates document natural resources management progress as well as planned actions for the upcoming implementation period (Appendix F).

This 2017 INRMP Update reviews, documents, and builds upon progress that has been made during the first fifteen years of INRMP implementation (2002-2016) to update goals, objectives, and management actions for the next five years (2017-2021). This INRMP continues to fulfill requirements of the SAIA of 1997 (Appendix A4). It also continues to satisfy requirements of DoDI 4715.03 and MCO P5090.2A, which mandate preparation and implementation of an INRMP as the military's chosen vehicle for demonstrating compliance with an ecosystem approach to managing land and natural resources. Since natural resources management practices at MCBH are not expected to be materially different from those described in the 2001 INRMP/EA and employed during the past 15 years, and since updated management activities are not expected to result in biophysical consequences materially different from those anticipated and analyzed in the existing NEPA document, a new NEPA analysis is not required (Section 5.3).

3.2 PLANNING APPROACH

3.2.1 MANAGEMENT PRINCIPLES

The foundations of the integrated natural resources management planning process used at MCBH are described in the 2001 INRMP/EA (also Appendix A2). Similar to other DoD facilities, the process is based on an ecosystem approach as described in numerous guidance documents. The INRMP reflects how MCBH improves the sustainability and native biological diversity of the ecosystems of which it is a part, while supporting MCBH's military mission.

[2] Drigot et al. 2001, referred to as "2001 INRMP/EA" throughout the document.

[3] A few COA titles have been altered slightly in INRMP Updates, including this one. However, the COA categories continue to represent the full array of natural resources found on MCBH properties.

[4] MCBH Environmental Department and SRGII 2006, referred to as "2006 INRMP" throughout the document.

[5] MCBH Environmental Department and SRGII 2011, referred to as "2011 INRMP" throughout the document.

MCBH's ecosystem management is a goal-driven approach to managing natural resources that:

- supports present and future mission requirements;
- preserves ecosystem integrity (at a scale and timeline compatible with natural processes);
- recognizes and addresses its influence on the social and economic well-being of the communities affected (both military and host civilian communities);
- adapts to complex, changing requirements; and
- explores and engages in collaborative partnerships involving regional stakeholders with shared natural resources responsibilities and concerns, to the extent practicable.

Adapted from MCO P5090.2A Section 11105.14.

The *DoD INRMP Implementation Manual* (DoDM 4715.03) stresses the importance of **adaptive management** in meeting the goals of ecosystem-based management (DoD 2013). DoDI 4715.03 defines adaptive management as "The process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans and using the resulting information to improve the plans". Adaptive management requires continual evaluation of activities to learn what worked, what did not work, and how practices can be improved. MCBH reviews routine management actions, previous studies, and previously implemented projects to assess the success and the need to plan for different or additional management measures.

3.2.2 Updated Guidance Followed

A number of handbooks and guidance documents have been published to insure consistent implementation of SAIA requirements and development of INRMPs throughout the DoD. This updated INRMP follows the most recent *Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* (HQMC 2006) as well as the procedures to update, review, and implement INRMPs in compliance with the SAIA as set forth in the *DoD INRMP Implementation Manual* (DoDM 4715.03). It reflects compliance with all existing laws, regulations, and guidelines (Section 5 and Appendix A3).

3.2.3 Relationship Between Military Training Mission, Integrated Natural Resources Management Mission, and the Larger Public Interest

The types and levels of natural resources management activities in the MCBH INRMP show a strong supportive relationship among conservation, military training, and public interest objectives.[6] This reflects guidance requirements:

- **Section 101(b)(1)(I) of the Sikes Act** states that each INRMP shall, to the extent appropriate and applicable, provide for "no net loss in the capability of military installation lands to support the military mission of the installation."
- **Marine Corps implementation guidance** states that "there may be instances in which a 'net loss' may be unavoidable to fulfill regulations other than the Sikes Act (for example, complying with a biological opinion under the ESA or protecting wetlands under the Clean Water Act)." (HQMC 2006). Marine Corps guidance further states that "*natural resources are not to be consumed by*

[6] This section reflects policy about the interrelationship between the INRMP and Marine Corps training as discussed in the *Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* (HQMC 2006).

mission requirements, but sustained for mission requirements. To achieve this, environmental programs and policies must protect the environment for the mission" (*emphasis added*) (HQMC 2006).

- **MCO P5090.2A** states a clear responsibility for Marine Corps installations to manage natural resources under their stewardship to support the military mission, while conserving, preserving, protecting, rehabilitating, and enhancing these resources to ensure "the natural resources entrusted to the Marine Corps remain healthy and available for future generations" (MCO P5090.2A, Section 11102).

Per this guidance, the MCBH INRMP contains management actions devoted to species at risk, identification and protection of wetlands, habitat restoration, erosion control, storm water management, flood control, marine resource protection, control of invasive plant species, and landscape maintenance. Implementation will result in improved sustainability of training platforms while also addressing legal mandates that MCBH be good stewards of natural resources managed in the public trust on its lands and waters.

Keeping these multiple objectives and mandates in mind, the MCBH INRMP has been updated and will be implemented in a way that continues to support Marine Corps training use (Section 4); ensures compliance with natural resources laws (Section 5); integrates with regional ecosystem management goals as articulated in related plans and documents (Section 8); and encourages public involvement and cooperative conservation with Sikes Act partners and others (Section 9).

3.2.4 STAKEHOLDER COORDINATION REQUIREMENTS

The SAIA requires that the INRMP be prepared, reviewed, and updated in coordination with USFWS and the cognizant State fish and game agency, which is the DLNR Division of Forestry and Wildlife in Hawai'i. Since MCBH also covers natural resources in the coastal and offshore areas, it coordinates with NOAA Fisheries and DLNR Division of Aquatic Resources (DAR).

A Memorandum of Understanding (MOU) between DoD, USFWS, and the Association of Fish and Wildlife Agencies (AFWA) (updated July 2013) provides detail on the continuing policy of cooperation and coordination between these entities in the preparation, update, and implementation of installation INRMPs and management of natural resources on military installations. In 2015 another MOU was issued agreeing to detailed guidelines for streamlined review of INRMP Updates to facilitate faster review of INRMPs and improve coordination and collaboration (Section 5.2 and Appendix A6).

The SAIA also requires that the public be afforded an opportunity to review and comment on the INRMP during its preparation. Per Marine Corps guidance, MCBH addressed the public participation requirement by having the 2001 INRMP/EA circulated for public comment through the NEPA process as detailed in 40 Code of Federal Regulations (CFR) Part 1500 and MCO 5090.2A Chapter 12. Appendices G1 and H contain documentation of stakeholder participation in implementation and review of the INRMP. On-going interest by the public in MCBH's natural resource management program is addressed as needed.

3.3 INRMP STRUCTURE

This INRMP provides MCBH with a framework for managing natural resources on lands it owns or controls. It guides the natural resources management program at MCBH and informs other MCBH departments, government agencies, and the public of the planned management actions over the five year implementation period. All actions are subject to the availability of funds and personnel, procurement of goods or services, and/or coordination with outside agencies. Detailed descriptions of each management action are included in Section 7.

3.3.1 COURSE OF ACTION

This INRMP Update has a similar structure to previous versions in describing INRMP implementation in terms of completing a suite of management actions covering multiple natural resources and MCBH geographic areas organized by COA. The COA subject areas were carefully chosen to represent the full spectrum of natural resources covered under MCBH's jurisdiction. Some of the COA have been renamed and/or slightly modified to more clearly distinguish their content. The number of COA in this INRMP Update has increased from seven to eight, reflecting a reorganization that adds 7.0: INRMP Program Management and Implementation. This new section details programmatic management actions that are broad in scope, are carried out as part of normal operating procedures, and apply across the other COAs.

7.0. INRMP Program Management and Implementation
7.1. Wildlife Management
7.2. Wetland Management
7.3. Watershed Management
7.4. Coastal and Marine Resources Management
7.5. Landscape Maintenance and Vegetation Management
7.6. Natural Resources-based Outdoor Recreation, Outreach, and Public Access Management
7.7. Resource Information Management

Each COA provides information on the topic area to set the management context, including relevant guidance and policies, pertinent background, and existing conditions. Implementation is organized under goals, objectives, and management actions – both on-going and planned (Section 3.3.2). Supporting information includes documentation of past INRMP implementation progress (Appendix F1), and active and programmed management actions (Appendix F2). Information on how the COA are funded is contained in Table F2-1 and Appendix F3.

3.3.2 GOALS, OBJECTIVES, AND MANAGEMENT ACTIONS

Each COA has an overarching goal, a set of objectives, and supporting management actions. **Goals** are broad, guiding principles for the program, and **objectives** are measurable targets for achieving the goals (DoDM 4715.03). They need to be clear and practical, and able to be assessed for adaptive management. See Table 7.0-1 for a summary of the INRMP's goals and objectives. **Management Actions** are activities or tasks that will be undertaken to help meet objectives. There are three types of management actions in the INRMP.

- **Programmatic Management Actions**: Programmatic management actions transcend all COA and are consolidated into COA 7.0. These actions relate to the required periodic review and update of the INRMP document and sustainment of adequate levels of qualified staff, supplies, and material resources to implement management actions detailed in the INRMP. They also cover activities related to compliance with applicable laws and policies and interagency cooperation.
- **Routine Management Actions**: Routine management actions are conducted at regular intervals (e.g., weekly, monthly, bi-monthly, annually, as needed) by Natural Resources staff. Some of these may be conducted in coordination with other military units, partner agencies, and/or volunteers (e.g., bird surveys). Procedures provide specific documentation about how some routine activities are accomplished (Appendix D).

- **Projects**: Projects are management actions that have been or are planned to be outlined and programmed for STEP funding (Table F2-1).[7] A few projects may not require Operations and Maintenance Marine Corps (O&MMC) funding, but are accomplished in collaboration with other organizations or agencies. An example is research projects, which may require other "in-kind" support or working together to accomplish a common goal. Projects may be as simple as surveying MCBH properties for an endangered species (e.g., Hawaiian hoary bat) or an invasive plant. They may also be complex and have several phases of execution (e.g., wetland restoration projects): define the problem in a study; prepare a concept design or implementation plan to address the problem; develop detailed design and specifications to fix the problem; award a contract to implement the project; maintain the finished project; assess and monitor project results; and modify or replace the project. A single project can last from two to ten or more years, depending on the nature of the project, funds available, amount of advance site preparation needed, development of design specifications, regulatory permits required, etc. The status of projects is noted:

  STEP – in progress: Active and funded projects

  STEP – programmed: Programmed projects not currently funded

  STEP – in planning: Identified projects being considered for implementation that have not yet been programmed for STEP funding. These projects may require greater planning, may need to collect additional information, or may simply be a nascent idea that needs to be more fully developed.

Management actions are distributed along a five-year implementation schedule and are linked to specific goals and objectives within each of the eight COA (Section 7). The occurrence and relative priority of management actions in any given year during the INRMP time-frame can vary depending on a variety of factors including Command priority, funding availability, natural resources management priority, Sikes Act partner input, and personnel availability. See Appendix F2 for a summary of the management actions and when they are programmed to take place across the five years covered by this INRMP (2017-2021).

For discrete management actions that are continued from a previous plan (e.g., those initiated during a specific INRMP timeframe, having evolved from a previous phase of the same effort, or having been the "offspring" of a recommendation in a previous study), a brief history of that management action is provided for context. Details reside in previous INRMPs and/or the annual INRMP progress reports.

For more specific examples of how management actions across all COA have been carried out during the past five years of INRMP implementation (2012-2016), see Appendix F1 and Appendix G2. The reader can assume that similar actions will continue over the next five years of plan implementation (Appendix F2).

As part of adaptive management, some goals, objectives, and management actions have changed over time to better reflect the current management environment. Table F1-3 and Table F1-4 detail goals, objectives, and management actions that have been completed, removed or consolidated since the 2011 INRMP.

[7] Status Tool for Environmental Program (STEP): a Marine Corps Enterprise tool for Environmental Project Planning, Programming, Budgeting and Execution. It is the means by which new INRMP-oriented project ideas obtain funding, though not all of them will end up being 'funded' projects.

3.3.3 STRUCTURAL CHANGES

While efforts to streamline and provide the most up to date information necessitated changes of text in each update, the overall INRMP structure has remained consistent, allowing changes and progress to be easily tracked through all documents.[8] The 2001 INRMP/EA provided detail on the natural resources and related laws, policies, and management of each MCBH property. Updates document progress made over the previous five years and set a course for implementation over the next five year period.[9] Text, tables, and figures to support the main text are contained in appendices.

Four major organizational changes were made in this INRMP Update with the goal of streamlining presentation, consolidating similar information, and making the document more navigable for current Natural Resources staff. As indicated in Section 3.1, since this updated INRMP continues this existing level of program implementation, no revision to the NEPA analysis is required or contained in this document.

Implementation Framework. One change eliminated the use of the framework that had defined three levels of effort for implementing INRMP management actions: Operational Stewardship (continuing current level of action effort), Compliance-focused Stewardship (reduced level and type of effort that ensures compliance with relevant laws and regulatory agreements), or Optimal Stewardship (increased level and type of effort) (Appendix A2). Considering these alternative sets helped to define the minimum/maximum range of management efforts possible within the INRMP implementation framework, while still adhering to relevant laws, regulations, and directives.[10] Since 2001, MCBH has demonstrated a sustained commitment to the Operational Stewardship level of management effort in implementing the integrated natural resources management program.

However, planning and reporting based on the three levels of management actions proved to be repetitive and cumbersome without adding any real value to the execution of the INRMP. In concert with an effort to reduce the number of distinct management actions (see below), MCBH does not plan to continue separating its management actions by level of effort. The management actions presented in this INRMP Update reflect an on-going commitment to the previously defined Operational Stewardship level. Any activities that are accomplished above and beyond what is planned (Optimal Stewardship) will be documented. In the unforeseen case that MCBH considers reducing its management efforts to Compliance-focused Stewardship, discussions will be held in advance with Sikes Act partners. This may trigger new NEPA requirements.

COA. Some of the COA subject areas have been refocused to consolidate similar topic areas and more clearly define their contents. These changes will also assist in organizing electronic files covering the same topic areas so as to maintain consistency of and ease in retrieving information. Notable changes include:

[8] The one major difference is that the original 2001 INRMP/EA was developed as a combined management plan and programmatic EA and described environmental consequences to be expected from its implementation. Since no significant change to the proposed action and level or type of effort is being considered in the next five years of implementation, this INRMP Update does not need to repeat the discussion of predicted similar environmental consequences (Section 5.3). See discussion of environmental consequences in Section 8 of the 2001 INRMP/EA and FONSI in Appendix H1.

[9] Previous INRMP Updates have included a table at the beginning of Section 6 to identify what 'Existing Environmental Conditions' sections contained updated information. That table has been removed.

[10] To satisfy NEPA requirements when the original INRMP/EA was developed, potential environmental impacts were analyzed and discussed for the three alternative sets of management actions considered (Sections 5 and 8, and Appendix C of the 2001 INRMP/EA). Each alternative comprised a set of programmatic actions that vary in intensity and duration over the time frame of the INRMP.

COA 7.1, Wildlife Management: Revised from "Fish and Wildlife Management" to reflect only terrestrial wildlife, including migratory birds, to include endangered species; control of non-native vertebrate animals (e.g., pigs, cats, chickens, rats, mongoose, and pigeons); invertebrate pests (e.g., ants, bees); and pets.

COA 7.4, Coastal and Marine Resources Management: Revised to include fish and other forms of marine life associated with the hypersaline Nu'upia Ponds formerly included in COA 7.1.

COA 7.5, Landscape Maintenance and Vegetation Management: Revised from "Grounds Maintenance and Landscaping Management" to include all vegetation-related activities (i.e., plant surveys, invasive plant removal, plantings, habitat modifications, and tree maintenance), except those related to marine and coastal plants.

COA 7.6, Natural Resources-based Outdoor Recreation, Outreach, and Public Access Management: Revised from "Quality of Life, Natural Resources-based Outdoor Recreation, and Public Access" to include outreach conducted in support of natural resources-based outdoor recreation, education, and public access activities, rather than having outreach addressed separately in each COA.

Objectives. Objectives in each COA were revised and simplified in association with the streamlining effort. Upon review of the management actions in each COA, it became clear that, for most of the COA, management actions could be separated into two types, those related to Inventory and Monitoring of resources, and those related to Management and Enhancement of the resources. These objectives align with the overall natural resource management program efforts at MCBH.

Management Actions. The presentation of management actions was streamlined to reduce repetition through consolidation of routine actions, which clearly define regular, on-going actions undertaken by Natural Resources staff (and others) in each COA. Some management actions that had been repeated in each COA were consolidated (e.g., "Ensure relevant personnel obtain appropriate training on [resource type]" into 7.0; "Display/distribute available presentation materials on [resource type]" into 7.6). In addition to routine management actions, the COA include management actions in the form of STEP programmed and planned projects.

3.4 MEASURING SUCCESSFUL INRMP IMPLEMENTATION

Installations with INRMPs are required by the Sikes Act to report annually on the status of INRMP implementation. Following DoD and Marine Corps directives (HQMC 2006, DoD 2013), and as reflected in annual progress reviews, MCBH has met various criteria for measuring INRMP implementation progress as they have evolved.

Natural Resource Conservation Metrics. Metrics are used to assess the overall health and trends of each installation's natural resources program/INRMP implementation and to identify potential funding and other resource shortfalls. Annual reporting incorporates Navy/Marine Corps guidance on using the web-based Conservation (Natural Resources) Metrics Portal per MCO 5090.2A, Section 11200.4g (Appendix A5). DoD and Department of the Navy (DoN) policy for INRMP annual reporting metrics require MCBH to provide a current assessment of seven focus areas:

1. INRMP Implementation: the execution of actions taken to meet goals/objectives outlined in the INRMP

2. Listed Species and Critical Habitat: the extent to which Federally-listed species have been identified and the INRMP provides conservation benefits to these species and their habitats
3. Sikes Act Cooperation: the degree that the USFWS, NOAA, and State DLNR partnerships are cooperative and result in effective INRMP development
4. Recreational Use and Access: the availability and adequacy of public recreational use opportunities, and access for handicapped and disabled persons, given security and safety requirements for the installation
5. Team Adequacy: the adequacy of a professional natural resources team
6. Natural Resources Management: the effectiveness of management activities for conserving and rehabilitating installation natural resources as defined in the INRMP
7. Natural Resources Program Support of the Installation Mission: the level to which existing natural resources program supports the installation's ability to sustain the current operational mission ensuring no net loss of mission capability.

Annual Reviews. MCBH conducts annual reviews on INRMP implementation progress. In general, the evaluation procedure has been as follows: near the end of each calendar year, the MCBH Senior Natural Resources Management Specialist notifies the Sikes Act Partners of the annual INRMP Implementation meeting and sends them a progress report for review. At least 30 days are given to review the information before meeting at MCBH in January. Other Base departments that are regularly involved with natural resources actions and activities are also invited to attend the meeting.

Each annual progress report contains: (1) a narrative summary of natural resources accomplishments during the review year; (2) tables documenting progress made on each INRMP management action; and (3) the status of major INRMP projects. After reviewing, Sikes Act Partners and military operators meet with MCBH natural resources managers to discuss and make recommendations for improvements. The annual review process helps MCBH to verify, as required in the Marine Corps INRMP Handbook (HQMC 2006), that:

- Current information on all conservation metrics is available.
- All 'must fund' projects and activities have been budgeted for and implementation is on schedule.
- All required trained natural resources positions are filled or are in the process of being filled.
- Projects and activities for the upcoming year have been identified and included in the INRMP. An updated project list does not necessitate revising the INRMP.
- All required coordination has occurred.
- All significant changes to the installation's mission requirements or its natural resources have been identified.

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SECTION 4
MCBH MISSION, VISION, AND MANAGEMENT SETTING

4.1 MCBH MISSION AND VISION

The Marine Corps is the only Service specifically tasked by Congress to operate as an integrated combined arms force providing a joint force enabler in three dimensions – air, land, and sea. Marines are trained to be America's premier expeditionary total force in readiness, prepared to operate anywhere national interests require within a moment's notice. Amphibious and maritime pre-positioning forces play an ever-increasing role in supporting attainment of national objectives while protecting the United States' national interests and the international community's need for stability.[1]

MCBH supports this Marine Corps Mission by:

- *maintaining facilities and providing programs and services in direct support of units, individuals and families in order to enhance and sustain combat readiness for all operating forces and tenant organizations aboard MCBH.*

MCBH's Vision is to be the installation of choice for the Warfighter by continuing to meet and exceed the expectation of those who use its facilities and services. MCBH acknowledges that there is an obligation to balance this support with the requirement to preserve the environment.

4.2 TENANTS

MCBH supports a number of tenant commands. The major Marine Corps operational commands include: Third Marine Regiment (Reinforced) (3d Marines), Marine Aircraft Group-24 (MAG-24), and Combat Logistics Battalion-3 (CLB-3).[2] These commands are under administrative and operational control of the Third Marine Expeditionary Force (III MEF), currently headquartered in Okinawa, Japan.[3] III MEF is one of two MEFs commanded by U.S. Marine Corps Forces, Pacific (MARFORPAC) located at Camp Smith.

The focus of the III MEF (Hawaii) is to execute amphibious assault and other required air/ground operations. This requires constant deployment of appropriately organized units. Units of the III MEF (Hawaii) may also be required to augment other Marine Corps air/ground task forces. Facilities provided by MCBH are primarily for support of the III MEF (Hawaii) units, including operational, maintenance, berthing, and personnel support.[4]

[1] Derived from Commandant of the Marine Corps, J.T. Conway, General, USMC, *Marine Corps Vision & Strategy 2025*, Department of the Navy, Headquarters U.S. Marine Corps, Washington D.C. (June 2008) posted at: http://www.onr.navy.mil/~/media/Files/About-ONR/usmc_vision_strategy_2025_0809.ashx.

[2] The Navy's Commander Patrol and Reconnaissance Wing Two (CPRW-2) is scheduled to depart MCBH in 2017, however two aircraft will remain stationed at MCBH Kaneohe Bay.

[3] There are plans for the headquarters of III MEF to move to MCBH Kaneohe Bay as part of the drawdown of Marines on Okinawa.

[4] Derived from MCBH Master Plan (NAVFAC Pacific 2007).

Other principal tenant commands and tenants on MCBH properties include:[5]

- **US Pacific Command (USPACOM)**: one of six geographic Unified Combatant Commands of the United States Armed Forces. Commander, U.S. Pacific Command is the senior U.S. military authority in the Pacific Command Area of Responsibility. The Commander reports to the President of the United States through the Secretary of Defense and is supported by four component commands: U.S. Pacific Fleet; U.S. Pacific Air Forces; U.S. Army Pacific; and U.S. Marine Forces, Pacific. These commands are headquartered in Hawai'i and have forces stationed and deployed throughout the region.
- **U.S. Marine Corps Forces, Pacific (MARFORPAC)**: commands all U.S. Marine Corps forces assigned to the U.S. Pacific Command, accomplishes assigned operational missions; advises the Commander, U.S. Pacific Command on the proper employment, capabilities, and support of U.S. Marine Corps forces; and provides combat ready forces to other commands, as required.
- **Special Operations Command, Pacific**: synchronizes the planning of special operations and provides Special Operations Forces to support persistent, networked, and distributed Geographic Combatant Commanders operations to protect and advance the Nation's interests.
- **1st Battalion, 12th Marines**: provides close and continuous fire support by neutralizing, destroying or suppressing targets that threaten the success of the ground combat Marines.
- **Third Radio Battalion**: provides MEF units with signal intelligence and electronic warfare support.
- **4th Force Reconnaissance Company – Marine Forces Reserve**: provides trained Marines to augment active-duty forces or to mobilize as a unit to conduct pre-assault and deep post-assault reconnaissance and surveillance to support MEF elements.
- **Commander Fleet Logistics Support Squadron-51**: provides logistics support for Navy-unique, fleet essential airlift mission requirements.
- **School of Infantry (SOI) West – Hawaii Detachment**: trains riflemen, infantrymen, and assault amphibian crewman in skills across the infantry training continuum, and produces combat instructors.
- **Naval Regional Medical Clinic**: ensures medical readiness of Marine and Navy personnel and health care to other units.
- **Naval Regional Dental Clinic**: provides dental treatment to all eligible beneficiaries and maintains dental operational readiness.
- **Army Veterinary Facility**: primarily provides veterinary services to military working dogs.
- **Chaplains Religious Enrichment Development Operation (CREDO)**: provides appropriate forms of ministry to military personnel and dependents.
- **Marine Forces Pacific Band**: provides music for military ceremonies and other official activities.
- **Commander, Patrol and Reconnaissance Wing Two, U.S. Pacific Fleet headquarters (CPRW-2)**: three anti-submarine warfare squadrons, and a special purpose squadron.[6]
- **Anti-Submarine Warfare Helicopter Squadron Light-37 (HSL-37)**

In addition to tenant commands, the Hawaii Army National Guard (HIARNG) leases their Regional Training Institute (RTI) at MCTAB from the Marine Corps. The City and County of Honolulu (CCH) has a license agreement with MCBH for public use of Training Area 1 at MCTAB.

[5] See http://www.mcbhawaii.marines.mil/Units/TenantCommands.aspx for latest and complete list of MCBH tenants.

[6] This command will be departing in 2017. Only the Patrol Squadron Special Projects Unit (VPU-2), the Helicopter Maritime Strike Squadron (HSM-37), and two P-8 aircraft will remain behind.

4.3 LOCATION AND CURRENT USES OF MCBH PROPERTIES

MCBH is comprised of eight properties: 2,951-acre Kaneohe Bay (Mōkapu Peninsula); 1,074-acre MCTAB; 187-acre Waikane Valley Impact Area; 220-acre Camp Smith; 162-acre Pu'uloa RTF; 63-acre Manana Housing Area; 27-acre Pearl City Annex; and 12-acre Molokai Training Facility (Figure 1, Appendix B). A brief summary of the properties and their current uses, including training activities, is included in this section.[7] Master Plans provide additional information on existing facilities, development constraints, and recommended land uses (Section 8.1.2).

Not covered in this INRMP are non-MCBH properties throughout the State where MCBH-based units train due to limited land available on MCBH. Most large training areas used by III MEF (Hawaii) are controlled by the U.S. Army (on O'ahu at Makua, Schofield Barracks, and Kahuku Training Area; and on the Big Island (Hawai'i) at Pohakuloa Training Area); other branches of government; or by private landowners. Properties outside MCBH that are within DoD control and that have significant natural resources are covered by that host-installation's INRMP. MCBH units must adhere to the requirements of the installation's INRMP while training on non-MCBH properties.

Base Growth: MCBH, and MCBH Kaneohe Bay in particular, have and continue to expand as part of both Marine Corps-wide (*Grow The Force*) and Marine Corps Pacific forces efforts. The current resident population at MCBH Kaneohe Bay is 16,000. An EA was completed in 2011 for the *Grow The Force* initiative identifying the on-Base facilities required to support an additional 970 people by 2012 (Wil Chee - Planning and Environmental, Inc. 2011). An Environmental Impact Statement (EIS) was issued in 2012 analyzing the environmental impacts of basing MV-22 and AH-1/UH-1 aircraft at MCBH Kaneohe Bay, including new and renovated facilities, aircraft operations, and personnel increases (approximately 2,200 people by 2018) (Department of the Navy 2012). Although neither analysis identified impacts on natural resources that could not be mitigated, the increased facilities and personnel will put more pressure on natural resources in general. Natural Resources staff review and comment on these types of proposed projects to insure resource protection.

Public Access Use: As with all U.S. military bases, access by the public to MCBH lands is limited due to security requirements. Under the Sikes Act, all military installations with significant natural resources must permit sustainable multi-purpose use of the resources subject to safety requirements, military security, and non-degradation of the natural resources. This is reflected in MCO P5090.2A Section 11104.1.c (*Public Access Associated with the Natural Resources Management Program*), which directs that "Marine Corps lands will be available to the public for enjoyment and use of natural resources, except when a specific determination has been made by the installation [Commanding General/Commanding Officer] CG/CO that a military requirement prevents such use for safety or security reasons, or when such use would cause substantial environmental degradation".

MCBH has an established natural resources outreach program that has involved thousands of members of the public in learning about and protecting public trust resources. This public access program is focused primarily on accomplishing environmental enhancement objectives and informing groups on MCBH natural resources and the importance of proper stewardship (COA 7.0 and Section 9). In addition, the Base manages limited public access fishing and hunting programs (COA 7.6).

In 2014 MCBH initiated a recreational bow hunting program at MCTAB open to DoD affiliated personnel, active or retired civilian employees of MCBH, other uniformed services, and sponsored civilians (Section

[7] For more detail, including a description of the history of acquisition of the properties, see Sections 2.2 and 2.3 of the 2001 INRMP/EA.

6.2.4 and COA 7.6). This program is managed by the Operations and Training (O&T) Directorate with technical oversight by the Environmental Department. Access to designated hunting areas is limited to individuals with a valid Base hunting permit that have been selected to hunt during a given hunting period. Access limitations are enforced through a permit system, limits on number of people hunting, and a locked gate that allows hunters to enter the fenced hunting area.

The beach in Training Area 1 at MCTAB (non-hunting area) continues to be open to all members of the public during weekends and selected holidays except when closed during major training evolutions.

4.3.1 MARINE CORPS BASE HAWAII, KANEOHE BAY

MCBH Kaneohe Bay is located on Mōkapu Peninsula in the Koʻolaupoko District of windward Oʻahu. The Base is bordered by the Pacific Ocean to the north, Kāneʻohe Bay to the west, Kailua Bay to the east, and civilian residential communities of Aikahi Park and Kaimalino in Kailua adjacent to MCBH Kaneohe Bay's Nuʻupia Ponds WMA to the south. MCBH Kaneohe Bay occupies approximately 2,951 acres of land and exercises control of the 500-yard Naval Defensive Sea Area (otherwise known as the security buffer zone) extending seaward from the shorelines.[8] MCBH Kaneohe Bay contains training areas, active duty housing, residential housing, administrative and operational buildings, wetlands, wildlife management areas, and personnel support facilities. See Figure 2, Appendix B and discussion of the environmental aspects of MCBH Kaneohe Bay in Section 6.1.

Training Support: MCBH Kaneohe Bay supports airfield operations with runways, landing pads, aircraft parking aprons, hangars, maintenance facilities, radar, meteorology, and other support facilities. The installation has a single operational runway used by fixed-wing aircraft and helicopters and four helicopter landing pads. The airfield is operated by Marine Corps Air Station (MCAS). The airfield normally operates for 18 hours per day Monday through Friday and for 10 hours per day on Saturday and Sunday. It can be opened for special exercises and public events as necessary.

Supply/storage activities including general warehousing, air and ground unit storage, cold storage, fuel storage, and open storage occur in various areas of MCBH Kaneohe Bay. Ordnance storage and handling operations occur in the magazines in the ordnance storage area on southern slope of Ulupaʻu Crater. Ordnance assembly operations occur at West Field and at the combat aircraft loading area in the vicinity of the approach runway. Large vehicle maintenance facilities are located primarily in the middle to southeastern portion of MCBH Kaneohe Bay.

Training areas are located in several areas of MCBH Kaneohe Bay, with the largest area being the range training facility in Ulupaʻu Crater (Figure 3, Appendix B). Other training occurs in the southeastern portion

[8] OPNAVINST 5500.11D, EO 8681 of 14 February 1941, and Section 1382, Title 18, U.S. Code established a Naval Defensive Sea Area (NDSA) around MCBH Kaneohe Bay and eastward to Kapoho Point, Oʻahu for the purpose of national defense. The U.S. Government claims title to the entire NDSA. The Kaneʻohe Bay Defensive Sea Area has been suspended by the Chief of Naval Operations, except for a 500-yard Security Buffer Zone surrounding the Mōkapu Peninsula. The current representation of the buffer zone on maps depicts a polygon surrounding the peninsula and extending more than 500 yards from the shoreline. This Restriction Zone area is larger than the NDSA/500-yard Security Buffer Zone, which runs parallel to and extends 500 yards from the shoreline. In practice, the Restriction Zone acts as a buffer to the NDSA/500-yard buffer zone. However, MCBH has no enforceable jurisdiction in the area of the Restriction Zone outside the 500-yard defensive sea area (Tokarz 1985). The installation commander can increase the NDSA/500-yard buffer zone at any time for any reason relating to national security (Major J. Hitesman, Deputy Staff Judge Advocate, Marine Corps Base Hawaii, pers. comm. 2001) (Guidance found in: Commander, Pacific Division, Naval Facilities Engineering Command Memo 11011 Ser 2411/7359 of 25 July 1988; and Military Police Procedure 5500.12 MPP 5500.12 MP/KB of 18 December 1995) (COA 7.4, 2001 INRMP/EA; and Section 3.6.1, *MCBH Coral Reef Ecosystem Management Study*, Shafer et al. 2002).

of the peninsula where a helicopter Tactical Landing Zone is located. MCBH Kaneohe Bay conducts training and asserts access control in the 500-yard security buffer zone extending seaward from its shorelines.

4.3.2 MARINE CORPS TRAINING AREA BELLOWS

MCTAB occupies a 1,074-acre portion of the military controlled lands at Bellows at the southern end of the Ko‘olaupoko Region on the windward coast of O‘ahu.[9] MCTAB is located approximately 12 miles south of MCBH Kaneohe Bay. MCTAB is a non-live fire training range whose training areas can support up to Battalion-size ground maneuver operations. It has a half mile long beach frontage that supports ship-to-shore operations involving Landing Craft Air Cushioned (LCAC) and amphibious assault vehicle (AAV) landings. At MCTAB, MCBH has authority to the high tide line or the area of highest wave run-up, but can exert limited control over the off-shore waters during military maneuvers involving movement to shore and parachute operations. Bellows Air Force Station (AFS), located to the northeast of MCTAB with its western and southern border adjoining MCTAB, controls 422 acres, including the beachfront. The northern end of the Bellows AFS beachfront is used for military recreation facilities and Base support activities; no military landings occur on this beach. Waimānalo Stream and an old jetty separates the beaches of MCTAB and Bellows AFS.

MCTAB’s beach and shoreline area, designated as Training Area 1 (TA-1), is used for military training during the week, and is normally open for public recreational use on weekends and holidays. Public use of TA-1 is managed by the CCH under a license agreement with MCBH.[10] The Honolulu Police Department is responsible for protection of people and property, preservation of public peace, and the prevention and detection of crime during period of open public use. Tinker Road and Waimānalo Stream divide the MCTAB training areas. MCTAB is primarily used for military training, however on select weekends recreational bow hunting is authorized in Training Areas 2 (TA-2) and 3 (TA-3) (COA 7.6). HIARNG leases 48 acres for a Regional Training Institute. The leased property is defined by Waimānalo town and Kalanianaole Highway to the south, the Kahawai tributary to Waimānalo Stream to the west, and MCTAB to the north and east. HIARNG is expected to perform natural resources management within their leased land in a manner consistent with MCBH’s INRMP. See Figure 15, Appendix B and discussion of the environmental aspects of MCTAB in Section 6.2.

Although MCBH, HIARNG, and Bellows AFS have independent INRMPs for their properties in Waimānalo, they maintain a dialogue to ensure close coordination and partnering in the protection and preservation of their respective natural resources. MCTAB maintains jurisdiction over two wetlands along Waimānalo Stream named Puha ‘Ekahi and Puha ‘Elua. The Air Force has jurisdiction over Pu‘ewai Wetland located west of Tinker Road Bridge where it adjoins Waimānalo Stream. Bellows AFS has jurisdiction over most of Inoa‘ole Stream, with MCBH controlling the portion near its mouth by Waimānalo Bay. See Figure 17, Appendix B.

Training Support: MCTAB directly supports training by warfighters of MARFORPAC, and by occasional visiting Marine Expeditionary Units (MEUs) in transit to other Asia/Pacific locations. There are three main training areas at MCTAB: TA-1, the shoreline training area, adjoins Waimānalo Bay and is bracketed by Waimānalo Stream and Inoa‘ole Stream, while TA-2 and TA-3 are inland from Waimānalo Bay (Figure 15, Appendix B). TA-2 is separated from TA-1 by Tinker Road and from TA-3 by Waimānalo Stream. The

[9] It is anticipated that during this INRMP implementation period 1.6 acres of MCTAB will be deeded to GSA and eventually sold to the State of Hawai‘i to address encroachment issues by the Waimānalo Health Center.

[10] The current license operates as a month to month extension of the five-year license signed by MCBH and CCH in 2004. New terms based on the *MCTAB Training Area 1 Recreation Use Feasibility Study* (Helber Hastert & Fee 2010) cannot be incorporated into the licensing agreement until a new one is renegotiated.

MCTAB Master Plan (Group 70 2002) and the *MCBH Master Plan* (Section 8.1.2) contain details on the types of training that occur at MCTAB. Ground maneuvers utilize specifically designated routes of ingress/egress from the beach inland to avoid impacts to environmentally sensitive areas and the nearby residential community. Live firing is prohibited and loud noise producing operations are restricted to certain hours. Non-Marine Corps entities that use MCTAB for training include: Army, Navy, Honolulu Police Department, host nations, and the FBI. MCTAB is utilized as part of Rim of the Pacific Exercise (RIMPAC), a biennial international military exercise hosted by the Navy to increase the tactical proficiency of military units by conducting a wide variety of maritime operations.

4.3.3 WAIKANE VALLEY IMPACT AREA

The 187-acre Waikane Valley Impact Area is located in Waikane Valley, at the northern end of the Koʻolaupoko Region on the windward coast of Oʻahu. The property was used off and on by the military for live fire training until the lease with the private owner expired in 1976. MCBH acquired the property through condemnation after it was determined that the land could never be certified clear of unexploded ordnance. The land is currently unoccupied and does not contain any active military training areas. The area is partially secured by a chain-link fence, approximately 4,400 feet long on the south perimeter and short portions of the east and west perimeters. A portion of the southern part of Waikane Valley Impact Area has been fenced off and cleared of ordnance to allow access to a sacred Hawaiian site (Figure 26, Appendix B).

Clean-up efforts of munitions of explosive concern (MEC) occurred in 2014 and 2015 under DoD's Military Munitions Response Program (MMRP) (Section 8.1.16). MCBH is responsible for security (e.g., law enforcement to prevent poaching and unauthorized off-roading), maintenance, and resource management (e.g., opportunistic monitoring of natural resources). Although initial clean-up efforts have been completed, entry to the site is prohibited without proper clearances and Explosive Ordnance Disposal (EOD) escorts. Although public access is prohibited, trespassers have been known to break through the fence or cut through gates to gain access to the southern area for unauthorized recreational activities such as feral pig hunting and off-roading. See Figure 24, Appendix B and discussion of the environmental aspects of Waikane Valley Impact Area in Section 6.3.

4.3.4 MARINE CORPS BASE HAWAII, CAMP H.M. SMITH

Camp Smith is located in the leeward Oʻahu uplands, near the town of ʻAiea. It is a 220-acre installation situated on the upper slopes of Halawa Heights at an approximate elevation of 600 feet above sea level. Major facilities include administrative and operational buildings, troop housing, and personnel support facilities. Commander, USPACOM and MARFORPAC are the major tenants sharing the complex, and Camp Smith is also the headquarters for the Commander, MARFORPAC. The main military activities are administration and community support for the major occupants of the office buildings and family housing units within Camp Smith. A helicopter landing pad located in an isolated area in the northwest portion of Camp Smith is operated in accordance with Visual Flight Rules, with approach and departure clearance over undeveloped forest areas.

The administrative and family housing landscaped areas are subject to landscape maintenance programs and policies (COA 7.5). Occupants are subject to Base and housing regulations covering control of pets and introduction of prohibited plants and animals. Natural Resources staff include Camp Smith in their feral and nuisance wildlife monitoring and control program (primarily pigs, chickens, and pigeons) and invasive vegetation control efforts. See Figure 27, Appendix B and discussion of the environmental aspects of Camp Smith in Section 6.4.

4.3.5 PU‘ULOA RANGE TRAINING FACILITY

Pu‘uloa RTF occupies 162 acres on the coast, near Pearl Harbor’s Iroquois Point, at the eastern edge of the ‘Ewa Plain in leeward O‘ahu.[11] It is an active training facility used for small arms qualification and practice. Marine Corps marksmanship training is supported at this facility using six live fire ranges. Rifle and pistol requalification and training are also conducted by units from the Navy and the Army. Federal, State, and local law enforcement; local gun clubs are accommodated on a non-interference basis. The area seaward of Pu‘uloa RTF falls within the Pearl Harbor NDSA controlled by the Navy. The shoreline area is subject to occasional haul-outs by endangered Hawaiian monk seals and rare visitations by the green sea turtle. Natural Resources staff include Pu‘uloa RTF in their integrated pest management program, e.g., nuisance bird control. See Figure 31, Appendix B and discussion of the environmental aspects of Pu‘uloa RTF in Section 6.5.

4.3.6 MANANA HOUSING AREA

Manana Housing Area occupies 62 acres in leeward O‘ahu, and is located seven miles west of Camp Smith. It has 168 housing units for Marines and 80 housing units for Navy personnel, along with recreation and personnel support facilities. MCBH Animal Control officers assist Public Private Venture housing with conducting nuisance, free-roaming, and feral animal control (e.g., chickens) at Manana. Other than its landscaped areas being subject to landscape maintenance programs and policies (COA 7.5), and its occupants being subject to Base and housing regulations covering control of pets, nuisance plants, and animals, Manana Housing Area contains no significant natural resources and is not subject to major coverage in this INRMP. See Figure 35, Appendix B.

4.3.7 PEARL CITY ANNEX

Pearl City Annex is a 27-acre site located within Joint Base Pearl Harbor-Hickam (JBPHH) on Pearl City Peninsula. There are three warehouses that provide a total of 212,160 square feet of covered storage space, an additional 41,968 square feet of space provided by two open-sided sheds, and a tenth of an acre jurisdictional wetland. The facility is primarily used as a storage area for a wide range of material and equipment that cannot be stored at MCBH Kaneohe Bay due to lack of space. Its open lawn, wetland, and shoreline areas are frequented by endangered waterbirds (e.g., Hawaiian stilt) and by federally-protected migratory birds (e.g., plovers). Natural Resources staff include Pearl City Annex in their nuisance wildlife monitoring and control program, primarily for pigs. See Figure 35, Appendix B and discussion of the environmental aspects of Pearl City Annex in Section 6.6.

4.3.8 MOLOKAI TRAINING SUPPORT FACILITY

The Molokai Training Support Facility is a 12-acre facility located near the Molokai Airport. Due to lack of current training activities on Moloka‘i, there is not a major presence there. It contains no significant natural resources and is minimally discussed in this INRMP.

[11] In January 2011 approximately 25 acres, previously leased to the Federal Aviation Administration, were transferred from the U.S. Navy to MCBH.

4.4 MANAGEMENT ENVIRONMENT

MCBH has a strong tradition of exemplary natural resources stewardship and community involvement.[12] This updated INRMP provides details on the current management environment supporting natural resources management at MCBH. The INRMP is supported by previous plans and studies, which contain information that remains of historical value as a baseline reference, and future studies that are programmed to fulfill natural resource management needs.

4.4.1 STAFF AND ORGANIZATION

Over the past 35 years, the Environmental Department has been subject to staff increases, organizational changes, expansion in responsibilities to serve additional tenants and to accommodate increased organizational complexities, new legal compliance demands, and expanded amount of geographic area placed under their jurisdictional responsibility. Chart 4.1 shows how the Environmental Department fits into the overall MCBH Command structure. An important aspect is that the Environmental Department exists on co-equal footing with the Facilities and Supply Departments as part of the Installation, Environment, and Logistics (IEL) Directorate. IEL reports to the Commanding Officer.

Chart 4.2 shows the most current organization and overall composition of the Base Environmental Compliance and Protection Department (Environmental Department). The Environmental Department is currently led by an active-duty Marine Corps Major as Director.[13] There are 29 military and civilian environmental professionals under the Director's supervision in multiple functional areas. Base natural resources are managed by the Natural Resources staff within the Conservation Division of the Environmental Department, and supervised by the Department's Deputy Director. The Deputy Director oversees the work of the natural resources and cultural resources program staff and the CLEOs, which together comprise the Conservation Division. When fully staffed, the Natural Resources staff consists of a GS-12 Senior Natural Resources Management Specialist; a GS-11 Natural Resources Management Specialist; and a GS-09 Wildlife/Bioscience Science Technician. Natural Resources staff works closely with each other and with other departmental staff. There are many overlapping areas of concern that require a team effort among departmental subject matter experts (e.g., storm water and erosion management, community outreach, spill response, recycling, pollution prevention, environmental restoration, environmental enhancement, and use of a geographic information system). The interaction across disciplines reflects the complexity and interdependencies among various facets of the environment and programs that manage them.

Over the past five years the Natural Resources staff has had changes and experienced personnel shortages. The previous Senior Natural Resources Management Specialist, onboard since 1982, departed her position in May 2012 due to illness and retired in December 2012. Internal promotions of the GS-11 Natural Resources Management Specialist (on staff since 1996) and the GS-09 Wildlife/Bioscience Technician (on staff since 2008) filled the GS-12 and GS-11 positions in early 2013. Although these two persons have provided consistency, over the course of the last INRMP implementation period (2012-2016) occupancy of the GS-09 position has been sporadic at best, having been vacant for four of five years due to funding shortfalls. The ability to supplement the Wildlife/Bioscience Technician position with contractors was met with limited success. The position was filled with a permanent hire in October 2016.

[12] Sections 2.5.1 and 2.5.2 of the 2001 INRMP/EA provide details, including the history of the natural resources program and staff development.

[13] The Environmental Department Director position is an active duty USMC Major's billet, but has also been filled by individuals with the rank of Captain and Lieutenant Colonel.

A synopsis of the required qualifications of the MCBH's natural resources professional "core" staff follows, demonstrating that MCBH satisfies the Sikes Act requirement that qualified natural resources professionals are implementing the INRMP and keeping it current:[14]

GS-12 Senior Natural Resources Management Specialist

The Senior Natural Resources Management Specialist represents MCBH as the senior technical and regulatory authority in matters related to MCBH natural resources management. This person provides direction to the natural resources program and directs the workload; however, this is not a supervisory position. The GS-12 should have comprehensive knowledge in the areas of terrestrial wildlife, marine life, land management, water resources, vegetation management, and public outreach; a broad knowledge of environmental planning; knowledge of pertinent natural resources and environmental laws, regulations, policies, and precedents governing federal and military land management; comprehensive knowledge in effecting MCBH compliance with NEPA; and broad knowledge of Marine Corps budgeting and execution procedures. The individual must hold at least a four-year degree in any of the aforementioned natural resources disciplines.

GS-11 Natural Resources Management Specialist

The Natural Resources Management Specialist stands in for the Senior Natural Resources Management Specialist when he/she is unavailable. The GS-11, like the GS-12, should have comprehensive knowledge in the areas of terrestrial wildlife, marine life, land management, water resources, vegetation management, and public outreach; a broad knowledge of environmental planning; knowledge of pertinent natural resources and environmental laws, regulations, policies, and precedents governing federal and military land management; comprehensive knowledge in effecting MCBH compliance with NEPA; basic knowledge of the Marine Corps budgeting process; and ability to identify, assess, document, and track environmental resource requirements utilizing STEP. The Natural Resources Management Specialist is also responsible for managing MCBH's Integrated Pest Management program. The individual must hold at least a four-year degree in any of aforementioned natural resources disciplines.

GS-09 Wildlife/Bioscience Technician

The Wildlife/Bioscience Technician position duties and responsibilities have been modified since the last INRMP Update as a result of:

- A need to expand biological field survey/monitoring of MCBH's four endangered waterbirds, two migratory seabird colonies, and endangered marine mammals on the Mōkapu Peninsula and other remote MCBH properties.
- A need to improve MCBH's natural resources outreach, volunteer, and educational program.

The GS-09 Wildlife/Bioscience Technician responsibilities involve assisting in implementing the Natural Resources section's environmental enhancement programs (i.e., coordinating tours, volunteer environmental service projects, and permitted scientific research projects in Nu'upia Ponds WMA and Ulupa'u Crater WMA); monitoring all MCBH wetlands; monitoring and performing mitigation actions required to control beach erosion; identifying unauthorized trespasses into environmentally sensitive areas; and monitoring deterioration of environmental assets such as native vegetation, wetland habitats, and shorelines. The Wildlife/Bioscience Technician is responsible for managing the feral and nuisance animal

[14] Excerpt from SAIA, Section 107 states: "To the extent practicable using available resources, the Secretary of each military department shall ensure that sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel are available and assigned responsibility to perform tasks necessary to carry out this title, including the preparation and implementation of integrated natural resources management plans."

control/trapping agreement; conducting some trapping operations independently or with support from United States Department of Agriculture (USDA) Wildlife Services; providing technical oversight for Bird Aircraft Strike Hazard (BASH) activities on the airfield; managing the USFWS depredation permit, and assisting the natural resources managers with their project management. The individual must have basic working knowledge of the biology of native Hawaiian flora and fauna.

4.4.2 OTHER NATURAL RESOURCES SUPPORT

In addition to the Environmental Department's Natural Resources staff, a number of natural resources support functions are performed by other units or entities on- and off-Base.

Environmental Impact Review Board

A Base-wide interdepartmental committee known as the Base Environmental Impact Review Board (EIRB) reviews staff actions regarding compliance with NEPA. The EIRB functions to ensure adequate review of the environmental impact of Base actions. The Environmental Department Director serves as the EIRB Chair and Executive Agent.[15] The EIRB is the principal MCBH forum within which the original INRMP/EA was reviewed and approved, prior to acquiring the Commander's signature on the FONSI for implementation (Appendix H1). Its members continue to play that function for INRMP updates.

Environmental Lawyer

Pursuant to SECNAVINST 5430.25E and 5430.27D, the MCBH Office of the Staff Judge Advocate and the Office of Counsel, Hawai'i Area Counsel Office (HACO), have a shared responsibility to provide legal advice, assistance, research and representation on laws protecting the human environment, natural resources, and historic and cultural resources. Office of Counsel, HACO, has two attorneys assigned to provide environmental and land use law support to MCBH: Counsel, MCBH (primary), and Counsel, HACO/MARFORPAC (alternate). If needed, HACO can obtain additional environmental law assistance from the Marine Corps' Western Area Counsel Office based in Camp Pendleton, California or from the Office for the Counsel to the Commandant at Headquarters Marine Corps (HQMC). The MCBH Office of the Staff Judge Advocate has a billet in its Organizational Chart for an Environmental Lawyer, but this billet is not usually filled. When vacant, the duties are performed by the Staff Judge Advocate or the Deputy Staff Judge Advocate. By informal agreement between the MCBH Staff Judge Advocate and the MCBH Counsel, Counsel serves as legal advisor to the MCBH EIRB even though Base Order 5420.1, Environmental Impact Review, identifies the MCBH Staff Judge Advocate as Legal Advisor to the MCBH EIRB.

Federal Conservation Law Enforcement Officer

MCBH has two Federal GS-11 CLEOs in the 1811 Investigator Series who are commissioned through the Federal Law Enforcement Academy in Brunswick, Georgia. They are tasked with carrying out the Conservation Law Enforcement Program outlined in MCO 5090.4A. The CLEOs enforce all Federal and State laws, statutes, regulations, and rules primarily aimed at protecting natural, cultural, historical, and archeological resources, as well as other statutes, rules, and regulations relevant to assuring compliance with environmental and other laws within MCBH jurisdiction, to include waters within Kāne'ohe Bay. Their duties include enforcing Federal and installation statutes and rules as identified within specific CFRs and installation orders related to outdoor recreational activities involving natural resources that may be impacted by recreational activities or are natural resources dependent (e.g., fishing and hunting programs, training activities and special events where resources may be impacted). The CLEOs insure MCBH tenant and

[15] The scope of responsibilities and staff composition of the Base EIRB are described in detail in Base Order 5420.1 Environmental Impact Review Procedures. Section 12303 of MCO P5090.2A directs that such an EIRB exist at each Marine Corps installation to ensure Base compliance with NEPA.

visiting commands are in compliance with all laws, rules, and regulations identified in MCO 5090.4A, relevant CFRs, and Hawai‘i State laws. They are commissioned deputy USFWS officers and are in compliance with MCO 5090.4A and the USFWS-Marine Corps Memorandum of Agreement. They have a close working relationship with NOAA Fisheries law enforcement agents, Hawai‘i’s DLNR Division of Conservation and Resources Enforcement (DOCARE), and other local and Federal law enforcement agencies.

Note: Due to the anticipated and on-going increase in tenant commands reassigned or stationed aboard MCBH, and the increase in deployed units operating within Hawaiian waters, it is reasonable to conclude that additional operations and training within MCBH will have impacts within areas of natural and cultural resources concern. MCBH CLEOs are responsible for assuring compliance aboard seven properties spread throughout the island of O‘ahu and property on the island of Moloka‘i. It is recommended that additional CLEO positions be created before any additional command and tenant growth aboard MCBH.

Military Police Animal Control Officers

Two Animal Control Officers occupy civilian billets in the Military Police Department (MPD). Their primary duties are responding to domestic pet issues associated with residential areas and the Base’s built environment. They regularly patrol MCBH properties and report natural resources non-compliance issues and violations to the CLEOs (e.g., poaching, trespassing, laying nets). They manage the “Game Warden” program that consists of MPD volunteer auxiliaries who assist with implementation of the fishing access permit program. They provide assistance to Natural Resources staff by transporting sick, injured, or dead protected wildlife to appropriate authorities; monitoring beach areas to ensure non-disturbance of endangered Hawaiian monk seals and sea turtles when they haul-out on MCBH beaches; and responding to nuisance animal complaints at Camp Smith and Manana Housing Area.

Marine Corps Community Services

Marine Corps Community Services (MCCS) provides fitness and recreation programs and quality of life services and products to the military community of MCBH, primarily at Kaneohe Bay, Camp Smith, and Manana Housing Area. Many of their activities and events involve interactions with the natural resources managed by the INRMP (e.g., water-based recreational activities such as diving, boating/kayaking, surfing; and land-based activities such as camping, 101 Days of Summer events, renting of beach cottages along the Base shoreline). MCCS water safety (i.e., lifeguards) assists in cordoning off beaches when monk seals and sea turtles are present. MCCS is an important resource for disseminating natural resources educational material to those they support.

Other MCBH Departments

Natural Resources staff receives support in implementing the INRMP from other departments. Facilities Department planners, engineers, engineering technicians, surveyors, and shop laborers help plan, design, map, and/or implement INRMP actions. The O&T Directorate helps coordinate INRMP actions requiring access to restricted areas (i.e., the red-footed booby (*Sula sula rubripes*) colony on the Kaneohe Bay RTF). Waterfront operators provide vessel transport when needed (e.g., support for Federal marine resource surveyors). They also regularly assist the CLEOs in performance of off-shore surveillance duties, and participate in oil spill drills and lay out boom in the event of a real oil spill emergency.

Federal Fire Department

MCBH is among a minority of Marine Corps installations that do not maintain their own fire department. The Federal Fire Department, a separate Federal agency, is primarily responsible for responding to and directing all fire responses on MCBH, including structural fires and wildland fires on training ranges. The

Marine Aircraft Group-24 may be available to assist with wildland fire response.[16] Base Order 3302.1, Antiterrorism / Force Protection Plan, Appendix 11: Fire Response Management to Annex C (Operations) details responsibilities of military units to assist Federal or civilian firefighters in fighting fires that may occur on government-owned or leased lands or during State of Hawai'i emergencies. The O&T Directorate is responsible for keeping Base Order 3302.1 up-to-date.

U.S. Department of Agriculture Wildlife Services

USDA Wildlife Services provides assistance in the form of trapping nuisance and feral wildlife, primarily rats, mongoose, cats, chickens, pigeons, and pigs that threaten protected wildlife species or pose a nuisance or safety hazard to Base personnel on MCBH properties. Because most protected wildlife species are found on MCBH Kaneohe Bay, the majority of effort and time is spent there; however, wildlife control activities are conducted on almost all MCBH properties. USDA Wildlife Services receives direction from Natural Resources staff regarding target areas to focus their efforts. Trapping requirements doubled in FY16 due to limited in-house resources and more efforts being expended at Camp Smith and Pearl City Annex to control feral pigs and chickens.

Sikes Act Cooperators

MCBH receives support in implementing its natural resource management actions from cooperating agencies under the Sikes Act, such as Hawai'i DLNR, USFWS wildlife biologists, and NOAA Fisheries biologists. Navy subject matter experts (e.g., wildlife specialists, applied biologists, environmental engineers, Geographic Information System (GIS) specialists, and archival experts) at various units of the Naval Facilities Engineering Command (NAVFAC Pacific, NAVFAC Hawaii, NAVFAC Engineering and Expeditionary Warfare Center) also provide assistance. Support for certain INRMP activities is also provided by HIARNG.

Other Public and Private Agency Expertise

MCBH receives support implementing its natural resource management actions from agencies, universities, museums (e.g., Bishop Museum), non-governmental organizations (e.g., Sierra Club, Hawai'i Audubon Society, O'ahu Invasive Species Committee (OISC)) (Section 9 and Appendix G2). Local *hala* weavers have supported educational and Base events with demonstrations of Hawaiian cultural practices.

Volunteers

Through continuing community outreach and involvement, Natural Resources staff has enjoyed assistance from thousands of dedicated volunteers over the past thirty-five years, performing primarily wildlife habitat improvement, trash clean-up, and resource monitoring (Section 9 and Appendix G2).

Contractor Support

Many of the natural resources management actions in this INRMP involve special studies or resource inventories, design and construction of projects, establishment and/or implementation of resource monitoring protocols, and development or updating of databases, which require expertise budgeted for and provided through assistance of contracted personnel. Recently, natural resources contract management assistance occurs with the USFWS, U.S. Army Corps of Engineers (USACE), NAVFAC Pacific, and NAVFAC Hawaii.

[16] Marine Aircraft Group-24 is put on stand-by for wildland fire response after the Range notifies the Base Emergency Operations Center of a wildland fire. The Emergency Operations Center is responsible for requesting fire bucket assistance from MARFORPAC.

4.4.3 TRAINING AND SUPPLIES

The Environmental Department strives to continuously improve the success of natural resources management activities through professional development and information exchange as required by the Sikes Act. This is accomplished through professional training to keep staff knowledge of management strategies current. In general, staff members obtain training in ESA Section 7 consultation (USFWS), wetland delineation, and Clean Water Act (CWA) Section 404 Nationwide Permitting. Staff may attend the Naval Civil Engineer Corps Officers School (CECOS) that provides training in natural resource laws, regulations, policies, executive orders, DoD Instructions, and other guidance, noting Service-specific requirements. Additionally, the National Military Fish and Wildlife Association, a non-profit organization consisting of professional State and Federal resource managers, provides training to DoD natural resources professionals to maintain their professional certification, as required by the Sikes Act.

Successful natural resources management activities also depend on the use of modern equipment and technology as well as the regular procurement of supplies to support the program. Supplies are necessary to conduct day-to-day operations and provide vital support to volunteer activities.

1 **Chart 4.1: MCBH Organizational Chart – Simplified**

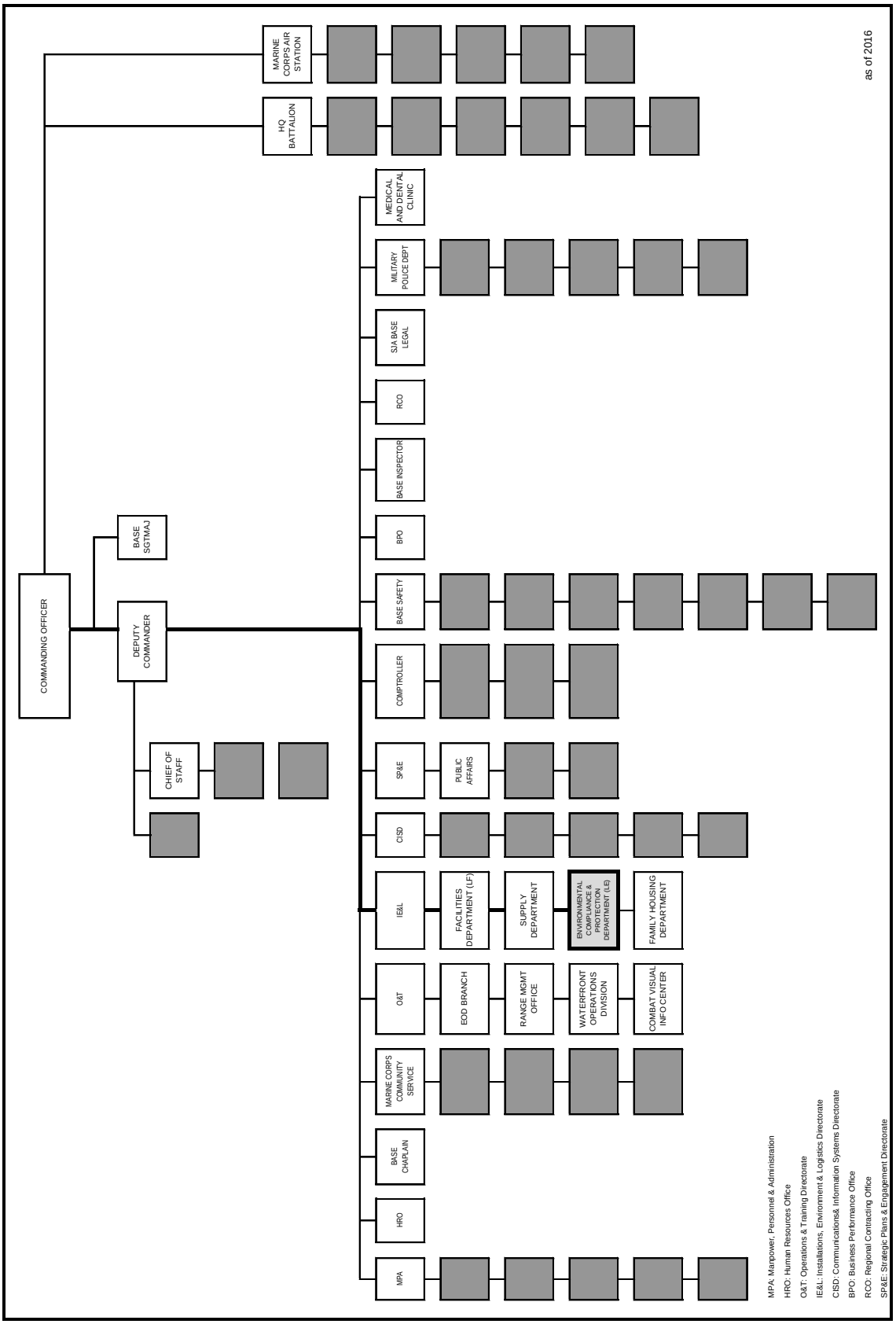
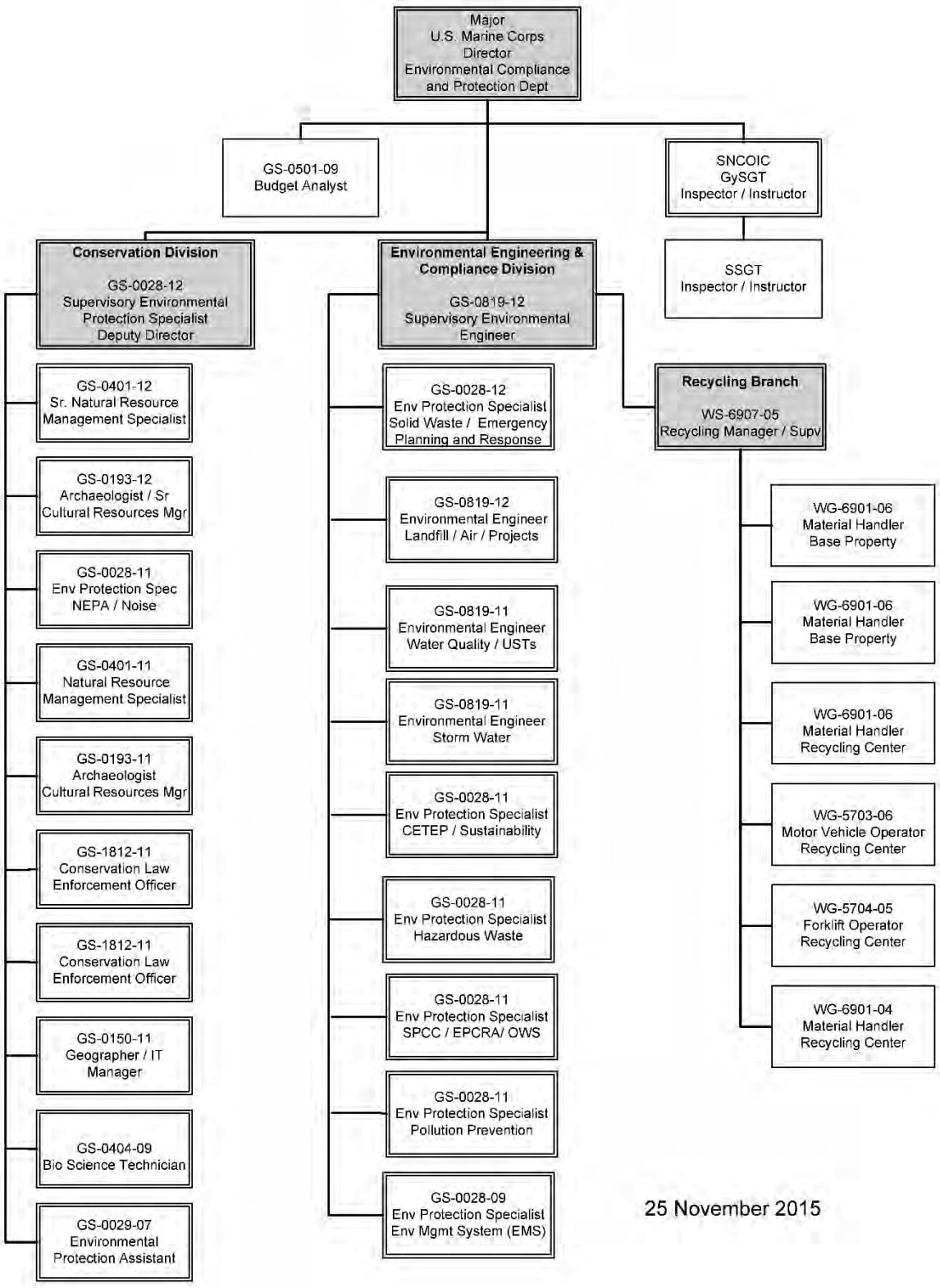


Chart 4.2: MCBH Environmental Compliance and Protection Department Organizational Chart



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SECTION 5
NATURAL RESOURCES MANAGEMENT MANDATES AND REGULATORY CONTEXT

5.1 APPLICABLE LAWS, REGULATIONS, AND OTHER DIRECTIVES

The information contained in this section has been updated to include relevant changes since the 2011 INRMP. Appendix A3 summarizes the principal Federal and State laws, executive orders, regulations, and other directives that influence MCBH's INRMP. Items of particular interest or increased emphasis are detailed in Sections 5.1.1 and 5.1.2.

5.1.1 LAWS, EXECUTIVE ORDERS, AND MEMORANDUMS OF UNDERSTANDING

Endangered Species Act

Relevant changes related to the ESA and natural resources management at MCBH include amendments to the rule itself as well as a policy change; changes to the listing status of the green sea turtle (*Chelonia mydas*), humpback whale (*Megaptera novaeangliae*), and seven species of yellow-faced bees (*Hylaeus* sp,); and designation of Hawaiian monk seal (*Neomonachus schauinslandi*) critical habitat.

Two rule changes and one policy pertaining to the ESA became effective March 14, 2016.

- A final rule that amends the regulations governing Section 7 consultation under the ESA to revise the definition of "destruction or adverse modification" of critical habitat.
- A final rule that amends the regulations governing the designation of critical habitat under Section 4 of the ESA.
- A final policy pertaining to and clarifying the process of certain areas being excluded from critical habitat designation, including exclusion of military lands due to national security and homeland-security impacts.

ESA Listing Status. The green sea turtle was originally listed by NOAA Fisheries and USFWS as threatened under the ESA in 1978, except for the Mexican Pacific coast breeding population, which was listed as endangered. In 2012 the Association of Hawaiian Civic Clubs petitioned NOAA Fisheries and USFWS to identify the Hawai'i green sea turtle population as a distinct population segment (DPS). The petition was filed pursuant to the ESA and required that the NOAA Fisheries and USFWS make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information to indicate that the petitioned action may be warranted. NOAA Fisheries and USFWS issued the final rule to list eleven green sea turtle DPS, effective May 6, 2016. It lists the Central North Pacific population segment (green sea turtles of the Hawaiian archipelago and Johnston Atoll) as threatened under the ESA. As part of the final rule, NOAA Fisheries and USFWS concluded that critical habitat was not determinable at the time but it would be proposed in future rulemaking (Appendix D6).

NOAA Fisheries revised the ESA listing status of the humpback whale, effective October 11, 2016. The globally listed endangered species was divided into 14 DPS. NOAA Fisheries determined that based on best available scientific information, the Central North Pacific (Hawaiian archipelago and Johnston Atoll) population segment does not warrant listing. The humpback whale remains on the State of Hawai'i endangered species list and protected under the Marine Mammal Protection Act (MMPA) (Appendix A8).

USFWS listed seven species of yellow-faced bees native to Hawai'i as endangered, effective October 31, 2016. MCBH conducted surveys for two species of Hawaiian bee that had the potential to be found on

MCBH properties. The species *Hylaeus anthracinus* was found at MCBH Kaneohe Bay, while *Hylaeus longiceps* was not. As part of the final rule USFWS concluded that critical habitat was not determinable at the time (Appendix D6).

Critical Habitat Designation. The final rule to revise designated critical habitat for Hawaiian monk seals in the Northwestern and main Hawaiian Islands was issued by NOAA Fisheries, effective September 21, 2015 (Appendix D6).

Memorandum of Understanding to Promote the Conservation of Migratory Birds (Department of Defense and the U.S. Fish and Wildlife Service)

In accordance with the MBTA and Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (January 10, 2001), DoD and USFWS cooperatively developed and signed a MOU that outlines a collaborative approach to promote the conservation of migratory bird populations while sustaining the use of military managed lands and airspace for testing, training, and operations (Appendix A7).[1] The *MOU to Promote the Conservation of Migratory Birds* (September 5, 2014) describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize take; and ensure DoD operations are consistent with the MBTA. It outlines the responsibilities of both USFWS and DoD regarding migratory bird conservation and directs USFWS to work with DoD by providing guidance and recommendations. The MOU does not alter or waive responsibilities of DoD or USFWS, as applicable, under the MBTA, the ESA, NEPA, or the Sikes Act, nor does it authorize the take of migratory birds. The MOU does require any implementation of wildlife conservation measures to follow BASH guidelines and consider military mission impacts and elevated risk to aircraft and aircrew.

Along with the MOU, the USFWS rule, *Migratory Bird Permits: Take of Migratory Birds by the Armed Forces*, 50 CFR Part 21 (February 28, 2007), provides additional guidance for incidental take resulting from military readiness activities or active DoD airfield operations (Appendix A7). The USFWS rule prescribes regulations to exempt the Armed Forces for the incidental taking of migratory birds during military readiness activities authorized by the Secretary of Defense or the Secretary of the military department concerned.[2] Both the MOU and the USFWS rule emphasize that the development and implementation of military installation INRMPs should ensure protection of migratory birds. USFWS is particularly concerned about the species listed in *Birds of Conservation Concern 2008* (USFWS 2008b) (Appendix A7).

MCBH has an on-going relationship coordinating with USFWS with regard to migratory birds, particularly in the two WMAs on MCBH Kaneohe Bay where there are significant concentrations of MBTA-protected species. Coordination activities include those that better protect and improve bird habitat, reduce fire risk, document population size through bird counts, and comply with the terms of a depredation permit under the MBTA for use in the BASH program (COA 7.1). MCBH intends to continue its current level and type of effort to work with military operators and USFWS to sustain adherence to migratory bird guidance.

[1] This EO requires all Federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within two years, a MOU with the USFWS to address management actions and conservation of migratory birds on their properties.

[2] The rule authorizes take of migratory birds, with limitations, which result from DoD military readiness activities. If the DoD determines that a proposed or an ongoing military readiness activity may result in a significant adverse effect on the sustainability of a population of a migratory bird species of concern, then they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects. The Secretary of the Interior, or his designee, will retain the power to withdraw or suspend the authorization for particular activities in appropriate circumstances.

Proposed Revisions to the U.S. Fish and Wildlife Service Mitigation Policy

The USFWS proposed revisions to its policy that has guided recommendations on mitigating the adverse impacts of development on fish, wildlife, plants, and their habitats since 1981 (FR Vol. 81, No. 45, March 8, 2016). The revised Mitigation Policy provides a framework for achieving a net gain in conservation outcomes, or at a minimum, no net loss of resources and their values, services, and functions resulting from proposed actions. The Mitigation Policy serves as overarching guidance applicable to all actions for which the USFWS has specific authority to recommend or require the mitigation of impacts to species and/or critical habitat. The proposed revisions are, in part, intended to address changes in the past 35 years including (1) the acceleration of habitat loss and subsequent loss of ecosystem function; (2) threats that were not fully evident (e.g., climate change, spread of invasive species); (3) substantial advancement in the science of fish and wildlife conservation; (4) substantial changes to the Federal statutory, regulatory, and policy context of conservation; and (5) a need to clarify the USFWS's definition and usage of mitigation in various contexts.

The USFWS has also published a new proposed draft ESA Compensatory Mitigation Policy that addresses mitigation of impacts of species that are listed, or may soon need to be listed under the ESA (FR Vol 81, No. 171, September 2, 2016). The new policy is needed to implement recent Executive Office and Department of the Interior mitigation policies that necessitate a shift from project-by-project to landscape-scale approaches to planning and implementing compensatory mitigation. If adopted, the policy would cover permittee-responsible mitigation, conservation banking, in-lieu fee programs, and other third-party mitigation mechanisms, and would stress the need to hold all compensatory mitigation mechanisms to equivalent and effective standards.

Memorandum for Executive Departments and Agencies: Incorporating Ecosystem Services into Federal Decision Making

The Office of Management and Budget, Council on Environmental Quality, and Office of Science and Technology issued a *Memorandum for Executive Departments and Agencies on Incorporating Ecosystem Services into Federal Decision Making* (October 7, 2015). The memorandum directs Federal agencies to incorporate the values of natural, or "green" infrastructure and ecosystem services in Federal planning and decision-making and to institutionalize polices to that effect, where appropriate and practicable. It establishes a process for the Federal government to develop guidance on integrating ecosystem service assessments into relevant programs and projects to promote sustainable use of natural resources, ecosystem and community resilience, and the recreational value of the Nation's unique landscapes. Implementation guidance to be developed by the Council on Environmental Quality will suggest best practices for ecosystem services assessments and outline an assessment framework for integrative consideration of ecosystem services into decision processes.

Guidance for Federal Agencies on Sustainable Practices for Designated Landscapes

The *Guidance for Federal Agencies on Sustainable Practices for Designated Landscapes* (October 31, 2011, supplemented October 22, 2014) was developed to help meet the goals outlined in EO 13514 *Federal Leadership in Environmental, Energy, and Economic Performance* (Appendix E3). It describes strategies to achieve sustainable Federal landscape practices.

Marine Resource Protection (Hawai‘i State Laws)

There are several new or revised Hawai‘i Administrative Rules (HAR) and Hawai‘i Revised Statutes (HRS) regarding marine resources. HAR Chapter 13-95 prohibits taking, breaking, or damaging, with any implement, any stony coral or live rock. HRS Title 12 Section 171-58.5, prohibits the mining and taking of sand, dead coral or coral rubble, rocks, soil, or other marine deposits seaward from the shoreline. HAR Chapter 13-86.1 puts restrictions in place to limit large scale commercial harvesting of sea cucumbers.

5.1.2 MILITARY GUIDANCE

DoD Instruction 4715.03, Natural Resources Conservation Program

DoDI 4715.03, *Natural Resources Conservation Program* (March 18, 2011), updates DoDI 4715.3 (May 3, 1996), which formalized policies and procedures for the integrated management of natural resources on military lands and other areas managed or controlled by DoD. DoDI 4715.03 updates programming and budgeting priorities and establishes new metrics to better evaluate how natural resources management can enable the military mission and ensure the long-term health of installation ecosystems. It provides procedures for developing, implementing, and evaluating effective natural resources management programs including INRMP preparation, review, and implementation.
Website: http://www.dtic.mil/whs/directives/corres/pdf/471503p.pdf.

DoD Manual 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual

DoDM 4715.03, *Integrated Natural Resources Management Plan (INRMP) Implementation Manual* (November 25, 2013), establishes implementing guidance to manage DoD's natural resources for mission and stewardship purposes. The manual: clarifies and provides detailed guidance for how to implement DoDI 4715.03; creates streamlined procedures for required annual and five-year INRMP reviews with Federal and State regulators, reducing the approval time for proposed actions; and establishes new performance metrics to better evaluate how natural resources management enables the military mission and supports the long-term and sustainable use of habitats at a landscape level. The manual incorporates and cancels previous Sikes Act guidance including *Memorandum: Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews* (November 1, 2004), and *Memorandum: Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning Leased Lands* (May 17, 2005).

DoD Directive 4715.21 Climate Change Adaptation and Resilience

DoD Directive 4715.21, *Climate Change Adaptation and Resilience* (January 14, 2016), establishes policy and assigns responsibilities to provide DoD with the resources necessary to assess and manage risks associated with the impacts of climate change.

Marine Corps Order P5090.2A, Environmental Compliance and Protection Manual

The *Environmental Compliance and Protection Manual* (MCO P5090.2A) is the principal guide for all Marine Corps installations on how to meet numerous stringent environmental legislation and requirements of regulatory agencies at the Federal, State, and local levels. The most recent update by HQMC was in August 2013 (Change 3). MCO 5090.2A is currently undergoing Marine Corps Installations Command (MCICOM) revisions and may be published in 2017. Chapters most relevant to the MCBH INRMP include:

Chapter 11. Natural Resources Management: Describes Marine Corps policies and responsibilities for compliance with procedural and statutory requirements for natural resources management, including land management, fish and wildlife management, forest management, resource-based outdoor recreation management, and environmental restoration.

Chapter 12. Environmental Planning and Review: Describes policies, procedural requirements, and responsibilities for NEPA compliance for proposed Marine Corps actions. Includes changes and additions to applicable statutes, regulations, and EOs that have been promulgated in recent years related to NEPA compliance.

Integrated Management of Stray Animals on Military Installations. Armed Forces Pest Management Board Technical Guide No. 37

The Armed Forces Pest Management Board Technical Guide No. 37 (May 25, 2012) was developed to: provide commanders with an example of a stray animal control policy; identify responsibilities and resources required to implement this policy; provide guidelines for the capture, management and disposition of stray animals; protect working animals, pets, and wildlife from injury and death caused by stray animals; and suggest integrated management options and identify coordination requirements to humanly control stray animals on military installations.

MCBH Environmental Compliance and Protection Department's Standing Operating Procedures

The *MCBH Environmental Compliance and Protection Department's Standing Operating Procedures* (ECPSOP) provides guidance, written for and distributed to a general audience, as a means of orientation to the Base population (e.g., active duty Marines, Sailors, family members, civilian employees, contractors, and visiting guests) to the mission of the Environmental Compliance and Protection Department (e.g., applicable statutes, program elements, and responsibilities of the component programs and staff), and to the basics of their responsibility to comply with environmental laws on the installation. Chapters relevant to the INRMP include Chapter 1: Environmental Program Management System Standing Operating Procedures (SOP), Chapter 12: Natural Resources Management SOP, and Chapter 13: National Environmental Policy Act. In simple terms, the Natural Resources Management section of the ECPSOP "provides information to help you understand what you must do to comply with Federal, Base, and State regulations and laws, do's and don'ts to safeguard and preserve natural resources found aboard MCBH properties and where to get additional help to maintain compliance with applicable laws, regulations, and military directives." The ECPSOP, last updated in March 2016, is being finalized as a Base Order. The section in the revised ECPSOP covering Natural Resources Management will not change significantly and will reflect the contents of this INRMP.

5.2 SIKES ACT COORDINATION GUIDANCE

Memorandum of Understanding between the U.S. Department of Defense, and the U.S. Fish and Wildlife Service, and the Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resource Management Program on Military Installations (July 19, 2013). This MOU between DoD, USFWS, and AFWA reiterates the cooperative relationship between DoD, USFWS and State fish and wildlife agencies in INRMP development, review, and implementation with mutually agreed upon fish and wildlife conservation objectives (Appendix A6). The MOU describes the roles, responsibilities, and operating authorities of the parties to the agreement and provides for the development of a streamlined process for reviewing and concurring on updates to existing INRMPs. Guidelines issued two years after the MOU detail how to efficiently execute coordination between the agencies.

Guidelines for Coordination on Integrated Natural Resources Management (June 15, 2015) detail INRMP content and requirements, coordination between the USFWS and the DoD; and the USFWS program responsibilities.

Guidelines for Streamlined Review of Integrated Natural Resource Management Plan Updates (July 20, 2015) clarify the process for reviewing and concurring on updates to existing INRMPs.

5.3 NEPA

In accordance with NEPA, DoD installations are required to follow formal consultation procedures, appropriate NEPA documentation, and legal review prior to implementing certain actions. Some actions

that MCBH undertakes require EAs, some require the more lengthy EIS process, while others may be categorically excluded.[3]

Per SAIA guidance, the 2001 INRMP/EA was developed as a combined management plan and EA, with the environmental analysis conducted at a programmatic level (Sections 5 and 8 of the 2001 INRMP/EA). Per discussion with HQMC and Sikes Act partners during the latest annual review it was determined that an update to the INRMP was appropriate, and because the changes that have occurred in the past five years and since the 2001 INRMP/EA "are not expected to require natural resources management practices materially different from those described in the existing INRMP, the installation is not required to perform additional NEPA analysis" (DoD 2013).

During the previous INRMP implementation period MCBH proposed establishing a recreational bow hunting program at MCTAB to expand the forms of recreation offered to Marines and support personnel. This proposal required an EA to determine if implementation of a bow hunting program would result in significant adverse impacts.[4]

5.4 OTHER CONSIDERATIONS

MCO P5090.2A requires Marine Corps installations to use the NEPA process as the vehicle through which to comply with EO 12898 (as amended by EO 12948), *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations* (February 11, 1994), by evaluating the potential environmental effects of proposed actions on minority and low-income populations and implementing appropriate mechanisms for improving participation by any particularly affected minority and low-income populations. MCBH's ongoing approach is to involve diverse stakeholders – including racially, ethnically, and/or economically disenfranchised groups – in the INRMP implementation process (Section 10.2, 2001 INRMP/EA). In addition, due to the cultural importance of MCBH lands and resources to native populations, opportunities to involve Native Hawaiians will continue to be sought and included in the on-going implementation of this INRMP.

MCBH INRMP management actions are implemented with consideration for health and safety risks to children, in compliance with EO 13045 *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997) (as amended by EO 13229 and EO 13296) (Section 10.3, 2001 INRMP/EA). EO 13045 directs Federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and ensures policies, programs, activities, and standards address these disproportionate risks appropriately. Participation of children, both as volunteers and through educational activities, is an important part of MCBH's natural resources program (Section 9.1). MCBH will continue to maintain heightened awareness of the possibility for negative health and safety effects of children participating in such activities and will implement appropriate measures to reduce these risks. Examples of measures that have been adopted include requiring parents to sign a liability waiver for minors working on volunteer projects, providing a safety brief alerting participants of potential hazards and dangers before a volunteer activity or tour of one of the WMAs, and prohibiting small children from participating in events involving sharp tools.

[3] Categorical exclusions (CATEX) are a category of actions that do not individually or cumulatively have a significant effect on the environment and therefore do not require an EA or an EIS. MCO P5090.2A identifies 45 CATEX, a few of which apply to natural resources management.

[4] As hunting was previously prohibited on all MCBH properties, establishment of a recreational hunting program required a policy change in the form of a new Base Order. Changes to the INRMP were required to reflect the addition of a newly allowed natural resource-based outdoor recreation activity. An INRMP Update had just been completed the year before, so an INRMP Supplement was developed to identify related changes to the INRMP (SRGII 2013).

SECTION 6
EXISTING ENVIRONMENTAL CONDITIONS

Descriptions of the existing environment of each of the MCBH properties with significant natural resources are provided in Section 6 of the 2001 INRMP/EA and subsequent updates.[1] These descriptions are not repeated if environmental conditions remain essentially unchanged. **This section highlights new or updated information about the current environment at each MCBH property that is relevant to understanding the INRMPs execution over the next five years**.[2] Much of this information results from assessments, studies, landscape-altering events, and/or projects completed during the previous INRMP reporting period.[3] Appendix C1 lists species found on or visiting MCBH properties.

6.1 MARINE CORPS BASE HAWAII, KANEOHE BAY

6.1.1 LOCATION, COMMUNITY SETTING, AND LAND USES

MCBH Kaneohe Bay consists of approximately 2,951 acres on Mōkapu Peninsula on the windward shore of O‘ahu, within the Ko‘olaupoko District (Figure 2, Appendix B). MCBH Kaneohe Bay is bordered to the east by Kailua Bay, to the west by Kāne‘ohe Bay, to the north by the Pacific Ocean, and to the south by private residential housing (‘Aikahi and Kaimalino communities of Kailua) and the CCH wastewater treatment plant. Nu‘upia Ponds on the south end of the installation and Ulupa‘u Head on the northeast end are officially designated WMAs. The two nearest towns are Kāne‘ohe and Kailua, located to the southwest and southeast, respectively. The population of the region is approximately 82,749 (Kāne‘ohe: 44,114, Kailua: 38,635) (2010 census).

6.1.2 PHYSICAL FACTORS

Geology, Geomorphology, and Soils

Erosion Control at Ulupa‘u Crater. There are several areas at the Kaneohe Bay Range Training Facility (KBRTF) where recent projects have left areas denuded of vegetation and restoration is needed to reduce the amount of sediment being carried to the ocean in run-off. Some sections of the previously repaired Range Access Road are eroding and washing out again.

Water Resources, Wetlands, and Watersheds

Wetlands. For ease of identification and discussion, the unnamed wetland to the south of Nu‘upia ‘Ekahi pond in Nu‘upia Ponds WMA was named Nu‘upia Hema (Figure 6b, Appendix B).

The Salvage Yard Wetland and the Temporary Lodging Facility Wetland have been found to contain contaminated soils. Plans for sampling, remediation and restoration are currently being addressed under the Installation Restoration (IR) Program and active natural resource management in these areas is limited (Figure 6c, Appendix B).

[1] The 2001 INRMP/EA, 2006 INRMP Update and 2011 INRMP Update can be found on the Reference CD.

[2] Previous INRMP Updates have included a table listing the environmental conditions sub-categories and indicated if any changes had occurred since the initial description in the 2001 INRMP/EA or previous updates. That table has been removed as all changes to existing environmental conditions have been described in Section 6 (this section) of each INRMP Update.

[3] See Appendix F1 for further details.

Nu‘upia Ponds WMA. Approximately one acre of Nu‘upia Ponds WMA just north of Nu‘upia ‘Ekolu was lost due to the expansion of the 3d Radio Battalion’s transportation compound.

In March 2016, 1,000 ft of security fence was installed around the northern part of Nu‘upia Ponds WMA just north of Pa‘akai Pond. Numerous observations of unauthorized training, physical fitness activities, mountain biking, four-wheel drive vehicles, and free roaming cats and dogs, all of which are prohibited in this area, prompted this action. For example, in 2014, an escaped pet dog entered the WMA and killed 50 ground nesting wedge-tailed shearwaters (*Ardenna pacifica*).[4] The fence was constructed to aid in the protection of resident endangered waterbirds and plants, ground nesting migratory seabirds, as well as archeologically sensitive sites found within the shoreline area, by preventing unauthorized access into the WMA. Three gates were installed to provide access for authorized pedestrians and vehicles upon coordination with Natural Resources staff (e.g., beach and shoreline clean-up events, facilities maintenance, Weed Warrior activities).

Two areas of Nu‘upia Ponds WMA, the former Moving Target Range (MTR) and the former Trap and Skeet Range, have been found to be contaminated (Figures 7a and 7b, Appendix B). The MTR, utilized as a moving target machine gun range from the 1940s through the 1950s, was confirmed to contain munitions constituents (e.g., lead, arsenic, antimony) and potentially munitions and explosives of concern (MECs) (e.g., combat grenade remnants). Most of the bermed area, which also contains the wedge-tailed shearwater colony, has remnants of spent rounds. The former Trap and Skeet Range, which covers 42 acres directly south of Nu‘upia ‘Ekolu and Nu‘upia ‘Elua Ponds, contains munitions constituents (concentrations of antimony, arsenic, copper, lead, and polynuclear aromatic hydrocarbons exceeded screening levels). These areas are now under the purview of the MCBH Munitions Response Program (MRP) within the Environmental Restoration Program, which addresses non-operational range lands with suspected or known hazards from MECs. Clean-up efforts associated with the MTR are on-going as part of Navy’s IR program (Section 8.1.15). Existing land use controls, including signage (denoting restricted area) and physical barriers (aluminum fencing), prevent unauthorized entrance to the area. Entrance into these areas for active natural resources management is now limited to authorized MCBH personnel and USDA Wildlife Services personnel. Management of the wedge-tailed shearwater colony is expected to continue as it has in the past, with counts being conducted yearly and crazy ant infestations managed prior to nesting season.

Mōkapu Central Drainage Channel. A project to expand the Mōkapu Elementary School is currently in design and may require changes to the Mōkapu Central Drainage Channel (MCDC). It is undetermined what impacts this will have on flow rates, sediment transportation, or flooding potential.

6.1.3 Biological Factors

Vegetation

Landscape Regulations. The *MCBH Landscape Manual* (July 2014) superseded the *MCBH Master Landscaping Study* (HDA 2002) and applies to all properties involving plantings of trees, shrubs, or groundcover. Landscape requirements are more fully discussed in Section 7.5.

The manual includes an update of two plant lists: (1) Native, Polynesian-Introduced and Non-Native Plants Approved for Use in Landscaping Projects on MCBH Properties and (2) Prohibited Plant List (containing invasive and/or high maintenance species). Any plant considered for a landscape project

[4] In 2016 the scientific name for the wedge-tailed shearwater was changed from *Puffinus pacificus* to *Ardenna pacifica*. http://checklist.aou.org/

not specifically identified on the **Approved** or **Prohibited** plant lists must be reviewed and approved by the Environmental Department. Plantings shall always consider native plant material first.

Native Plants. Nama (*Nama sandwicensis*), which is found on the sand dunes overlooking Pyramid Rock Beach, and maiapilo (*Capparis sandwichiana*), which grows on the *ʻaʻā* lava flows near the Pali Kilo beach cottages, are State Species of Conservation Concern. These rare plants had not been captured in previous INRMPs because they are not threatened or endangered species. However, according to Hawaiʻi DLNR Division of Forestry and Wildlife (DOFAW) botanists, these plants are becoming very rare to find on Hawaiian shorelines. The botanists noted that MCBH Kaneohe Bay has the largest population of maiapilo on Oʻahu. DOFAW botanists have successfully collected and germinated nama seeds and added them to the Lyon Seed Conservation Lab seed bank. Attempts to collect maiapilo seeds were unsuccessful because the window of opportunity to collect seeds was missed, or ripe fruit could not be found, possibly due to rat predation.

Invasive Plants. Fountain grass (*Cenchrus setaceum*) was discovered near the ridgeline on the northwest back side of Ulupaʻu Crater, a steep location that is extremely difficult to access. It was also found on Westfield where it was removed.

Terrestrial Wildlife

Nēnē. In December 2014 four nēnē (*Branta sandvicensis*, Hawaiian goose) briefly visited the Klipper Golf Course. Base Water Reclamation Facility (WRF) personnel reported five nēnē in their compound in February 2016.[5]

Pueo. In January 2016 a pueo (*Asio flammeus sandwichensis*) nest with eggs was observed in Nuʻupia Ponds WMA. Although during a follow up visit a few weeks later no eggs or chicks were observed, this is the first confirmed pueo nesting on MCBH property. It is hypothesized that the adult pueo may have consumed the egg fragments for calcium, something known to occur with other bird species.

Koloa. During the summer of 2014 there was an outbreak of avian botulism in koloa (*Anas wyvilliana*, Hawaiian duck) at the Base WRF. The first indications are koloas dragging their wings, then lethargy sets in, and finally their heads droop and cannot be raised and they die. Dead koloa were first reported by WRF staff on June 17, 2014. A U.S. Geological Survey (USGS) wildlife disease specialist, Dr. Thierry Work, confirmed the presence of avian botulism. The last report of a dying or dead koloa for that season was on August 27, 2014. On June 17, 2015 another outbreak of avian botulism in koloa was reported at the WRF. These outbreaks resulted in 26 koloa deaths in 2014 and 37 koloa deaths in 2015. With treatment, two birds recovered from the disease in 2015. No other species appeared to be affected. In 2016, 29 ducks contracted avian botulism, and 26 died. One Hawaiian stilt also died of avian botulism. In 2016, modifications were made to the inlet of the treatment ponds to prevent dying birds from falling in and being cycled through the system, which if left uncorrected could exacerbate the disease cycle.

The USGS wildlife disease specialist provided information on a possible anti-toxin that might help birds that are affected by avian botulism. However, good controlled trials have not been conducted and the efficacy of the anti-toxin is mixed at best. In addition, the anti-toxin must be administered in the very early stages of the infection, when ducks are difficult to capture. According to USDA Wildlife Services, in 2016 seven of the 29 ducks were administered the anti-toxin and only three recovered. DNA samples were collected from the ducks that died in 2015. Even though the results have not yet been received by MCBH, the researcher who collected the samples, Stephen Turnbull, Koloa Communication and

[5] It is undetermined whether the geese were actually nēnē (they may have been Cackling geese *(Branta hutchinsii minima and taverneri*), nor is their origin known.

Outreach Coordinator for DLNR-DOFAW, indicated that these ducks appeared to be very koloa-like due to their small size, coloration, and other characteristics. MCBH will notify USFWS once it receives the results of the genetic testing.

Laysan Albatross. A few Laysan albatross appear at the airfield annually. They are reported by USDA Wildlife Services several times a month, primarily during the December - March timeframe. USDA Wildlife Services attempts to capture adult birds if they land. They are banded, if necessary, then relocated to Ka‘ena Point unless they are sitting on an egg. Eggs are removed from the nest and transferred to Pacific Rim Conservation, which uses them to replace non-viable eggs at Ka‘ena Point, or more recently, raises them to fledging at James Campbell Wildlife Refuge. In 2013, a chick fledged at KBRTF near Range 9. In 2015, one adult bird was newly banded at the airfield and one egg was removed from a nest at KBRTF.

Caspian Tern. A solitary Caspian tern (*Hydroprogne caspia*) continues to visit Nu‘upia Ponds WMA every winter. According to bird biologists, this is the only location on O‘ahu this migratory bird is routinely seen.

Red-footed Boobies. The health and population status of the red-footed booby (*Sula sula rubripes*) population utilizing Ulupa‘u Crater continues to be monitored, with the population remaining relatively stable at more than 2,000 individuals. Habitat enhancements at the booby colony included planting of 15 tree heliotrope (*Heliotropium foertherianum*) to provide additional nesting trees. However, the trees did not survive due to insufficient watering. Many of the existing artificial nesting platforms have fallen into disrepair. A STEP project to identify and construct a newer design has been created (COA 7.1).

In May 2014 USGS was granted a research permit to conduct high-resolution global positioning system (GPS) tracking of a sample of the adult nesting red-footed boobies in Ulupa‘u Crater WMA and the wedge-tailed shearwater colony located on the Fort Hase shoreline of Nu‘upia Ponds WMA. The project tracked at-sea foraging patterns and habitat affinities. In 2014, 39 red-footed boobies were tagged, with GPS data recovered from 30. In 2015, 40 red-footed boobies were tagged, with GPS data recovered from 35. Tracking from the select number of birds demonstrated extraordinary ranging behavior. Although not currently being used for management, this is interesting information to have about the population. It will be used to determine potential impacts to seabirds from ocean-borne wind energy devices or, in the event of a fuel or oil spill, determine if seabirds from MCBH Kaneohe Bay may have come in contact with the spill.

Wedge-tailed Shearwaters. The wedge-tailed shearwater colony in Nu‘upia Ponds WMA located on the shoreline adjacent to Kailua Bay at Fort Hase continues thrive (Figure 5a, Appendix B). This seabird species, which is protected under the MBTA, is actively managed by protecting its habitat from people and controlling invasive species such as the yellow crazy ant (*Anoplolepis gracilipes*).

In 2014 and 2015 adult wedge-tailed shearwaters were tagged as part of the USGS research project to track at-sea foraging patterns and habitat affinities. In 2014, 42 wedge-tailed shearwaters were tagged, with GPS data recovered from 11. In 2015, 20 wedge-tailed shearwaters were tagged, with GPS data recovered from 9.

Since 2010, Natural Resources staff, with assistance from USFWS and O‘ahu Invasive Species Committee (OISC), have conducted an annual census of actively used wedge-tailed shearwater burrows. In 2015 there was a slight decrease in the population of wedge-tailed shearwaters observed as compared with the previous year. Although most of the colony appears stable based on chick density, there was one location near the Base’s security boundary fenceline that separates MCBH from

the Kaimalino residential community that had 128 chicks in 2014 and only contained three in 2015. It is suspected that feral cats are responsible for this decline.

Unauthorized access by surfers from the Kailua community continues to threaten the nesting area. Natural Resources staff worked with Hawai‘i DLNR for permission to utilize their sign design and information. Signage, which indicates that the area is a wedge-tailed shearwater nesting area and that disturbance is prohibited by law, was installed around the wedge-tailed shearwater colony (Appendix G3).

Yellow Crazy Ants. Yellow crazy ants first invaded the wedge-tailed shearwater colony between 2006, when none were observed, and 2010, when they had invaded over half the colony. The ants pose a threat to the colony as adult birds may abandon young chicks if burrows are infested. The ants can also cause severe deformities in chicks (shortened beaks, blindness), reducing survival rates. In 2015 and 2016 the colony was treated with Maxforce™ Complete, an ant killing bait granule, prior to egg hatching (July 21, 2015 and June 21, 2016). Based on morphological data collected by USFWS, the treatment appeared to be effective in terms of reduced nest abandonment and chick health.

Yellow-faced Bee. In October 2016, seven species of endemic yellow-faced bees (*Hylaeus*) were listed as Federally endangered under the ESA. Natural Resources staff and USFWS suspected that one of these species, *Hylaeus anthracinus*, could be present at MCBH Kaneohe Bay due to favorable habitat conditions and a previously unconfirmed report. In November 2016, Natural Resources staff along with entomology specialist, Karl Magnacca with the Oahu Army Natural Resources Program at Schofield Barracks, performed surveys and confirmed the presence of *Hylaeus anthracinus* at Pyramid Rock, North Beach, and Fort Hase. Additional surveys are planned.

Predator Control. Regular predator trapping of feral, nuisance, and free roaming animals continues at MCBH wetlands and WMAs with oversight from Natural Resources staff. Funding provided to USDA Wildlife Services was significantly increased to include managing live capture traps in the WMA and perform additional control work at other MCBH properties.

Due to the rodenticide “Ramik” pesticide label expiring and the concern of rodenticides being ingested by non-target species, it was eliminated from use. A new type of kill trap of New Zealand design called a DOC 250 has replaced the use of pesticides for control of mongoose and rats. Other trapping methods like the new automatic self-resetting Goodnature® A24 rat trap are under consideration for use.

Marine Resources

Marine Surveys. While the quantitative inventory of coastal and marine species in MCBH waters was completed in 2008 (USFWS 2008a), the qualitative surveys were not completed until 2012 (USFWS and USGS 2013). The combined inventories document the presence and general distribution of coastal terrestrial and nearshore coral reef species and habitats, and identify and spatially locate marine communities, habitats, features, and structures that exist within the offshore restricted 500-yard security buffer zone around Mōkapu Peninsula (COA 7.4 and Figure 9, Appendix B).

Corals. Two species of stony corals considered rare and listed as vulnerable to extinction on the International Union for Conservation of Nature and Natural Resources (IUCN) List of Threatened Species were found within MCBH jurisdictional boundaries in Kāne‘ohe Bay during the USFWS marine surveys. Blue rice coral (*Montipora flabellata*) and spreading or sandpaper rice coral (*Montipora patula*) are both endemic to Hawai‘i. In 2009 the Center for Biological Diversity petitioned NOAA Fisheries to list 83 coral species as either threatened or endangered under the ESA, including these two species. In 2014 NOAA Fisheries listed twenty of the petitioned coral species, but determined that *Montipora*

flabellata and *Montipora patula* did not warrant listing at the time. HAR 13-95-70 affords protection for all stony corals, including these two species (Section 5.1.1).

A project to increase the number of beach cottages along the Pali Kilo shoreline could put a unique coral reef filled cove at risk. Natural Resources staff is working closely with the MCCS management to develop warning signs, educational materials, and briefings for cottage guests regarding how to recreate around this sensitive resource.

Hawaiian Monk Seal. Between 2012 and 2016, 99 monk seal haul-outs were recorded at MCBH Kaneohe Bay. The final rule to revise designated critical habitat for Hawaiian monk seals in the Northwestern and main Hawaiian Islands was issued by NOAA Fisheries in 2015 (Appendix D6). NOAA Fisheries determined that the 500-yard buffer zone in marine waters surrounding MCBH on Mōkapu Peninsula was precluded from Hawaiian monk seal critical habitat designation because the area is managed under the MCBH INRMP in a manner that is beneficial to the species.[6]

Table 6-1. Recent Haul-Outs of Hawaiian Monk Seals at MCBH[7]

Year	Number of Sightings	Locations
2012	20	Cottage Cove Beach, Fort Hase Beach, Hale Koa Beach, North Beach, Pyramid Rock Beach, Pu'uloa RTF[8], Fossil Beach[9]
2013	22	Fort Hase Beach, North Beach, Pyramid Rock Beach, Fossil Beach
2014	8	Fort Hase Beach, North Beach, Pyramid Rock Beach
2015	17	Fort Hase Beach, Hale Koa Beach, North Beach, Pyramid Rock Beach, Fossil Beach
2016	35	Monument Point, North Beach, Pyramid Rock Beach

Sea Turtles. In June 2015 a green sea turtle nested along the Fort Hase shoreline. Six holes were dug, and evidence of hatchlings was observed, though the number of hatchlings is unknown. Although an olive ridley turtle (*Lepidochelys olivacea*) successfully nested on Pyramid Rock beach in 2009, this is the first time a green sea turtle has been recorded nesting on MCBH Kaneohe Bay. There has been evidence along the shoreline that turtles either attempted or did successfully nest over the past few years; unfortunately these attempts went unobserved. All sea turtle haul-outs at MCBH properties are reported to NOAA Fisheries, USFWS, and recorded in an in-house database (COA 7.4 and Appendix C2 and D5).

Beach and Shoreline Erosion. Shorelines at Pyramid Rock Recreational Beach, North Beach, and Fort Hase Beach have experienced accelerated erosion over the past few years. Recreational activities are likely contributing to the erosion as shoreline stabilizing vegetation has died off in some areas due to trampling by beachgoers and campers, and all-terrain vehicles (ATVs) damaging vegetation. Unusual El Niño weather patterns in 2015 caused swells that resulted in waves reaching higher ashore and carrying off unstabilized sand. Hale Koa Recreational Area has lost over 40 ft of shoreline, which

[6] In the main Hawaiian Islands Hawaiian monk seal critical habitat includes the seafloor and marine habitat to 10 m above the seafloor from the 200 m depth contour through the shoreline and extending into terrestrial habitat 5 m inland from the shoreline. In areas where critical habitat does not extend inland, designation ends at a line that marks the mean lower low water.

[7] Excerpted from MCBH Monk Seal Sighting Database. See also Figure 10, Appendix B.

[8] Three of the 2012 sightings occurred at Pu'uloa RTF.

[9] This is the beach located at the base of the cliff on the Kailua Bay side of Ulupa'u Crater, near Ki'i Point.

has resulted in the need to remove pavilions and will eventually result in closure of campsites located closest to the shoreline. Hale Koa's beach is virtually non-existent now. Sea level rise associated with climate change will likely contribute to issues with erosion along MCBH shorelines.

6.1.4 SOCIAL FACTORS

Recreational Resources

Regulations Regarding Pets and Outdoor Recreation.[10] Base Order P5233.2 Base Pet and Wildlife Regulations (March 2012) details regulations on keeping pets aboard MCBH and what pet owners must do to ensure protection of wildlife and other natural resources.

Base Order P1710.1 Base Recreational Activities (June 2012) details which recreational activities are permitted, the associated regulations and permits, and the locations where they may occur.

Beach Recreation. In 2016 the Base CO authorized contained fires and alcohol consumption for those of legal drinking age on all MCBH Kaneohe Bay beaches. MCCS opened a concession at Pyramid Rock to rent ocean oriented recreational equipment. A CATEX was completed and NOAA Fisheries and USFWS were consulted on the contained fires on the beaches. They provided concurrence that the installation of fire rings may affect, but is not likely to adversely affect, monk seals or sea turtles seal as long as mutually agreed upon conservation measures are implemented (Appendix C2 and D5).

Interpretive Exhibits. In 2013, a natural resources contractor designed and installed several interpretive exhibits along the Nu'upia Ponds Recreational Running Trail to educate the Base population on endangered waterbirds, native fish, native plants, and invasive species. A STEP project initiated in 2013 to develop and fabricate 'National Park Service' type interpretive exhibits will educate Base residents on respectful use of the Base's natural resources. The exhibits will provide information on endangered species (e.g., monk seals, turtles, waterbirds, plants), coral reefs, identification of native and invasive species, and wetland habitats.

6.2 MARINE CORPS TRAINING AREA BELLOWS

6.2.1 LOCATION, COMMUNITY SETTING, AND LAND USES

MCTAB is a 1,074-acre Marine-controlled active military training area located adjacent to Bellows Air Force Station (487 ac) (Figure 15, Appendix B). Bellows AFS/MCTAB lands are located on the windward shore of O'ahu, within the Ko'olaupoko District. These military lands are bordered by Waimānalo Bay to the east; Olomana Golf Course to the west; and residential communities of Lanikai to the north, Enchanted Lakes to the west-northwest, and Waimānalo to the south and west. The population of Waimānalo was approximately 9,932 persons in the 2010 census.

6.2.2 PHYSICAL FACTORS

Water Resources, Wetlands, and Watersheds

Wetlands. A ground-based wetland inventory and jurisdictional delineation was conducted in 2014 (Ching 2017). Some targeted areas on MCTAB could not be surveyed due to overgrown vegetation. One jurisdictional wetland on the adjoining Bellows AFS, the NIKE site wetland, was identified and

[10] These regulations were previously covered in Base Order P5500.15B Base Regulations, which was cancelled in 2012.

mapped. The Marine Corps delineated the site in anticipation of obtaining it as part of excessed lands from the Air Force, however issues have emerged with the real estate transfer and it is not currently scheduled to proceed.

Inoa'ole Stream. Inoa'ole Stream is an intermittent stream at Bellows that flows only during high rain events. The stream is degraded and stagnant in places due to invasive plants growing in the stream and the shallow rooted ironwoods (*Casuarina equisetifolia*) uprooting from the stream bank and falling into the stream. The stream is dark brown/black in color due to tannins from the ironwood needles. This stream is currently managed by Bellows AFS, however, MCBH has been working on acquiring Bellows AFS excess land, which would include the responsibility for managing Inoa'ole Stream.

Waimānalo Stream Hydrology. Projects recommended in the *MCTAB Watershed Impairment Study, with Recommendations for Stream and Estuarine Repair* (SRGII 2002) are being implemented on Waimānalo Stream. These projects seek to restore hydrological functioning, reduce flooding risk, improve aquatic habitat, and provide more desirable terrain for training.

The *Waimānalo Stream Floodway Restoration* project to recover 1.5 acres of floodway that were filled when the USACE channelized and straightened Waimānalo Stream in the late 1930s as part of a flood control project was completed in December 2014. The floodway restoration involved grading and grubbing the area upland of and adjoining the stream bank, removal of non-native invasive vegetation, and replanting the area with native plants. Over 7,400 cubic yards of material was removed and several thousand native plants [*Scaevola taccada* (naupaka), *Cyperus javanicus* ('ahu 'awa), *Cyperus polystachys* (manyspike flatsedge), *Plumbago zeylanica* ('ilie'e), *Heteropogon contortus* (pili grass), and *Vitex rotundifolia* (pōhinahina)] were planted. Although the native plants have since become overrun by non-native vegetation, the project area did successfully receive floodwaters during heavy rain events in 2015, reducing the severity of flooding of the Olomana golf course.

A complimentary project to dredge accumulated sediments and vegetation along a 2,500 ft stretch of Waimānalo Stream was contracted in 2016. The Facilities Department accomplished this project with oversight from the Environmental Department. The objective of the project was to reduce flood risk and restore stream hydraulic capacity. Dredged material was tested for contaminants. The excavated material is being stored in bermed areas at MCTAB for possible beneficial reuse for construction or training projects. Natural vegetative debris and human-originated rubbish dumped or washed into the stream will require periodic routine maintenance dredging. The maintenance dredging of this stream will improve the flow and holding capacity of the stream, which will likely increase the transport of sediments and debris into Waimānalo Bay, which in turn could have negative impacts on the coral reef ecosystem found there. The invasive California grass spreading across the stream does provide some habitat for the endangered moorhen, but it also hinders streamflow, adding to the flooding dilemma. From the perspective of natural resources protection, the preferred and ideal action is to allow the stream to return to its natural state, a slow-moving meandering estuary. Restoration of natural floodways and associated wetlands would help absorb floodwaters and act as a filter for the stream. However, the impacts of doing this would have to be assessed and evaluated.

Water Quality. The Ko'olaupoko Watersheds are considered a priority by the State for addressing polluted runoff.[11] In 2014 the marine waters of the Waimānalo Stream mouth were included on the 2014

[11] The State directs resources at priority watersheds and targets them for implementation project investments and water quality monitoring and assessments to achieve pollutant load reductions and demonstrate improving water quality. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/polluted-runoff-control-program/319-grant-program/

Hawai'i Department of Health (HIDOH) Clean Water Branch 303(d) list of impaired waters.[12] They were listed as impaired for pollutants: Nitrate + Nitrite (NO_3^- + NO_2^-), Chlorophyll a, and Ammonia (NH_3) (HIDOH 2014). Although Waimānalo Stream was among the first freshwater bodies in Hawai'i to be listed as impaired under Section 303(d) in 1998, the marine waters in and adjacent to the mouth of the stream have not been previously listed with HIDOH Clean Water Branch citing insufficient data.

6.2.3 BIOLOGICAL FACTORS

Vegetation

Landscape Regulations. The *MCBH Landscape Manual*, finalized in July 2014, applies to all properties with landscaped areas and planted trees (Section 6.1.3 and Section 8.1.8). Although landscaping projects are relatively uncommon at MCTAB, removal of vegetation is not. This manual is applicable to any vegetation planting or removal activity carried out at this training area including the HIARNG RTI on leased land within MCTAB.

Terrestrial Wildlife

Nuisance Animals. Presently, the only feral and nuisance animal control activity at MCTAB is the control of feral pigs.

Marine Life

Marine Surveys. Nearshore qualitative and quantitative surveys of the ocean environment that supports military training at MCTAB were conducted from 2014 – 2017 (USFWS lead). An area approximately one mile along the shoreline and extending 1.5 miles off-shore was surveyed. The surveys were a collaborative effort between USFWS, NOAA Fisheries, and Hawai'i DLNR, and accomplished by an inter-agency interdisciplinary dive team. The qualitative surveys focused on developing benthic community/habitat maps, while the quantitative surveys counted the number and type of all species. Some evidence of coral bleaching was observed. There was one area where an invasive algae (Leather mudweed (*Avrainvillea amadelpha*)) is establishing a foothold. No evidence of direct physical impact (e.g., broken coral, track marks) from vehicles that conduct off-shore training was observed (COA 7.4 and Figure 20, Appendix B).

Hawaiian Monk Seals. The final rule to revise designated critical habitat for Hawaiian monk seals in the Northwestern and main Hawaiian Islands was issued by NOAA Fisheries in 2015. The waters seaward of MCTAB from the seafloor to 10 meters above the seafloor and extending from the lower low water mark to the 200m depth, were designated critical habitat for the Hawaiian monk seal (Appendix D6). The shoreline (from the lower low watermark) and inland terrestrial habitat were precluded from designation because the area is managed under the MCBH INRMP in a manner that is beneficial to the species.

6.2.4 SOCIAL FACTORS

Recreational Resources

Recreational Facilities. While public recreational use of the campground and beach in MCTAB TA-1 is permissible per a license agreement between MCBH and CCH, minimal management and lack of a consistent presence during peak use times affords little protection of natural resources and illegal

[12] http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/integrated-report-and-total-maximum-daily-loads/

activities regularly occur.[13] Sixty warning signs were fabricated and have been installed along Tinker Road that inform the public what activities are not permitted beyond the rock barrier that lines TA-1/Tinker Road and on the beach (i.e., no ground fires, no off-road vehicles, no pets, no camping, no sand removal) (Appendix G3). The signs will be installed to support law enforcement efforts to bring order and security to the area and clearly identify violations that would support a case and achieve convictions in Federal and county courts.

Recreational Hunting. The recreational hunting program, initiated in September 2014 and managed by the O&T Directorate, allows bow hunting for feral pigs for a limited number of people in designated hunting areas at MCTAB (COA 7.5). Since the inception of the program, recreational bow hunting has been occurring on a regular basis at MCTAB, with 179 hunts in the first two years resulting in the harvest of 62 pigs. This is a 36% harvest rate, nearly 10 times that of similar archery-only hunting areas on O‘ahu. By this measure, the hunting program has proven successful at meeting its main objective of providing a high-quality recreational hunting experience. Base Order 1711.1 authorizes the recreational hunting program and includes a map of permitted hunting areas at MCTAB (Appendix E6 and E10).

6.3 WAIKANE VALLEY IMPACT AREA

6.3.1 LOCATION, COMMUNITY SETTING, AND LAND USES

The 187-acre parcel of land owned by MCBH in Waikane Valley, known as the Waikane Valley Impact Area, is part of the former Waikane Valley Training Area, which once encompassed about 1,061 acres (Figure 24, Appendix B). USACE has jurisdiction over the adjacent 874 acres of the former Waikane Valley Training Area. Waikane Valley is the northernmost valley in the Ko‘olaupoko District of windward O‘ahu. The site is located about 14 miles north of MCBH Kaneohe Bay. The property is bounded to the north, south, and west by undeveloped forest lands owned by two corporations (Kualoa Ranch and SMF Enterprises). CCH owns the land to the southeast, which is designated as the Waikane Nature Preserve.

Efforts to clean-up a large portion of the impact area under the DoD MMRP were completed in 2015. However, as indicated in Section 4.3.3, the Waikane Valley Impact Area is closed to unauthorized personnel. Authorized personnel continue to require EOD escorts. The only natural resources management activities that occur include enforcement of poaching and off-roading activities and opportunistic monitoring of natural resources conditions. For example, regular surveillance of illegal entry and hunters is conducted in this area by the MCBH CLEOs in cooperation with Federal and State agents.

6.3.2 PHYSICAL FACTORS

No new information.

6.3.3 BIOLOGICAL FACTORS

No new information.

[13] The current license operates as a month to month extension of the five-year license signed by MCBH and CCH in 2004. New terms have been established, but not agreed to by CCH.

6.3.4 SOCIAL FACTORS

Facilities and Supporting Infrastructure

Fencing. A new fence, approximately 3,900 ft long, has been constructed between the southern and northern portions of Waikane Valley Impact Area. The southern area contains Waikane Stream and the majority of cultural features of Waikane Valley including the Kamaka Shrine and Waikane Spring (Figure 26, Appendix B). The fence also provides a barrier to illegal access to the northern portion of the property where MEC potentially still exists.

6.4 MARINE CORPS BASE HAWAII, CAMP H.M. SMITH

6.4.1 LOCATION, COMMUNITY SETTING, AND LAND USES

Camp Smith covers 220 acres in the leeward O'ahu uplands (Figure 27, Appendix B). The nearest town is 'Aiea which had a population of 9,338 in the 2010 census. Keaīwa Heiau State Recreational Area is contiguous with Camp Smith along the northern boundary. The 'Aiea Loop Trail, a 4.8 mile trail, begins and ends in this park. This trail runs along the ridge on the west side of Hālawa Valley and at one point is about 600 ft from the Camp Smith boundary. Camp Smith is bordered to the northwest and southwest by residential and commercial areas, including 'Aiea Homesteads and Hālawa Heights. Hālawa Valley is located south of Camp Smith, and is highly industrialized and urbanized.

6.4.2 PHYSICAL FACTORS

No new information.

6.4.3 BIOLOGICAL FACTORS

Vegetation

Landscape Regulations. The *MCBH Landscape Manual* applies to all properties with landscaped areas and planted trees, including Camp Smith (Section 6.1.3 and Section 8.1.8).

Invasive Plant Species. No botanical surveys have ever been conducted on Camp Smith.[14] The forested areas along the north and east of Camp Smith are mostly non-native invasive plant species. Of major concern is the discovery, in 2015, of a highly invasive shrub-like plant, devilweed (*Chromolaena odorata*), also known as Siam weed. Devilweed is a candidate for one of the top 100 worst weeds in the world. It is a threat to the Army's training areas. It was found on the State's 'Aiea Loop Trail, and has spread significantly in the forested areas surrounding Camp Smith, as well as in the parking lot medium strips and landscaped areas.

OISC field staff voluntarily surveyed Camp Smith and have mapped out the distribution of devilweed (Figure 30, Appendix B).[15] The initial large patch was found covering the hillside above the housing area in vicinity of the water tanks and in the forested area to the northeast of the USPACOM Headquarters building. OISC has lent significant field staff time to survey, map, and herbicide the

[14] A list of non-native plants at Camp Smith is included in the *MCBH Invasive Species Management Study* (Garrison et al. 2002). These species were compiled by extracting info from other reports and field observations.

[15] The staff are the contracted field component of the States' O'ahu Invasive Species Council.

infested areas on Camp Smith. Camp Smith will continue to be monitored for reoccurrence and infested areas will be treated as needed.

Terrestrial Wildlife

'Elepaio. In early 2016, MCBH natural resource managers were joined by Army biologists to survey Camp Smith for 'elepaio using audio callbacks and identify potential habitat based on vegetation characteristics. Based on their experience they concluded that Camp Smith did not contain preferred habitat for 'elepaio. However, a juvenile 'elepaio was detected in the adjacent Keaīwa Heiau State Recreation Area near 'Aiea Stream, which lies approximately 600 ft from the Camp Smith boundary.

Nuisance Animals. The number of nuisance animals at Camp Smith has increased over the past five years, specifically pigs and chickens, and control efforts by USDA Wildlife Services has been significantly increased. In 2016, over 50 pigs were removed. In addition, in March 2016, the MCBH CO authorized five individuals to conduct archery hunting of pigs at Camp Smith to assist with control efforts.[16] There may be over 500 feral pigs that make Hālawa Valley their home.[17]

6.4.4 Social Factors

No new information.

6.5 PU'ULOA RANGE TRAINING FACILITY

6.5.1 Location, Community Setting, and Land Uses

Pu'uloa RTF is a 162-acre facility, located on the leeward O'ahu coast near Pearl Harbor at the eastern edge of the 'Ewa Plain (Figure 31, Appendix B). It is an active training facility used for small arms practice. The facility is located in an urbanized area, just east of the town of 'Ewa Beach, which had a population of 14,955 persons in the 2010 census. The northern border of Pu'uloa RTF has expanded to include some of the land from the former Federal Aviation Administration Transmitter Facility site. The land adjacent to the northern border is relatively undeveloped. Lands to the east of Pu'uloa RTF are primarily lands leased by Ford Island Properties and operated as part of the military privatized housing program (Carmel properties) that includes the Iroquois Point Community. To the east of the housing area, the Iroquois Point Elementary School is located on lands owned by CCH. The western border of Pu'uloa RTF adjoins private property, portions of which have been developed into single-family housing. Directly adjacent to the western edge of this residential area (approximately 300 ft from Pu'uloa RTF) is 'Ewa Beach Park, a public recreation area.

6.5.2 Physical Factors

Geology, Geomorphology, and Soils

Erosion Control. Pu'uloa RTF extends along approximately 3,000 ft of sandy shoreline. Within the past decade Range operators have observed periods of erosion and recession along portions of the shoreline, particularly at the east end. As a result of nine T-head groins being constructed along the shoreline seaward of Iroquois Point housing, the accretion of sand on the eastern end of Pu'uloa's shoreline has recovered much of the historical beach frontage, but the land adjoining the beach has

[16] Five active duty service members were authorized to bow hunt pigs on Camp Smith through July 1, 2017. The EA completed for hunting on MCTAB indicated that no hunting would occur on Camp Smith due to numerous safety concerns, constraints, and restraints.

[17] Per anecdotal discussion with DLNR DOFAW in 2016.

been significantly eroded away. The erosion has reached the backside of the lead-filled impact berms that support small arms training. A shoreline erosion study to investigate the severe loss of beach and shoreline at Pu‘uloa RTF was completed in 2015 (SSFM International, Inc., Sea Engineering, Inc., and Brownlie & Lee 2015). The report contains several recommended courses of action to address shoreline erosion. In the near term, the report recommends implementing a monitoring program to quantify the extent and rate of shoreline change, and planting vegetation in areas where cover is light, eroded, or worn away by foot and vehicle traffic. Long-term considerations include installing a sheet pile bulkhead and restoration of the shoreline vegetation (beach stabilization). These solutions will not require permitting unless other more drastic alternatives (i.e., construction of groins), are adopted, which will result in larger implementation costs and require significantly more time to accomplish stabilization actions (COA 7.4).

6.5.3 BIOLOGICAL FACTORS

Vegetation

Landscape Regulations. The *MCBH Landscape Manual* applies to all properties with landscaped areas and planted trees, including Pu‘uloa RTF (Section 6.1.3 and Section 8.1.8).

Terrestrial Wildlife

Invasive Species. The coconut rhinoceros beetle (CRB) (*Oryctes rhinoceros*) was first identified in Hawai‘i at JBPHH and Mamala Golf Course in December 2013. The adult beetle has principally targeted coconut palms (*Cocos nucifera*), but will attack other palms. They bore into the center of the crown (or top), where they injure young, growing tissue and feed on the exuded sap. This damage can significantly reduce coconut production and kill the palms. In March 2014, CRB adults and larvae were discovered in mulch piles at Pu‘uloa RTF and in most of the surrounding coconut palms. Infested material was disposed of by JBPHH utilizing air curtain burners. In 2015, MCBH partnered with the University of Hawai‘i (UH) at Hilo to allow experimental trials on Pu‘uloa RTF for control and eradication of the CRB. The various treatments involved pesticides, sand, and netting or a combination. Sand and netting alone were found to be ineffective at reducing CRB damage to the trees. Quarterly pesticide applications were not effective. Monthly pesticide applications did reduce CRB damage, but are not practical to continue.

CRB has been found to utilize just about any type of green waste. At Pu‘uloa RTF it was found to have infested kiawe (*Prosopis pallida*) leaf litter and waste in close proximity to coconut waste. While the adult beetle has a preference for coconut trees, their presence in the trees is largely transitory. All 27 palms on Pu‘uloa RTF are infested and will likely be removed. It has been decided to cease pesticide applications to these trees. Coconut palms are not a preferred landscape species, and monthly applications of a pesticide are costly and not an environmentally-sound management option.

Pu‘uloa RTF is currently the hotspot of the CRB infestation activity, and concern of how to handle Pu‘uloa RTF’s green waste disposal remains. Currently, green waste material is either transported to a green waste collection site on Barber’s Point (Kalaeloa) where it is composted, or a collection site on JBPHH where it is disposed of in air curtain burners. MCBH, JBPHH, and Hawai‘i Department of Health (HDOA) are maintaining vigilance in trying to limit the spread of this pest species.

Nuisance Animals. Other than the occasional removal of some chickens, very limited nuisance wildlife control work is conducted at Pu‘uloa RTF.

Marine Life

Hawaiian Monk Seals. Although infrequent, monk seals do haul-out on the Pu‘uloa RTF shoreline. Between 2012 and 2016, three monk seal haul-outs were recorded for Pu‘uloa RTF, all in 2012. The final rule to revise designated critical habitat for Hawaiian monk seals in the Northwestern and main Hawaiian Islands was issued by NOAA Fisheries in 2015 (Appendix D6). NOAA Fisheries determined that the shoreline and inland terrestrial habitat along Pu‘uloa RTF was precluded from Hawaiian monk seal critical habitat designation because the area is managed under the MCBH INRMP in a manner that is beneficial to the species. Also excluded was the offshore marine area adjacent to Pu‘uloa RTF and the Pu‘uloa Underwater Training Range (Navy), due to the benefits of exclusion for national security outweighing the benefits of designation. The off-shore waters at Pu‘uloa RTF fall under the jurisdiction of the Naval Base at Pearl Harbor.

6.5.4 SOCIAL FACTORS

No new information.

6.6 PEARL CITY ANNEX

6.6.1 LOCATION, COMMUNITY SETTING, AND LAND USES

Pearl City Annex is a 27-acre site located within JBPHH on Pearl City Peninsula (Figure 35, Appendix B). There are three warehouses, two open-sided sheds, open grassy lawns, and a shoreline bordering the northwest portion of the East Loch of Pearl Harbor Estuary. The facility is primarily used for storage of material and equipment. It is located near Pearl City, which had a population of 47,698 persons in the 2010 census.

6.6.2 PHYSICAL FACTORS

Water Resources, Wetlands, and Watersheds

Wetlands. A wetland survey and delineation was conducted in early 2014 (Ching 2017). A 0.11 acre jurisdictional wetland, Pearl City Annex Wetland, was identified and mapped (Table 7.2-1 and Figure 36, Appendix B).

6.6.3 BIOLOGICAL FACTORS

Terrestrial Wildlife

Nuisance Animals. Presently the only feral and nuisance animal control activity at Pearl City Annex is the control of feral pigs. The removal is conducted by USDA Wildlife Services under a contract with the Navy and occurs sporadically.

6.6.4 SOCIAL FACTORS

Trespassing. Homeless camping on the Navy property that abuts Pearl City Annex is routinely monitored by the CLEOs. Natural resources issues associated with homeless camps include illegal gill netting, along with human and solid waste deposition. Illegal drug use also occurs and may result in undesirable impacts.

7.0 INRMP PROGRAM MANAGEMENT AND IMPLEMENTATION

Change in Organization. This section consolidates programmatic management actions (i.e., compliance with applicable laws and policies, interagency cooperation) that support all eight component Course of Action (COA) management categories (Section 3.3). In previous INRMPs these were addressed in each individual COA, leading to unnecessary duplication in reporting.

Projects within each COA are notated in bold with a border. The status of projects is noted:

STEP – in progress: Active and funded projects.

STEP – programmed: Programmed projects not currently funded.

STEP – in planning: Other identified projects being considered for implementation that have not yet been programmed for STEP funding and may depend on information from other projects.

MANAGEMENT ENVIRONMENT

There is an on-going need to continue strengthening natural resources management capability and supporting the overall military mission, while effectively managing natural resources and ensuring compliance with relevant environmental regulations and agreements with Sikes Act partners. Implementation of ongoing and future conservation, rehabilitation, and management efforts described in this INRMP are aimed at accomplishing a set of goals and objectives (Table 7.0-1). This will be facilitated by a knowledgeable and sufficiently trained and manned Natural Resources staff; and on-going, training, education, enforcement, and outreach to appropriate operational, residential, and outside stakeholder personnel.

IMPLEMENTATION

GOAL 7.0: INRMP Program Management and Implementation

Systematically apply an ecosystem-based management approach to wildlife and other natural resources management activities at all MCBH properties.

The set of objectives and projects/actions described below is designed to help reach Goal 7.0. The rationale and background for each of the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

Objective 7.0.1: Develop, regularly update, and implement MCBH's INRMP, with qualified staff, adequately trained and supplied.

Information on why and how an ecosystem-based management approach needs to be documented in a regularly updated INRMP, which is adequately staffed and implemented by all military installations with significant natural resources, is covered in Sections 3, 5, and Appendix A2. A set of STEP entries covers the funding sources for basic operation of the Natural Resources division, including INRMP implementation.

Natural Resources Labor (STEP – in progress)

This covers salaries for Natural Resources staff to conduct core responsibilities, including carrying out INRMP requirements, projects, and annual reviews. Natural Resources staff conduct management activities or provide technical oversight across numerous subject matter areas associated with the COA areas of natural resources management concern: Wildlife; Wetland; Watershed; Coastal and Marine Resources; Landscape Maintenance and Vegetation Management; Natural Resources-based Outdoor Recreation, Outreach, and Public Access; and Resources Information.

Equipment and Supplies, Natural Resources Program Support (STEP – in progress)

This covers equipment and supplies to support and carry out INRMP requirements and objectives, including natural resources service projects and volunteer activities.

- Equipment: field tools (e.g., loppers, pruning saws, hand sickles, brush hooks, pulaskis), powered equipment (e.g., chainsaws, weed whackers, power washer), maintenance of light utility vehicles (e.g., oil, air filters, tires)
- Supplies: pesticides, live and kill traps, cleaning and maintenance supplies, emergency equipment and supplies
- Educational/Outreach/Training: interpretive/educational and regulatory signs, sign posts, Defense Logistics Agency document services for reproduction of educational pamphlets, professional skills training

Training and Associated Travel, Natural Resources Core Staff (STEP – in progress)

The Sikes Act requires that professionally-trained personnel manage DoD natural resources. To meet this requirement Natural Resources staff attends local and off-island training sponsored by DoD, conservation-oriented resource agencies (e.g., USFWS, NOAA), and non-Federal entities (e.g., National Military Fish and Wildlife Association). Personnel must have diverse knowledge and expertise in numerous subject matter areas to manage MCBH's natural resources. Without regular training in the ever-changing laws and environmental conditions, managing the resources would be exceedingly difficult.

Regular Review of the INRMP (STEP – programmed)

The next review of the MCBH INRMP will cover the period 2022-2026. The INRMP will be updated or revised in accordance with the SAIA.

Objective 7.0.2: Comply with applicable laws, regulations, policies, guidance, and plans to support natural resources management.

Section 5 and Appendix A3 detail laws, regulations, policies, and guidance applicable to natural resources management at MCBH. In practice, the Natural Resources division has to ensure compliance with a suite of Federal and State laws, as well as DoD and Marine Corps policies and guidance. Awareness of natural resources and related compliance requirements needs to be promoted across Base activities, including training, facilities management, and recreation. Compliance not only supports environmental protection, but helps meet the military mission and maintain access to training opportunities. Due to global travel by forces, invasive species represent a significant threat to natural resources, human health, and training ability. MCBH is planning to address local biosecurity concerns as part of the larger regional focus.

Ensure relevant operational materials adhere to the most recent guidance on natural resources management.

There is a need to strengthen operational management capability throughout MCBH by updating appropriate Base policies, guidelines and procedures to ensure compatibility with natural resources protection. Natural Resources staff review and update Base Orders, policies, plans, Standard Operating Procedures (SOPs), access procedures, and contract specifications with consideration for natural resource-related laws, best science and practices, Best Management Practices (BMPs), and use constraints.

Develop Biosecurity Plan (STEP – in planning)

A Biosecurity Plan is needed to analyze risks of introducing unwanted and potentially harmful organisms to MCBH properties and other locales where Marines train, including land and marine environments. The plan will outline coordinated efforts across Base departments and tenant commands to address the three principal methods of transporting potentially harmful vectors to MCBH – waterborne, ground, and air transportation (Appendix C3).

Objective 7.0.3: Optimize interagency cooperation to promote regional protection of natural resources.

Effective natural resources management requires MCBH to cooperate and coordinate with Federal and State agencies and other natural resources-oriented entities (e.g., OISC) with regard to laws and policies, management jurisdiction, available resources, and cooperative management actions. Section 11104.1.d of MCO P5090.2A states that Federal, State, and local conservation officials "will be permitted access to installation land and waters for official purposes after proper safety and security measures are taken." Section 11104.3.g further states that "When procuring INRMP implementation and enforcement services, priority shall be given to Federal and State agencies having responsibilities for the conservation or management of fish or wildlife." The SAIA requires that military installation INRMPs "reflect the mutual agreement" of Federal and State fish and wildlife agencies concerning "conservation, protection, and management of fish and wildlife resources." MCBH enjoys a close working relationship with its agency partners, which facilitates timely information exchange and formal and informal collaboration to address natural resources management issues. These close working relationships need to continue, while ensuring proper procedures and requirements are followed. This is accomplished through the following set of management actions.

Evaluate agency policies, plans, and activities for relevance and impact to management.

Natural Resources staff conduct reviews on current policies, plans, and activities of USFWS, NOAA Fisheries, Hawai'i DLNR, and other DoD agencies (Section 8) upon request to:

- Manage their associated impacts on MCBH's natural resources management activities (e.g., protected and pest species, wetlands, marine resources, recreation).
- Ensure MCBH management efforts are complimentary to those that are effective and desired throughout the region.
- Evaluate their impacts on military training.

Support interagency cooperative management to benefit MCBH natural resources.

Partnering is an effective way of leveraging limited funds, personnel, and time to benefit natural resources. It is especially important in situations where the focus is on regional stewardship or has off-Base implications. MCBH routinely identifies opportunities for INRMP-compatible outreach and collaborative projects. For example, NOAA Fisheries provided some of the cautionary signs MCBH has placed along fences to inform people of how to limit disturbance of monk seals, Hawai'i DLNR provided illustrations and pamphlet information as part of MCBH's interpretive exhibit project; and OISC, in conjunction with the Army and MCBH, is leading the effort to control devilweed in the forested areas surrounding Camp Smith.

MCBH regularly coordinates on-site access requests from natural resource partner agencies for a range of activities (Section 9 and Appendix G). Whale counts and recurring bird surveys are examples of agency sponsored activities that have been ongoing for many years in cooperation with MCBH.

For some on-going, long-term projects, an interagency agreement or memorandum of understanding may be appropriate to formalize the partnership. For example, scientists from Bishop Museum have been permitted to collect and curate fossil bird bones found at Mōkapu Peninsula for several decades (COA 7.1). MCBH is exploring the development of a memorandum of understanding with Bishop Museum that identifies the terms of the agreement regarding the investigation, curation, and return procedure associated with the collection of bird fossils from the Ulupa'u Crater cliffs.

Facilitate natural resource management data sharing.

INRMP implementation at MCBH would be greatly enhanced by the ability to easily share natural resources data with other entities with similar natural resource mandates (e.g., military agencies, Federal, State, City/County agencies, and/or private institutions). This is especially important in the context of DoD-mandated ecosystem management requirements; natural catastrophes; encroachment issues; and INRMP management actions requiring coordinated efforts from different entities. Some information exchanges require formal or informal data sharing agreements, while other data may be publicly available. Data sharing efforts involve:

- Reporting on inventory and monitoring efforts and performing related data management in response to specific requests and requirements (e.g., information on protected and pest species and habitats).
- Utilizing GIS and other databases developed by other entities. Identifying appropriate points of contact for discussions about content, data exchange, and system compatibility. Using the most updated, accurate, and standards-compliant data available.
- Implementing cooperative data sharing agreements with other entities.[1] Maintaining relationships and/or agreements to ensure all parties have up-to-date information and are following consistent standards. For example, NOAA Fisheries conducts yearly monk seal counts at MCBH. Although NOAA Fisheries has not requested assistance from Natural Resources staff to conduct these surveys, it would be desirable to codify procedures regarding sharing gathered data.

[1] Both the Staff Judge Advocate and Legal Counsel will be involved in reviewing any future cooperative data sharing agreements prior to their implementation.

Table 7.0-1. MCBH INRMP Goals and Objectives

Goal 7.0:	**INRMP Program Management and Implementation.** Systematically apply an ecosystem-based management approach to wildlife and other natural resources management activities at all MCBH properties.

Objective 7.0.1: Develop, regularly update, and implement MCBH's INRMP, with qualified staff, adequately trained and supplied.

Objective 7.0.2: Comply with applicable laws, regulations, policies, guidance, and plans to support natural resources management.

Objective 7.0.3: Optimize interagency cooperation to promote regional protection of natural resources.

Goal 7.1:	**Wildlife Management.** Contribute to maintenance of healthy regional wildlife populations by managing protected species and habitats that currently exist within MCBH lands/waters/air space, consistent with natural resources laws, military directives, interagency consultations, management programs, and permits.

Objective 7.1.1: Inventory and monitor wildlife species.

Objective 7.1.2: Manage and enhance wildlife species and their habitat.

Goal 7.2:	**Wetland Management.** Protect, enhance, and restore MCBH wetlands from loss or degradation to the maximum extent possible, consistent with the military mission and Federal wetland laws and regulations.

Objective 7.2.1: Identify, delineate, characterize, and monitor wetlands.

Objective 7.2.2: Implement wetland management and enhancement opportunities.

Goal 7.3:	**Watershed Management.** Use an ecosystem-based watershed approach to managing issues involving water quality, erosion, and flow/flooding on MCBH lands associated with streams, channels, land cover and drainages.

Objective 7.3.1: Inventory and monitor watershed conditions.

Objective 7.3.2: Conduct management and enhancement activities that promote watershed health.

Goal 7.4:	**Coastal and Marine Resources Management.** Protect, enhance, and manage the shoreline, beaches, and nearshore environments and off-shore marine resources within MCBH control and/or use.

Objective 7.4.1: Inventory and monitor coastal and marine biological resources and geophysical conditions.

Objective 7.4.2: Manage and enhance coastal and marine biological resources and geophysical conditions.

Goal 7.5:	**Landscape Maintenance and Vegetation Management.** Maintain landscaped areas and manage natural vegetation through cost-effective, environmentally sound, sustainable practices, emphasizing use of native plants, habitat integrity, coastal protection, and water and soil conservation in a manner that supports training needs and natural resources conservation.

Objective 7.5.1: Survey, inventory, characterize, and monitor vegetation.

Objective 7.5.2: Take a sustainable approach to managing and enhancing natural and man-made landscapes.

Goal 7.6: Natural Resources-Based Outdoor Recreation, Outreach, and Public Access Management. Support high quality, natural-resource-based (not activity-based) outdoor recreation, outreach and education, and controlled public access, consistent with natural resource conservation.

Objective 7.6.1: Inventory and monitor public engagement activities and their potential impact on natural resources.

Objective 7.6.2: Promote and enhance opportunities for public engagement in natural resources management-related activities.

Goal 7.7: Resource Information Management. Develop and use information management 'tools' to assist in implementing the INRMP and supporting integrated natural resources management on MCBH properties.

Objective 7.7.1: Inventory and maintain natural resources information and data for currency, accessibility, reporting, and management decision support.

Objective 7.7.2: Improve natural resources information and data.

7.1 WILDLIFE MANAGEMENT

Change in Organization. This section has been revised to address only terrestrial wildlife. The 'Fish' element of the former COA 7.1: Fish and Wildlife Management has been moved into COA 7.4: Coastal and Marine Resources Management. This section addresses the management of migratory birds, to include endangered species; control of non-native vertebrate animals (i.e., pigs, cats, chickens, rats, mongoose, and pigeons); invertebrate pests; and pets. MCBH does not manage any game animals, although the invasive feral pig, a State game species, is hunted on MCTAB. Control of non-native vertebrate and invertebrate animals is more fully addressed in the *MCBH Integrated Pest Management Plan* (Section 8.1.9).

MANAGEMENT ENVIRONMENT

Wildlife management has been the core component of MCBH's natural resource conservation activities since at least 1966.[1] Between the late 1960s and the early 1990s, fish and wildlife management efforts were largely focused on the two designated WMAs on Mōkapu Peninsula: 517-acre Nu'upia Ponds WMA and 25-acre Ulupa'u Head WMA.[2] Since 1994, when MCAS Kaneohe Bay consolidated all of its installations and facilities in Hawai'i under a single command becoming MCBH, there has been a concerted effort to improve management of wildlife that utilize wetlands, streams, and forested areas, in addition to the two WMAs.

Wildlife management activities are conducted at all MCBH properties, though the emphasis varies based on the presence of protected species, current natural resources issues, and available budget and personnel. Activities are mainly concentrated at Kaneohe Bay where there is the largest occurrence of protected marine life and wildlife. Management activities at MCBH's largely urbanized leeward properties are less intense, mainly occurring as needed. Control of non-native vertebrate animals has greatly increased at Camp Smith, which has redirected some trapping efforts from the windward properties. Only baseline environmental monitoring and conservation law enforcement are conducted at Waikane Valley Impact Area.[3]

MCBH hosts a variety of wildlife species, including four Federally-listed endangered waterbirds, one State-listed endangered raptor, one Federally-listed insect, potentially one Federally-listed mammal, two seabird colonies, and numerous visiting species of birds protected under the MBTA (Appendix C1). Natural Resources staff updates and provides a 'cheat sheet' for the Command and other interested parties that briefly describes the protected species that occur at MCBH and their habitat (Appendix D1).

Threats to the survival of native wildlife at MCBH and throughout Hawai'i include: loss and degradation of habitat; invasive species; disease; recreational activities; construction; light pollution; and changes in ecology related to climate change. Invasive species, in particular, are a significant management challenge. Since the Hawaiian Islands are remote and have evolved in isolation, they are much more susceptible to

[1] 1966 is when an 'Agreement for the Conservation and Development of Fish and Wildlife' was first completed among MCAS Kaneohe Bay, Pacific Division Naval Facilities Engineering Command, USFWS, and Hawai'i DLNR, pertinent to the then MCAS Kaneohe Bay on Mōkapu Peninsula.

[2] Refer to COA 7.1, 2001 INRMP/EA for details on the history of fish and wildlife management on Mōkapu Peninsula.

[3] Although clean-up efforts have occurred, Waikane Valley Impact Area is still considered an ordnance-contaminated property where active natural resources management is not safe or possible. Baseline environmental studies have been conducted there.

harmful events associated with invasive species. Invasive species can have an adverse impact, and in many instances a severe detrimental effect, on the capacity of lands and waters of MCBH to support military training. They can damage landscaped environments, as well as threaten endangered species, their habitats, and other functions of a healthy ecosystem. Their presence can result in unplanned economic expenditures to combat threats that siphon funding away from programmed projects. MCBH is addressing these issues and its overall approach through a planned emphasis on biosecurity (COA 7.0.2 and Appendix C3).

Policies

Natural Resources staff focuses on conservation of protected species as the key component of management at all properties, with an emphasis on species protected under Federal and State laws and regulations (e.g., ESA, MBTA, and HRS Chapter 195D) (Appendix A7 & C2). Associated efforts also focus on controlling invasive and pest species (Appendix C3).

Birds. MCBH properties provide habitat for a range of resident and visiting protected shorebirds, seabirds, and waterbirds. In some areas, public access is restricted due to the presence of protected bird species (Appendix C4). MCBH maintains a long-standing policy of regularly monitoring protected birds and updating databases, including spatial data (Appendix C4). Flyers that explain how to report and protect injured or disoriented birds are disseminated Base-wide by Natural Resources staff at the beginning of 'shearwater fallout season' (Appendix D2).[4] MCBH has established procedures that must be followed prior to and during implementation of any project (e.g., construction, maintenance) or military operational activity that may affect native bird species, protected or otherwise. The area must be surveyed prior to implementation, and if native bird species are present, protection measures must be followed (Appendix C4 & D4). Records are kept on the numbers of reported fallen shearwaters and their final disposition. A depredation permit valid for only one year and must be reapplied for annually (Appendix E1). Every January, MCBH provides a report to USFWS regarding any MBTA birds that were legally 'taken' under the previous years' depredation permit. Only herbicides considered safe for wildlife and approved for wetland use are used in and around wetland areas (Appendix E2).

Control of Non-Native Vertebrate and Invertebrate Animals. Non-native vertebrate and invertebrate animal species at MCBH (e.g., mongoose, feral pigs, free-roaming cats (feral and domesticated), yellow crazy ants, and CRB) alter habitat, may transmit disease, and disturb and prey upon native species, including ESA protected birds. Control of non-native vertebrate and invertebrate animals is a primary management tool in sustaining a safe habitat for protected species, and is required by executive order and military directives. Specifically, MCO P5090.2A directs installations to provide for exotic species control and minimize the economic, ecological, and human health impacts they cause. It directs each installation to develop and periodically review an Integrated Pest Management Plan (IPMP) that identifies animal control efforts for free-roaming cats, dogs, and nuisance wildlife, and outlines appropriate use of pesticides in compliance with applicable laws and DoD and Marine Corps directives (Section 8.1.9).[5]

[4] Light from urbanization can disorient fledgling shearwaters causing them to become exhausted and eventually fall to the ground, or increasing their chance of colliding with artificial structures (i.e., fallout). Once on the ground, fledglings are unable to fly and may be killed by cars or non-native vertebrate pests, or die of starvation or dehydration. Grounded fledglings (from fallout) are usually found between October and December.

[5] Cats are the number one killer of birds nationwide. Conservative estimates put the number of free-roaming cats on O'ahu at over 300,000 (Appendix C3).

Base Order P5233.2 Base Pet and Wildlife Regulations charges Natural Resources staff as the sole authorized agent to implement the program controlling all nuisance, wild, and feral animals aboard MCBH properties and within its jurisdictional areas. Control of non-native vertebrate animals at MCBH is conducted by USDA Wildlife Services. Base Order P5233.2 Base Pet and Wildlife Regulations specifies that trap/neuter/release programs and feral animal feeding areas are prohibited at MCBH properties, as is feeding wild animals (pigs and chickens). Control of non-native invertebrates is conducted by Natural Resources staff and guided by the newly revised *MCBH IPMP* (Section 8.1.9).

Pets. Uncontrolled or unauthorized pets present a direct threat to wildlife. Pet owners must follow Base Order P5233.2, which details authorized and prohibited animals, control of pets, licensing and registration requirements, prohibited activities with regard to wildlife, violations, and penalties. The Order specifies areas where pets are prohibited, in particular WMAs and beaches at certain designated times. Outside of the home, dogs must be kept under physical control (on a leash) at all times, except in designated dog parks. Enforcement is conducted by the CLEOs, MPD police officers, and Animal Control officers.

Specimen Curation. Federal laws (e.g., Antiquities Act), Federal regulations (at 36 CFR), and military directives require proper curation of collected specimens of natural and cultural resources on Federally-owned property (Appendix A3). Arrangements have been made to house biological specimens (e.g., fossil bird bones) collected on MCBH properties at the Bernice Pauahi Bishop Museum in Honolulu, and with the Smithsonian Institution's National Museum of Natural History in Washington D.C.[6]

IMPLEMENTATION

GOAL 7.1: Wildlife Management

Contribute to maintenance of healthy regional wildlife populations by managing protected species and habitats that currently exist within MCBH lands/waters/air space, consistent with natural resources laws, military directives, interagency consultations, management programs, and permits.

The set of objectives and projects/actions described below is designed to help reach Goal 7.1. The rationale and background for each of the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

Objective 7.1.1: Inventory and monitor wildlife species.

Monitoring is important for tracking the health and status of wildlife populations, evaluating the success and failures of management methods, and detecting new issues. At MCBH, wildlife monitoring focuses mainly on protected species (e.g., ESA-listed birds, migratory birds) and other native species. Recurring surveys, opportunistic observations, and specific monitoring projects document nesting attempts and breeding success of the populations, distribution changes, and habitat utilization. MCBH conducts project-specific monitoring of wildlife in response to specific projects, outside requests, or permit conditions.

[6] Bernice Pauahi Bishop Museum: The Hawai'i State Museum of Natural and Cultural History is designated as the Hawai'i Biological Survey, which means they are charged with locating, identifying and evaluating all native and non-native species of flora and fauna within the State and maintaining reference collections for a wide range of uses.

ROUTINE MANAGEMENT ACTIONS

MCBH routinely monitors protected species and native wildlife of management concern. Noteworthy single event observations (e.g., predation, rare bird sightings, unexplained deaths) are reported and documented.

Bird Surveys. Two regularly scheduled bird surveys are conducted at Kaneohe Bay: (1) the semiannual Hawai'i DLNR waterbird survey (Nu'upia Ponds and other MCBH wetlands), and (2) the annual Hawai'i Audubon Society sponsored Christmas Bird Count, which surveys all bird species on Base to include the red-footed boobies in Ulupa'u Crater (Appendix D3). These surveys provide valuable data on species presence and population trends for MCBH, as well as for State and Federal agencies who use it in combination with information from other survey areas to help guide conservation actions.

Occasionally a protected bird species that does not regularly occur aboard MCBH properties will be observed or reported (e.g., endangered nēnē have been reported twice at MCBH Kaneohe Bay in the past five years). Natural Resources staff record the occurrences and take appropriate protection measures if needed (Appendix C2, C4 & D4).

Wedge-tailed Shearwater Monitoring. Natural Resources staff conduct an annual census of occupied wedge-tailed shearwater burrows (Figure 5a, Appendix B; Appendix C4). Monitoring of the shearwater colony also involves identifying potential issues (e.g., yellow crazy ants, predation). In the past, USFWS and OISC have assisted with this effort. Due to the current clean-up efforts of munitions constituents (i.e., spent lead rounds) in this area, assistance from outside agency personnel will be reviewed on a case-by-case basis. This clean-up may involve partial destruction and reconstruction of the berms the wedge-tailed shearwaters seasonally (August – December) nest in to remove the spent lead. All clean-up work would occur outside the nesting/fledging season.

Avian Botulism Monitoring. Koloa at the Base WRF (and other sites nearby) will be closely monitored during summer months for symptoms of avian botulism in an effort to detect the disease in the earliest stages allowing for treatment of sick ducks and potentially limiting the spread of disease and the number of associated deaths. Sick ducks will be given a dose of botulism anti-toxin provided by the USGS Wildlife Health Center.[7]

PROJECTS

Endangered Hawaiian Hoary Bat Survey (STEP – programmed)

The Hawaiian hoary bat or *'ope'ape'a* (*Lasiurus cinereus semotus*) is an endangered species of hairy-tailed bat endemic to the Hawaiian Islands. Relatively little research has been conducted on the Hawaiian hoary bat, and data regarding its habitat and population status are very limited. No surveys for the Hawaiian hoary bat have been completed on any MCBH property. In 2014, the HIARNG Regional Training Institute, located on leased property adjacent to MCTAB, conducted Hawaiian hoary bat surveys and captured numerous bat calls. The proximity indicates that the Hawaiian hoary bat may be present, whether foraging or breeding, on at least one MCBH property. A preliminary site evaluation by USGS staff in May 2016 indicates some MCBH properties have suitable habitat for the Hawaiian hoary bat. Monitoring for seasonal presence and documentation of foraging behavior was recommended. Whether due to construction or expanded training needs, an inadvertent take of habitat or the bat itself would affect operations in that area until an

[7] See Section 6.1.3 for details on recent avian botulism outbreaks and the anti-toxin.

investigation could be completed. Surveying for the bat would allow for preemptive documentation and the ability to work with Federal and State wildlife managers to plan for mitigation in case activities are programmed in areas the Hawaiian hoary bat may occupy. Survey protocols would include multiple visits and utilize both acoustic surveys and visual detection to determine if the species is present.

Inventory and Study the State Endangered Hawaiian Owl (STEP – programmed)

The Hawaiian owl or *pueo* (*Asio flammeus sandwichensis*) is a subspecies of the short-eared owl that is endemic to Hawai'i. It is listed by the State of Hawai'i as endangered on the island of O'ahu. It is not a Federally-listed endangered species. Information on this ground-nesting raptor's biology is limited. In 2016 Natural Resources staff documented, for the first time ever, a *pueo* nest with eggs in Nu'upia Ponds WMA. A survey for the *pueo* on MCBH properties is planned. Procedures would be developed regarding how to protect, promote, and monitor the owl in concert with Hawai'i DLNR DOFAW and USFWS. This survey would support State research priorities, which include analysis of population trends and changes in habitat occupancy, especially on O'ahu. It would also allow for improved planning and protection of this species.

Endangered Waterbirds Study – Nu'upia Ponds and MCTAB (STEP – programmed)

The last time a focused study at MCBH was completed on all the endangered waterbirds was in the late 1990s (Rauzon 1992a, Rauzon 1992b, Rauzon and Tanino 1995, Cox and Jokiel 1997). In the intervening years construction encroachment, noise, and light pollution has significantly increased. Invasive vegetation is encroaching on the waterbird habitat. Due to staff turnover, staff shortages, and funding shortfalls, close monitoring of MCBH wetland habitats and associated waterbirds has declined over the years. This study will provide updated information on breeding/nesting success, population size, distribution, habitat/site condition, and threats. The study is planned to involve at least two years of observation at Nu'upia Ponds WMA and MCTAB. Results will be used to inform management of endangered species, including any actions (e.g., military operations, recreational activities) that occur around their habitats and may impact the species.

Flyway-Flight Pattern Analysis of Migratory and Endangered Birds – MCBH Kaneohe Bay (STEP – programmed)

A variety of manned and unmanned aircraft, to include the MV-22 "Osprey", military unmanned aerial vehicles (UAVs), and possibly recreational and scientific UAVs in the future, utilize the airspace around MCBH Kaneohe Bay. Authority to install antennae and cell towers is frequently requested. New energy technologies utilizing wind power and the possible addition of a power plant on land or in the ocean are being considered. All of these activities would place obstacles in the flight paths of migratory birds, to include endangered species, which can result in take under the MBTA and ESA. This project is necessary to support future construction plans or introduction of different aircraft systems. The analysis will be conducted for seabirds and shorebirds over different time periods (e.g., day/night, migrations, breeding season).

Non-Native Invertebrate and Vertebrate Pest Species Management Study (STEP – in planning)

This project would update the portion of the *MCBH Invasive Species Management Study* (ISMS) covering non-native vertebrate and invertebrate pest management (Garrison et al. 2002).[8] Since this study, new invertebrate pests have been introduced to O'ahu, some of which have found their way onto MCBH lands. For example, Pu'uloa RTF is a hotspot for the highly destructive CRB (*Oryctes rhinoceros*) that was discovered on JBPHH in December 2013. The study would focus on identifying organisms of highest priority biosecurity threat to training and protected natural resources target species currently of OISC and HDOA concern (e.g., CRB, brown tree snake, mosquitos, fire ants, marine organisms), and those that could be introduced as Marine Forces build-up in Guam, the Marianas, and other Pacific islands. It would identify the most effective control methods and BMPs to avoid introduction and spread. The study would include a review of the efficacy of control methods used by MCBH and other entities, including a review of the success or failure of methods implemented from recommendations in the previous ISMS. This information would be used in developing the Biosecurity Plan (COA 7.0.2).

Terrestrial Invertebrates Survey and Recommendations for Management – MCBH Kaneohe Bay and MCTAB (STEP – in planning)

The *Hawai'i State Wildlife Action Plan* (SWAP) states there are approximately 5,000 terrestrial invertebrates included in the species of greatest conservation need (Section 8.3.2.4). While there is some knowledge of which species of terrestrial invertebrates occur at MCBH Kaneohe Bay and MCTAB, this information has been compiled through discovery while conducting other surveys and management activities and is far from comprehensive. Seven species of yellow-faced bees (*Hylaeus* sp.) native to Hawai'i were listed as endangered under the ESA in 2016. MCBH contains preferred habitat for one of these species, *Hylaeus anthracinus,* and its presence has been confirmed at three locations at MCBH Kaneohe Bay. An inventory of terrestrial invertebrates will support conservation of native species and control of invasive species. Confirmation of the locations where *Hylaeus anthracinus* are present will help avoid inadvertent take of the species. Management actions to protect native species or combat invasive species will be identified.

Objective 7.1.2: Manage and enhance wildlife species and their habitat.

MCBH actively manages for protected wildlife species and to maintain ecosystems conducive to the perpetuation of native species. Actions include habitat enhancement projects, restricting access (either temporarily or permanently), trialing of new methods, and collaborative management. Management actions to enhance species populations and habitat include invasive species control, predator and pest management, and habitat manipulation. Invasive species (vertebrate and invertebrate animals and invasive pests) continue to be one of the most important wildlife management issues on many MCBH lands. Predator control is conducted primarily in areas that provide habitat for protected species (Appendix C3). Habitat enhancement projects are designed to benefit native birds.

[8] A separate STEP project has been programmed for an invasive vegetation inventory and management plan to be conducted in FY2017 (COA 7.5).

ROUTINE MANAGEMENT ACTIONS

Activity Analysis. Natural Resources staff routinely perform actions aimed at limiting disturbance of protected species due to authorized and prohibited human activity. These include: review and where appropriate the update of SOPs and Base Orders (e.g., people interacting with or feeding wildlife); installation and maintenance of signs and physical barriers (e.g., fences, gates); and conducting regular security patrols with an emphasis on deterring prohibited activities (e.g., trespassing, disregarding animal control laws). Staff continually evaluate compatible human activities and recommend alternatives if necessary. For example, construction or other human intrusions in Nu'upia Ponds WMA are minimized during the Hawaiian stilt nesting season (March - September). Since night-lighting is a threat to seabirds and shorebirds, Natural Resources staff ardently promotes incorporating International Dark Sky policies and initiatives for reducing light pollution associated with construction projects.[9]

Feral and Nuisance Animal Control. Natural Resources staff manage the feral and nuisance animal control agreements and activities at all properties targeting rats, mongoose, cats, chickens, pigeons, pigs, and the occasional dog (Appendix C3).[10] Ongoing since FY99, MCBH has maintained an agreement with USDA Wildlife Services for predator control services, including nuisance animal removal at Kaneohe Bay, MCTAB, and Camp Smith. In recent years, an increase in the number of feral and nuisance animals at Camp Smith has resulted in the need to intensify USDA Wildlife Services' trapping efforts. Chicken reduction is being conducted at Manana Housing Area. Trapping and control records are maintained in the MCBH natural resources databases.

Invertebrate Pest Control. Natural Resources staff engage in control efforts for invertebrate pests as needed (e.g., yellow crazy ants, CRB) (Section 6 and Appendix C3).

BASH/Depredation Permit. The MCAS airfield manager is in charge of implementing the Bird Aircraft Strike Hazard (BASH) program at the airfield on Kaneohe Bay (Appendix C3). Under a Cooperative Service Agreement with MCAS, USDA Wildlife Services personnel monitor the airfield for bird activity and haze birds as necessary. The Environmental Department is in charge of obtaining and annually renewing a Depredation Permit from the USFWS covering any authorized harassment or lethal control of migratory birds protected under the MBTA at MCBH (Appendix E1). This permit is required to conduct BASH management activities on the airfield. Natural Resources staff provide technical assistance in ensuring the environmental requirements identified in the BASH Plan are met. Natural Resources staff monitor to ensure that airfield staff properly execute BASH program responsibilities, that MCAS and their USDA Wildlife Services personnel maintain required data collection, and that BASH considerations are incorporated into airfield SOWs, plans and projects when appropriate. Natural Resources staff reports BASH activity as part of the annual reporting requirements for renewal of the Depredation Permit.

Injured Bird Treatment (oiled, botulism). Proper and timely treatment of injured birds can reduce mortality. Natural Resources staff respond to incidences of injured birds and notify the appropriate agencies (e.g., USFWS, USGS, Hawai'i DLNR DOFAW) to assist with the response if necessary. To inform staff and interested parties of the proper procedures to follow for the treatment of injured birds, a procedure will be developed that details actions to be taken when an event results in, or has the potential to result in injury to birds. The procedure will detail which agencies should be notified for compliance purposes, which

[9] http://darksky.org/light-pollution/wildlife/

[10] STEP Project HI2CONESOPB46134650, Wildlife and Predator Control Services, FY2016: $62K, with modest annual increases.

agencies and/or organizations treat injured birds, transport needs, and steps to take to limit injury to the fewest birds. Disposal of dead birds will also be addressed.

PROJECTS

Replace Existing Fence – Pa‘akai Pond (STEP – in planning)

The existing fence around Pa‘akai Pond was constructed in the late 1980s. It has been damaged over the years and needs to be replaced. This fence is approximately 475 ft long and runs parallel to the AAV trail. The replacement would utilize materials left over from a recently completed fencing project (HI2CONESC1045804203) and tie into that fence north of Pa‘akai Pond. Because military units are allowed to conduct foot patrols on the AAV trail that passes through Nu‘upia Ponds WMA, this fence is important to prevent unauthorized access into endangered species habitat.

Endangered Species Observation Towers – Nu‘upia Ponds WMA (STEP – programmed)

Nu‘upia Ponds WMA is home to four endangered waterbirds. Monitoring and management of these protected species is a key part of MCBH natural resource management efforts. This project will construct five 20-25 ft tall observation towers for monitoring. These observation towers would be used by Natural Resources staff biologists, other Federal/State biologists, and contracted biologists to monitor, evaluate, and study the foraging and nesting/breeding behavior of the endangered waterbirds. The towers will also be used to monitor animals that could predate on the waterbirds, their chicks, and eggs. The towers would be used to monitor numerous Base recreational events that are conducted within and around Nu‘upia Ponds WMA to ensure no violations occur with the protected wildlife or wetlands. The CLEOs would use the towers to monitor the WMA for resource violations and unauthorized access.

Construct Water Crossing Points to Improve Access within Nu‘upia Ponds (STEP – programmed)

Access within the interior of Nu‘upia Ponds is necessary to conduct monitoring and management of ESA-listed waterbirds; conduct vegetation control to preserve endangered species habitat; and conduct removal of trash and debris that enters the ponds from Base housing and Kaneohe Bay. Access is difficult as the main avenues of movement are impassable without wading waist-deep in water or knee-deep in mud.

Two channels that allow the circulation of water between ponds require footbridges to cross into the interior pond areas. One channel had a footbridge until it was removed due to safety concerns, and the other used to be a very shallow waterway, but has become a free flowing channel. This project will construct footbridges to span the two channels. Envisioned as a potential volunteer project, the footbridges could be constructed out of telephone poles with wooden or recycled plastic slats.

Repair/Replace Nu‘upia Ponds Footbridge (STEP – programmed)

The only readily accessible point into the Nu‘upia Ponds to conduct ESA management activities is a concrete footbridge that crosses the MCDC. This bridge is also the only access point for Base personnel to access the Nu‘upia Ponds Running Trail that traverses the southern perimeter of the ponds. This bridge serves Natural Resources staff and law enforcement personnel, and supports Base recreational activities. The bridge has fallen into disrepair (i.e., spalling concrete, failing safety rail, and large cement pieces breaking off the bridge). In addition, an area around one side of the bridge that is anchored into the MCDC

stream bank is badly eroded. The bridge repair/replacement project is planned to incorporate vehicle access as currently the only vehicular access to the ponds is located on the opposite side of the Base.

Seabird Relocation Study (STEP- in progress)

Ulupa‘u Crater, at MCBH Kaneohe Bay, houses KBRTF, a live-fire weapons range, and Ulupa‘u Head WMA, established to protect a colony of over 2,000 red-footed boobies – one of only two colonies of these seabirds in the main Hawaiian Islands. Natural Resources staff are currently working with USFWS on a five-year project to assess the viability of using social attraction methods (e.g., decoys and recorded audio) and habitat manipulation (e.g., artificial nesting) to attract red-footed boobies to alternative locations around Ulupa‘u Crater. The goal of the project is to allow for greater training flexibility and red-footed booby protection by enticing the birds to expand the nesting colony to areas further away from the impact area at KBRTF.

Repair/Replace Artificial Nesting Platforms for Migratory Birds in Ulupa‘u Crater (STEP – programmed)

Artificial nesting platforms in Ulupa‘u Head WMA that were constructed as part of mitigation for a range fire that killed over 120 boobies in July 1990 have fallen into disrepair and many are no longer useable. In October 2016, a mortar incident killed 15 boobies when an errant high explosive round detonated near a prime nesting and roosting tree. Corrosion from salt air has played a major role in damaging the nesting platforms. Past overuse of herbicides has also reduced the number of trees that are available for nesting/roosting. Increased range use, new weapons technology, and increased fire frequency have revealed a need to remove some nesting sites on the range. This project will fund the repair, replacement, and construction of additional artificial platforms to encourage the colony to find suitable nesting locations outside of the impact area of the range. MCBH is soliciting advice from USFWS and Hawai‘i DLNR DOFAW on the best design for new booby nesting platforms. Planting of appropriate, non-invasive additional trees for nesting is discussed in COA 7.5.

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7.2 WETLAND MANAGEMENT

MANAGEMENT ENVIRONMENT

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year. Wetlands, both natural and man-made, represent a critical component of watershed health. Healthy wetlands:

- provide fish and wildlife habitat,
- increase flood protection,
- decrease erosive potential of surface water,
- maintain surface and groundwater supply,
- improve water quality and sediment filtration, and
- support aesthetic and recreational activities.

MCBH wetlands provide valuable habitat for ESA and MBTA-protected waterbirds, seabirds and shorebirds, and native fish (COA 7.1, Appendix C1). Varied habitats, including mudflats, shallow ponds, and estuarine and coastal wetlands, provide locations for birds to rest, forage, and nest. Wetlands along coastlines, streams, and ponds provide habitat for fish and crustaceans, who use the areas for spawning, food sources, and protection. Wetlands provide aesthetic and recreational opportunities such as wildlife viewing.

Wetlands play an important role in flood protection. In times of heavy rainfall, wetlands help decrease flooding by absorbing rainfall and overland flow of water, which is then slowly released. This helps to reduce peak discharges caused by floods. In coastal wetlands plants bind soils together, resisting erosion by wind and waves and providing a physical barrier that slows storm surges and tidal waves, providing shoreline and storm protection.

Wetlands provide for ground water recharge and discharge. They improve water quality by acting as natural filters, trapping and holding water and sediment, and retaining excess nutrients and other pollutants such as heavy metals. The natural cleansing properties of wetlands are held in such regard that storm water regulations recognize ‘constructed wetlands’ as a BMP available to reduce nonpoint source pollution (MCO P5090.2A Section 20104.3.e.(2)(c)).

While healthy wetlands provide many important services, degraded wetlands are less able to effectively perform these functions. Human activities cause wetland degradation and loss by changing water quality, quantity, and flow rates; increasing pollutant inputs; and changing species composition as a result of disturbance and the introduction of non-native species.

Policies

Executive Order 11990 – *Protection of Wetlands* requires Federal agencies to take action to minimize destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibilities for managing Federal lands and facilities. Wetland protection is a significant component of natural resources management at MCBH. This emphasis complies with MCO P5090.2A Section 11201.3, which directs Marine Corps installations to “comply with the national policy to permit no overall net loss of wetlands,” and “avoid, to the maximum extent practicable, wetlands destruction or degradation.” It goes on to say that any installation or unit proposed action that cannot avoid

wetlands "shall be designed to minimize wetland degradation and shall include regulatory agency-required compensatory mitigation."

Any impacts of proposed actions significantly affecting jurisdictional wetlands (adverse or positive) must be evaluated and addressed in an environmental document prepared pursuant to NEPA. In addition, Clean Water Act (CWA) Sections 401 and 404 set up permitting programs that prohibit arbitrary filling or disturbance of navigable waterways, including jurisdictional wetlands. HAR Title 11 Chapter 55 Appendix M requires a State permit from HIDOH to conduct control of invasive weed species that may result in a discharge of pesticides (including herbicides) directly to surface water (COA 7.5, Appendix E2).

Jurisdictional Wetlands. The Federal regulations implementing CWA Section 404 define wetlands as:

> Those areas that are inundated or saturated by surface or ground water (*hydrology*) at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation (*hydrophytes*) typically adapted for life in saturated soil conditions (*hydric soils*). Wetlands generally include swamps, marshes, bogs, and similar areas (40 CFR 230.3). Jurisdictional wetlands, those that are regulated by the USACE under Section 404, must exhibit all three characteristics: hydrology, hydrophytes, and hydric soils (USACE 1987).

There is a Federal requirement to delineate and map wetlands and provide information for compliance and/or management purposes to all that have the potential to affect wetlands. USACE regulatory wetland delineation criteria are codified at 33 CFR 328.3 and further defined in the *USACE 1987 Wetland Delineation Manual*. The protocols in this manual are used to determine the boundaries of jurisdictional wetlands. The USACE certifies wetland boundary delineations for a period of five years, so existing delineations must be reviewed and re-certified as conditions dictate (i.e., significant natural changes appear to be occurring (wetland expanding/shrinking); construction or other activity may encroach upon a wetland; or maintaining awareness of the wetland boundary). The USACE wetland delineations remain valid after five years as long as there are no significant changes in the wetland by either natural causes or man-made activities. Since wetlands are affected over time by both, changes in wetland boundaries can be expected and wetland jurisdictional delineations will not remain valid indefinitely. If, after the five year period there are significant changes to a wetland or an action is contemplated that will have a direct or indirect impact to a wetland, a new delineation would have to be performed to identify its current boundary.

Wetlands of MCBH

The wetlands of the Koʻolaupoko region represent an inter-related patchwork of small but essential habitat fragments for endangered Hawaiian waterbirds and migratory waterfowl on Oʻahu. Wetlands at MCBH Kaneohe Bay and MCTAB represent a significant piece of this network and wetland management activities provide important regional benefits for these bird populations. The *Recovery Plan for Hawaiian Waterbirds* (USFWS 2005) notes MCBH's key role as wetland managers in the region.

At MCBH Kaneohe Bay wetlands include the Nuʻupia Ponds complex and smaller wetland pockets located on historical estuarine or marsh lands (Figure 6a, Appendix B). Several of the smaller wetlands were either created (e.g., storm water retention basins on the golf course), or are located in low-lying fill areas along the Mōkapu shoreline where wetland conditions have evolved. On MCTAB, wetland areas are primarily found in areas adjacent to Waimānalo Stream that flows through the property (Figure 17, Appendix B). There is also an area in TA-3 that exhibits the characteristics of a wetland but has yet to be formally delineated. There is a small wetland at Pearl City Annex, which may be the remnant of a former wetland in the area (Figure 36, Appendix B).

Table 7.2-1. MCBH Wetlands

Wetland	Delineation Date	Size m^2	Size ac
MCBH Kaneohe Bay			
Nu‘upia Pond Complex		454,033	112.19
Nu‘upia ‘Ekahi Pond	2002	31,413	7.76
Heleloa Pond	2002	1,369	0.34
Halekou Pond	2002	5,135	1.27
Nu‘upia ‘Elua Pond	2002	2,704	0.67
Nu‘upia ‘Ekolu Pond	2002	247,747	61.22
Nu‘upia ‘Eha Pond	2002	12,036	2.97
Kaluapuhi Pond	2002	47,301	11.69
Pa‘akai Pond	2002	96,233	23.78
Nu‘upia Hema (named in 2015)	2002	10,095	2.49
Hale Koa	2009	8,048	1.99
Sag Harbor	2009	2,838	0.70
Klipper Ponds	2002	7,895	1.95
Temporary Lodging Facility (TLF)	2002	3,402	0.84
Salvage Yard	2002	38,927	9.62
Motor Pool	2002	5,212	1.29
Percolation Ditch	2009	8,642	2.14
Subtotal MCBH Kaneohe Bay		528,997	130.72
MCTAB			
Puha ‘Ekahi	2002	3,937	0.97
Puha ‘Elua	2009	4,901	1.21
Puha ‘Ekolu[1] (renamed in 2016)	2002	1,368	0.33
Subtotal MCTAB		10,206	2.51
Pearl City Annex			
Pearl City Annex Wetland	2016	443	0.11
Subtotal Pearl City Annex		443	0.11
TOTAL MCBH		**539,646**	**133.34**

Wetland boundaries are documented through field surveys that delineate new or changed boundaries. In partnership with the USACE, MCBH parcels have been surveyed and jurisdictional wetland boundaries have been delineated (Ching 2002, 2010, 2017). The most recent surveys delineated the NIKE site[2] wetland (Bellows AFS property)[3] and a small wetland at Pearl City Annex (Sections 6.2.2 and 6.6.2). This completed an initial delineation of MCBH wetlands on all properties. As of the latest survey there are 133.34 acres of jurisdictional wetlands on MCBH properties (Table 7.2-1 and Figures 6, 17 and 36, Appendix B).

[1] Lower Waimānalo Stream Wetland (7.845 acres) was designated in 2002 as part of a MCBH project. Puha ‘Ekolu represents the small portion that falls within the MCTAB boundary along Waimānalo Stream. A majority of this wetland is on Bellows AFS property, and has since been renamed Pu‘ewai Wetland. Bellows AFS is currently working on restoring this wetland and its acreage is subject to change.

[2] This site was named after a Cold War era guided surface-to-air missile battery.

[3] This wetland delineation was performed on the NIKE site in anticipation of the property being acquired by the Marine Corps. Issues have arisen that have stalled the land transfer.

Wetland Management

Wetland management activities at MCBH focus on threat control and restoration. Due to Hawai'i's year-round growing season and the introduction of non-native invasive plant species, many of MCBH's smaller wetlands have become severely degraded, resulting in poor habitat for wildlife and limiting the effectiveness of their hydrologic functioning. Attempts are being made to restore the watershed health of these systems. A FY2015 STEP project, *Wetland Restoration Plan* (HI2CONWLC2245694303), to be accomplished over the next ten years, involves restoring and enhancing five wetlands at MCBH Kaneohe Bay and MCTAB (Objective 7.2.2).

Wetlands have been a focus of management concern by both the Marine Corps and the Air Force at Bellows. The 'core' area of mangrove infestation, with the largest concentration of mature mangrove trees, was found in the Bellows AFS wetland known as Pu'ewai, located in the lower reach of Waimānalo Stream. Set forth as a conservation measure in a 2009 USFWS Biological Opinion issued in response to formal ESA Section 7 Consultation for a wildlife control operation at JBPHH, Bellows AFS is restoring the Pu'ewai Wetland to provide additional foraging, loafing, and nesting habitat for Hawaiian waterbirds and improve storm water conveyance. Between 2004 and 2013 Bellows AFS removed all of the mangrove (approximately 4.7 acs) in this wetland. A wetland restoration project is underway consisting of hydrological studies, wetland engineering (excavation of fill and regrading of channel bottom and banks), and native revegetation. A management plan will be implemented upon completion of the restoration project that includes vegetation modification, predator control, waterbird monitoring, and an avian botulism surveillance response plan (Bellows AFS 2013). Given that the Pu'ewai Wetland had been a significant source of mangrove seeds for infesting the banks of Waimānalo Stream within MCTAB, this restoration should have a positive impact on the Waimānalo Stream ecosystem.

Threats to MCBH wetlands can originate from MCBH activities and activities of adjacent off-Base land owners. A variety of factors can contribute to wetland degradation and loss on MCBH properties including:

- invasion by invasive plant species,
- use by non-native feral animals (pigs),
- structures or parking areas being built too close to a wetland,
- changes to hydrology as a result of a change in surrounding land use,
- polluted runoff.

Conducting invasive plant and feral animal control to reduce degradation of wetlands is a primary management objective of the Natural Resources staff. For example, feral pigs are attracted to MCTAB wetlands for wallowing and foraging. Specific threat reduction actions for invasive animal species at MCBH wetlands are detailed in COA 7.1. Control of non-native animals is conducted by USDA Wildlife Services personnel.

For invasive plant species, specific threat reduction actions are discussed in COA 7.5. Mangrove re-infestation, although greatly reduced, remains a threat to wetlands at MCBH Kaneohe Bay and MCTAB. Mangrove restricts water flow, fills in shallow ponds, degrades water quality and wildlife habitat, and augments upstream flooding risk and health risks. Native plants are often threatened by encroachment of rapidly growing non-native invasive plants such as California grass (*Urochloa mutica*) and water lilies (*Nymphaea* sp.). California grass grows aggressively, smothering native vegetation along the banks. Water lilies form dense mats in the open water and California grass also grows over open water, reducing flood water storage and open water habitat.

Evaluating potential changes to hydrology as a result of changing land use is most often addressed as a part of the Base's environmental review process. This requires current wetland delineations. Opportunistic monitoring of wetlands for water quality, vegetation (native/invasive), and use by waterbirds provides important information on the effectiveness of MCBH's management efforts and the need to adjust through adaptive management.

Wetland management in certain areas is constrained. A portion of the Salvage Yard Wetland is off-limits to AAV use for Mud Ops due to PCB contamination (Section 6.1.2; Figure 6c, Appendix B). Areas within the larger Nu'upia Ponds wetland complex are limited access as a result of chemical contaminants and munitions and explosives of concern (Section 6.1.2; COA 7.5; Figure 7a & 7b, Appendix B).

IMPLEMENTATION

GOAL 7.2: Wetland Management

Protect, enhance, and restore MCBH wetlands from loss or degradation to the maximum extent possible, consistent with the military mission and Federal wetland laws and regulations.

The set of objectives and projects/actions described below is designed to help reach Goal 7.2. The rationale and background for the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

Objective 7.2.1: Identify, delineate, characterize, and monitor wetlands.

Since 2002 MCBH has contracted USACE to identify and delineate wetlands on MCBH properties for the purpose of assessing jurisdictional waters of the United States. The wetland survey reports contain descriptive narratives, tables and photographs; detailed data on the hydric soil, water, and vegetation characteristics of each wetland; GIS files on wetland boundaries and associated data; and documentation of USACE wetland verification (Ching 2002, 2010, 2017). The reports are held with the MCBH Environmental Department, Natural Resources section or at the office of the USACE, Pacific Oceans Division, Fort Shafter, Hawai'i. MCBH updates wetland boundaries and performs new wetland delineations where appropriate, with priority for wetlands that are threatened by future construction or other land use changes, or that have been impacted by natural events.

Monitoring wetlands allows Natural Resources staff to identify issues and plan management activities. Short-term monitoring is often programmed as part of a restoration and enhancement project. Over the long-term, wetland monitoring is incorporated into routine Natural Resources staff activity. Monitoring supports MCBH's compliance with regulations requiring that jurisdictional wetlands are properly managed and maintained and that habitat for resident endangered waterbirds is sustained.

PROJECTS

Wetland Inventory and Delineation – Nu‘upia Ponds and MCTAB (STEP – programmed)

This project will update the USACE delineated wetland boundaries at Nu‘upia Ponds and MCTAB. By 2019, it will have been almost 20 years since the last delineation was performed at Nu‘upia Ponds. Although the ponds are within a protected WMA, they are subject to on-going threats such as climate change resulting in sea level rise and encroaching invasive plant species. This project will assess the health and vitality of the wetlands and inventory vegetation and wildlife found within the wetlands. It will overlap with the planned wetland restoration, Project HI2CONWLC2245694303.

Objective 7.2.2: Implement wetland management and enhancement opportunities.

There is a need to continue to work with planners, operators, and others to pursue *MCBH Strategic Plan*, *MCBH Master Plan*, and INRMP objectives so that wetland functions and values are protected, enhanced, and sustained. Wetland management involves identifying threats and implementing strategies to address them. Success of wetland restoration projects depends on the on-going ability to control invasive plants, minimize human disturbance, conduct regular predator trapping, and regularly monitor waterbird populations and wetland function.

PROJECTS

Wetland Restoration Plan – MCBH Kaneohe Bay and MCTAB (STEP – in progress)

A *Wetland Restoration Plan* was funded in FY2015 to evaluate five wetlands at MCBH Kaneohe Bay (Nu‘upia Hema, Salvage Yard, Motor Pool, and Hale Koa) and MCTAB (Puha ‘Ekahi) for opportunities to enhance habitat for endangered waterbirds, improve water circulation, capture storm water run-off, and restore native wetland vegetation (Project HI2CONWLC2245694303). Wetland characteristics, including the presence of contaminants, groundwater depth and salinity, and surface water salinity will be assessed. Vegetation surveys focus on invasive species that will be targeted for removal, with the intent of replacing them with native wetland plants.

The plan will evaluate site conditions (salinity and hydrology) for ‘ideal’ wetlands to help inform desired conditions for restoration. It will also investigate actual site conditions of wetlands that are targeted for restoration. In particular, the availability of fresh and saline water via groundwater or runoff will be a determining factor in the development of restoration options. Concept designs will be developed that include approximations of size, depth, slope, layout, and amounts of material (soil or fill) to be moved and/or disposed. Survey grade designs for each wetland will be developed if/when restorations are implemented. Costs will be estimated based on design parameters, along with an evaluation of the presence/absence of contaminants.

Initial funding only provided for a 35% restoration design for two wetlands (Nu‘upia Hema and Salvage Yard). Implementation (design/build) funds will be requested upon completion of 35% restoration designs. In addition to an EA, the main permitting requirements for wetland restoration are CWA 401 and 404 permits. Permits will be acquired as part of the implementation.

Nu‘upia Hema and Salvage Yard Wetland Restoration Environmental Assessment (STEP – programmed)

An EA will be completed to meet NEPA compliance requirements prior to conducting restoration efforts at Nu‘upia Hema Wetland and Salvage Yard Wetland.

Nu‘upia Hema Wetland Restoration (STEP – programmed)

The Nu‘upia Hema Wetland Restoration project expects to restore wetland functions, including creating better habitat to support migratory and endangered birds, by clearing accumulated sediment from the wetland, removing invasive weeds, establishing native plants, and improving water circulation with the Nu‘upia Ponds Complex. The project will include an evaluation of redirecting off-Base storm water discharge into Nu‘upia Hema. Currently storm water from the surrounding ‘Aikahi community and the City and County of Honolulu wastewater treatment plant discharges directly into Nu‘upia Ponds, allowing debris, contaminants, and invasive plants and algae to enter the ponds. Rerouting the discharge into Nu‘upia Hema would provide freshwater to support endangered waterbird habitat. The wetland is better able to absorb contaminants and sewage spills that find their way into the storm water system.

A design/build project is planned to implement wetland restoration in Nu‘upia Hema Wetland based on the 35% design developed in Project HI2CONWLC2245694303. As part of this project the contractor will prepare draft permit applications in conjunction with the 100% design submittal. Permits will be submitted by the government.

Salvage Yard Wetland Restoration (STEP – programmed)

The Salvage Yard Wetland Restoration project plans to restore coastal wetland functions, including creating better habitat to support endangered and migratory birds, by clearing some soil from the wetland, removing invasive weeds, and introducing freshwater into the northern end of the wetland.

A design/build project is planned to implement wetland restoration of the Salvage Yard Wetland based on the 35% design developed in Project HI2CONWLC2245694303. As part of this project the contractor will prepare draft permit applications in conjunction with the 100% design submittal. Permits will be submitted by the government.

Motor Pool, Hale Koa, and Puha ‘Ekahi Wetland Restoration Design (STEP – in planning)

Develop 35% restoration designs for three additional wetlands (Motor Pool, Hale Koa and Puha ‘Ekahi). Details will be informed by work on similar projects.[4]

Motor Pool Wetland Restoration Environmental Assessment (STEP – in planning)

An EA will be completed to meet NEPA compliance requirements prior to conducting restoration efforts at the Motor Pool Wetland.

[4] Implementation of wetland restoration efforts will be programmed at approximately three year intervals, as funds become available. In addition to planning funds, each wetland restoration may require an EA and design/build funding. Subsequent to the projects outlined herein, Hale Koa Wetland and Sag Harbor Wetland (MCBH Kaneohe Bay) and Puha ‘Ekahi Wetland (MCTAB) will be targeted.

Motor Pool Wetland Restoration (STEP – in planning)

The Motor Pool Wetland Restoration expects to restore wetland functions, including creating better habitat to support migratory and endangered birds, by clearing accumulated sediment from the wetland, removing invasive trees and grasses, establishing native plants, and restoring hydrological functioning.

A design/build project is planned to implement wetland restoration of the Motor Pool Wetland based on the 35% design developed in Project HI2CONWLC2245694303. As part of this project the contractor will prepare draft permit applications in conjunction with the 100% design submittal. Permits will be submitted by the government.

Repair/Replace Aeration System and Install Waterline in Klipper Golf Course Ponds (STEP – programmed)

Several decades ago three water catchment systems were constructed to reduce flooding on Klipper Golf Course. They have evolved over the years into habitat for three endangered waterbirds (Hawaiian coot (*Fulica alai*), moorhen (*Gallinoula chloropus sandvicensis*), and koloa), and have also been delineated as jurisdictional wetlands. The golf course ponds were improved in 2001 by a project that dredged all three ponds to remove sediments and invasive plants; sought to reduce flooding on adjacent fairways; improved water circulation in the ponds; and improved waterbird habitat using native and culturally significant plants.[5] On-going management seeks to maintain the health of the pond's ecosystems and ensure that they continue to function as storm water retention basins, healthy wetlands, and endangered and migratory bird habitat.

Since the original project, some issues have arisen that affect pond functioning. Due to their design, the ponds rely solely on drainage from the golf course as their water source. However, this is not always viable since in low rain years the water levels drop, leaving only exposed mud in the ponds. A water line needs to be installed to provide a means to control the water levels in the ponds. Even in years when water levels are adequate, the ponds become stagnant without aeration. The stagnant low water levels can create conditions suitable for avian botulism, a paralytic disease of waterbirds caused by ingestion of a toxin. The existing aeration system has failed and needs to be replaced with more modern equipment. This project will replace the aeration system and install a pipe to provide water during low water events.

Control California Grass Using Salt Water in Percolation Ditch (STEP – in planning)

The *Wetland Restoration/Percolation Ditch Replacement* project was completed in 2007. The improvements reduced flood risk in the CLB-3 motor transport parking lot and created a more attractive environment that has seen increased use by endangered and migratory waterbirds, as documented in waterbird surveys. However, invasive plants are out-competing native plants installed as part of the project, diminishing bird habitat quality and reducing flood storage capacity. Natural Resources staff continue to manage invasive California grass and water lily encroachment into this wetland, as well as Christmasberry (*Schinus terebinthifolius*) and koa haole (*Leucaena leucocephala*) along the banks, by manual (volunteers), mechanical (AAVs), and chemical means (e.g., AquaMaster®, Habitat, and application techniques approved for use in Hawai'i's wetlands). These plants have been held in check with the use of approved

[5] The *Restore Endangered Waterbird Wetlands at Golf Course* wetland improvement project was planned, designed, and completed as part of the 2001 INRMP/EA implementation. It is further detailed in the final project report (HDA 2004) and the 2006 INRMP.

herbicides, however, due to new State regulations, continued use will require approval from HIDOH in the form of a National Pollutant Discharge Elimination System (NPDES) Aquatic Pesticides Permit.

A post-project evaluation assessed invasive species control methods and made recommendations for control alternatives (SRGII 2010). A project is planned to experiment with using saltwater in varying concentrations to supplement current control methods on these invasive, salt intolerant plants. It is surmised that California grass encroachment can be controlled by increasing the salt content of freshwater to a point where it is intolerable to California grass, but will not affect waterbird use of the freshwater in the Percolation Ditch Wetland. Attempts at obtaining DoD Legacy program and Strategic Environmental Research and Development Program grant funding to implement this project and tackle the persistent invasives failed. Although the current methods used are effective at removing California grass, this project remains under consideration as an environmentally preferable option.

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7.3 WATERSHED MANAGEMENT

MANAGEMENT ENVIRONMENT

Watersheds are the geographic area through which surface water and storm water flows across the land and drains into a common body of water (e.g., Nu‘upia Ponds, Kāne‘ohe Bay, Waimānalo Stream, or Base wetlands). They are often used as the geographic focus for delimiting areas of concern and studying impacts of natural and human activities. Watershed management is the process of implementing land use practices and water management practices to protect and improve the quality of the water and other natural resources within a watershed by comprehensively managing the use of those resources. MCBH has adopted a watershed approach, where appropriate, in managing its properties, most notably at MCBH Kaneohe Bay and MCTAB within the Ko‘olaupoko region of windward O‘ahu. Using a watershed approach ensures that the whole ecosystem is protected. More specifically, watershed management focuses on the condition of and potential impacts to areas including Nu‘upia Ponds, the MCDC, and Ulupa‘u Crater at Kaneohe Bay, and the three streams that pass through MCTAB (Waimānalo, Inoa‘ole, and Kahawai).

Mismanagement of watersheds can result in nonpoint source pollution (e.g., sediment laden runoff or contaminants), impaired streams, and habitat degradation. The problems affecting MCBH involve land-based erosion, stream degradation, nonpoint source pollution due to urban runoff and construction activities, and hydrologic modifications from dredging. Comprehensive solutions that consider downstream impacts are necessary when developing and implementing water quality protection and restoration actions.

Policies

Watershed management, in its most comprehensive sense, is a continuous process of information gathering, analysis, stakeholder interaction, action, and response evaluation. As described in the Unified Federal Policy (UFP) for a Watershed Approach to Federal Land and Resource Management, Notice of Final Policy, (October 18, 2000, 65 FR 62566), a watershed approach is “a framework to guide watershed management that: (1) uses watershed assessments to determine existing and reference conditions; (2) incorporates assessment results into resource management planning; and (3) fosters collaboration with all landowners in the watershed.” As defined in the UFP, a watershed assessment is “an analysis and interpretation of the physical and landscape characteristics of a watershed using scientific principles to describe watershed conditions as they affect water quality and aquatic resources.” Watershed condition is “the state of the watershed based on physical and biogeochemical characteristics and processes (e.g., hydrologic, geomorphic, landscape, topographic, vegetative cover, and aquatic habitat, water flow characteristics and processes (e.g., chemical, physical, and biological) as it affects water quality and water resources.” The UFP states that Federal agencies “will develop a science-based approach to watershed assessment for Federal lands. Watershed assessment information will become part of the basis for identifying management opportunities and priorities and for developing alternatives to protect or restore watersheds” in so far as existing “missions, funding, and fiscal and budgetary authorities permit”.[1]

Natural Resources staff systematically incorporate elements of watershed management into INRMP projects and into review of facilities and training area improvement projects funded by other Base departments. These efforts are consistent and compliant with Federal regulations and DoD and Marine

[1] Details on ecosystem management and a watershed approach are included in Appendix A2. Section 8 demonstrates consistency of MCBH watershed initiatives with related Federal and State initiatives.

Corps directives encouraging installations to follow an ecosystem-based watershed approach to managing shared natural resources in the regions within which MCBH properties are located. These approaches are inherently interdisciplinary, combining perspectives from multiple scientific disciplines with those from local, historical, managerial, and maintenance experience, to address the need to sustain multiple uses of an area, including military training.

Watershed Management

INRMP projects address watershed-wide concerns that affect quality of life for all residents, as well as the sustainability of military training areas and species of conservation concern. Nonpoint source pollution, sediments, contaminants, and excess freshwater in storm water runoff and overland flows from impervious urban surfaces flow into the sea, threatening human health and marine life, and degrading endangered species habitat. MCBH monitors various conditions within the watershed (e.g., erosion hotspots, groundcover, pollutant sources, and runoff patterns) to help assess overall watershed health and prevent adverse impacts to aquatic resources and the marine environment.

BMPs to improve watershed health and to protect watershed resources need to be incorporated into all flood control, repair, maintenance, and construction activities in both developed and undeveloped landscapes at MCBH properties. BMPs involve, for example, preserving greenspaces to improve storm water retention, reduce flood potential, and increase biofiltration. Control of erosion and runoff from heavily used and disturbed sites is another approach to reducing nonpoint source pollution. Implementation of BMPs and better storm water management is an important step toward recovering natural watershed functions, such as improved water flow and water quality in streams, channels, coastal wetlands, and marine waters within which MCBH personnel live, work, and recreate.

Natural Resources staff works with the Facilities Department, O&T Directorate, MCCS, contractors, and others to promote consistent implementation of watershed BMPs. As evidenced by the following recent projects, MCBH continues to make progress in characterizing flooding, sediment-laden runoff, and land-based erosion problems on a watershed scale and implementing solutions in a phased, geographically-focused approach.

Waimānalo Stream Restoration. Waimānalo Stream, which flows through MCTAB after draining upland, off-Base areas, has benefited from watershed management activities. The stream was channelized by the USACE in the late 1930s/early 1940s. The excavated material was placed on the stream bank, which made the MCTAB side of the stream significantly higher than the opposite stream side, and effectively destroyed the natural floodway. FY12 Project HI2009C10EC0992, Waimānalo Stream Floodway Restoration was completed in December 2014, partially restoring watershed functioning, including increasing flood storage (Figure 19, Appendix B). The restoration project excavated and recontoured approximately 1.5 acres adjacent to the bank of Waimānalo Stream. Native vegetation (e.g., sedges, grasses, naupaka) was planted on the site to protect the ‘naturalized’ stream bank from erosion and enhance the habitat for native waterbirds. While the floodway is functioning as designed, the native vegetation was overwhelmed by non-native invasive plants from the surrounding area due to an unusually wet summer in 2015.

Waimānalo Stream Maintenance Dredging. A Facilities Department maintenance dredging project will begin in 2017 to remove accumulated sediments and vegetation along a 2,500 ft stretch of Waimānalo Stream (Figure 19, Appendix B). The goal is to remove built-up sediments, urban and agricultural debris, and non-native invasive plants constricting the Waimānalo Stream channel to reduce flood risk to adjacent neighbors and restore stream hydraulic capacity. While the clogged stream causes flooding issues with Olomana Golf Course, the invasive grasses encroaching on the stream provide some foraging and nesting

habitat for the endangered moorhen. The reduced stream flow capacity also prevents upstream debris from flowing into Waimānalo Bay and onto the offshore coral reefs, which will require additional management actions to control. Maintenance dredging will occur as needed.

IMPLEMENTATION

GOAL 7.3: Watershed Management

Use an ecosystem-based watershed approach to manage issues involving water quality, erosion, and flow/flooding on MCBH lands associated with streams, channels, land cover and drainages.

The set of objectives and projects/actions described below is designed to help reach Goal 7.3. The rationale and background for the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

Objective 7.3.1: Inventory and monitor watershed conditions.

Healthy watersheds require addressing multiple resource objectives. Maintaining water resource integrity is critical to the functioning of a healthy watershed. Water resource integrity is dependent on chemical variables, biotic factors, flow regime, and other factors. Monitoring allows Natural Resources staff to identify issues and plan management activities. Short-term monitoring is often programmed as part of an enhancement project. Over the long-term, watershed monitoring is incorporated into routine activities by Natural Resources staff. This includes long-term effectiveness monitoring to evaluate BMPs and improve designs for future uses. Follow-on actions are programmed in response to identified problems.

ROUTINE MANAGEMENT ACTIONS

Monitoring of General Erosion Conditions and Hot Spots. Natural Resources staff monitors general erosion conditions throughout MCBH properties as part of regular duties. Known erosion hot spots, such as areas within Ulupa‘u Crater, are checked regularly to determine if erosion is occurring and to what degree. An Environmental Compliance Engineer is responsible for monitoring erosion hot spots to meet conditions listed in the Base’s CWA, Section 404, Storm Water Permit.

PROJECTS

Water Quality and Ecosystem Health Monitoring of Nu‘upia Ponds (STEP – in planning)

Nu‘upia Ponds is an important wetland complex within the Mōkapu Central Watershed and the larger Ko‘olaupoko regional ecosystem that has long been a focus of MCBH natural resources management efforts. Numerous studies were conducted in the 1980s-1990s to characterize the health of the pond system (AECOS Inc. 1983, 1985; R.M. Towill Corporation 1995; Cox and Jokiel 1997). A consolidated analysis of these studies is needed to see if a baseline for water quality of the ponds can be obtained. This project will also assess current water quality of Nu‘upia Ponds. Since it is a partially closed system, pollutants, contaminants, debris, and invasive plants and marine life that enter the ponds are not readily flushed out.

The water circulation and flow regime will be assessed to determine the natural flushing ability of the ponds. Results can be compared to past and future data to determine what direction the health of the ponds may be trending.

While water quality only provides a partial picture of the health of the ponds, it will identify items of possible health risk and serve as an indicator of unhealthy conditions external to Nu‘upia Ponds that affect the pond ecosystem. Examples of situations that could affect water quality are:

- In 2014 CCH began construction of a several miles long sewer tunnel from Kailua to Kāne‘ohe. The construction of the tunnel began about 80 feet below ground level, was about 15 feet in diameter, and bored through solid rock. The tunnel encountered groundwater that needed to be discharged at a rate of about 0.5-2M gpd. The water (primarily fresh, but containing contaminants) was discharged into the hyper-saline environment of Nu‘upia Ponds. No study was conducted to determine if the discharge would have detrimental short or long-term effects on the Nu‘upia Ponds ecosystem, the resident endangered birds, or the human health of the Natural Resources staff and the volunteers that conduct projects in the ponds. After discussions between the Base, CCH, and their contractor, the discharge location was changed to a vegetated area southeast of Nu‘upia ‘Ekolu. Once the sewer tunnel project is complete, all piping will be removed. Once the discharge into the ponds was stopped, water and sediment chemistry and biological analyses were conducted in Nu‘upia Ponds.
- Infrequent spills of partially treated sewage from the CCH Wastewater Treatment Plant that adjoins the Kaneohe Bay property have flowed into Nu‘upia Ponds, conveyed by a storm water channel shared by the Base and the treatment plant.
- Debris and contaminants entering MCDC via the storm drain system that drain housing and Base administrative areas flow into Nu‘upia Ponds or into Kāne‘ohe Bay.
- Overland flow of nonpoint source pollution (e.g., sediments, pollutants) into Nu‘upia Ponds.
- Invasive algae from Kāne‘ohe Bay introduced into Nu‘upia Ponds.

Assess Natural Resources Status of Waikane Valley (STEP – in planning)

MCBH conducts minimal basic natural resources stewardship responsibilities at Waikane Valley.[2] A reconnaissance survey of Waikane Valley, including surveying for sensitive biological species in areas where munitions clean-up was scheduled to occur and a rapid bio-assessment of stream conditions, was completed as part of the MMRP (AECOS 2010). Due to the concern of unexploded ordinance washing down from the valley walls onto the valley floor, and the fact that no training is conducted or recreational activities are permitted, infrequent visits (once a year) by Natural Resources staff occur. Until the project goals and objectives are more fully developed, routine management will consist of maintaining a general awareness of the condition of the watershed including erosion, invasive and native plants, wildlife, feral pigs, etc.

[2] While Waikane Valley has been ‘closed’ and transferred to the MMRP (Sections 4.3.3 and 8.1.16) for final clean up action and ultimate decisions on future disposition, there are natural resources assets and threats that remain at risk or could become a risk. There is regular monitoring/enforcing of access restrictions in the valley by MCBH Military Police and CLEOs.

Objective 7.3.2: Conduct management and enhancement activities that promote watershed health.

There is a continuing need to explore opportunities for and implement restoration activities that enhance watershed health.

ROUTINE MANAGEMENT ACTIONS

Regular Monitoring and Cleaning of the Mōkapu Central Drainage Channel (MCDC). The MCDC on Mōkapu Peninsula is a major water feature that drains the central part of the Base. A lot of rubbish ends up in the MCDC, inadvertently and intentionally. Although a restoration project accomplished many environmental and engineering goals (using native plants, installing erosion controls, widening the channel to handle flood waters), maintenance is required to ensure that the channel continues to perform necessary functions. Monitoring identifies problems (e.g., pollution, invasive species, debris), and periodic clean-ups are conducted to remove debris. A separate project is being considered to investigate ways to capture the debris that accumulates in the MCDC, to avoid it ending up in Nu‘upia Ponds or Kāne‘ohe Bay.

Design/Study for Developing Solutions for Managing Stream Debris in Waimānalo Stream (MCTAB) and the MCDC (Kaneohe Bay) (STEP – in planning)

Stream debris is an on-going problem in Waimānalo Stream (MCTAB) and the MCDC (Kaneohe Bay). In addition to vegetation and woody debris, these waterways accumulate deliberately dumped items such as random household goods (e.g., clothing, furniture, appliances, and bicycles).[3] Debris can clog stream channels, increase flooding risk, damage infrastructure, pollute waterways, and alter habitat. Debris, including trapped sediment, can end up on coral reefs where it threatens marine habitat. It is costly to remove. This project will analyze the types of debris impacting the waterways and off-shore resources. It will investigate ways to capture and facilitate its removal.

Sediment Dredging – Nu‘upia ‘Ekahi (STEP – in planning)

Deep sediments have built up in Nu‘upia Ponds, especially in the southwest corner of Nu‘upia ‘Ekahi. Some of the sediments were trapped by mangrove that were removed years ago, and some sediments can be sourced to more recent surface run-off. The deep sediments degrade the pond environment, cause a foul odor, provide a medium for mangrove seed pods to get established, and create hazardous conditions for Natural Resources staff and volunteers working along the edge of the pond. It is dangerous to work (e.g., invasive species removal, biotic surveys) in the pond as the sediments can be four or more feet deep in some areas. This project will dredge Nu‘upia ‘Ekahi to improve habitat conditions, reduce odors, and provide safer accessibility.

[3] Numerous clean-up events of the MCDC have produced a significant amount of household items (toys), items from nearby barracks (shoes, sports equipment, desks, chairs, TVs, bicycles, ironing boards), and commercial debris (shopping carts, stanchion pipes with concrete bases, BBQ grills), as well as hundreds of discarded plastic and glass bottles and aluminum cans.

Control of Surface Runoff and Erosion (STEP – in planning)

Surface runoff and erosion from the Ulupa‘u Crater impact site has the potential to cause sedimentation that impacts coral reefs and the quality of off-shore waters below Kaneohe Bay RTF in the vicinity of Fossil Beach (Figure 13a, Appendix B). This project will design and implement solutions to control erosion and sediments flowing off-site. Since digging is limited in the impact area, solutions will be located above ground (e.g. berms to redirect water flow, coir logs, Vetiver grass to stabilize eroded areas, catchment basin to capture and filter run-off).

7.4 COASTAL AND MARINE RESOURCES MANAGEMENT

Change in Organization. This section has been revised to include fish and other forms of marine life associated with the hypersaline Nu'upia Ponds, formerly included in COA 7.1: (Fish and) Wildlife Management. This change was made to more accurately differentiate the management of terrestrial versus marine resources.

MANAGEMENT ENVIRONMENT

The extensive geographic scope of MCBH's coastal and marine resources' responsibility is located primarily at Mōkapu Peninsula (MCBH Kaneohe Bay) with 11 miles of coastline and the hyper-saline Nu'upia Ponds. It also includes approximately one mile of Waimānalo Bay's coastline at MCTAB and about 0.6 miles of coastline at Pu'uloa RTF. Kaneohe Bay's primary coastal and marine resource responsibilities extend seaward from the Mōkapu Peninsula shoreline out to 500 yards (Figure 2, Appendix B). Within the 500 yard buffer zone, MCBH claims control to all access and resources found within the water column and benthic areas.[1] MCBH also has responsibility to police and manage any potential adverse impacts of its military training, recreational, construction, or other activities on shoreline features and processes and marine natural resources found in this zone, as well as in the marine areas affected during amphibious transits between MCBH Kaneohe Bay and MCTAB, or during ship-to-shore maneuvers at MCBH Kaneohe Bay and MCTAB.

Ship-to-shore training maneuvers at coastal areas of MCBH properties are crucial to enhancing and sustaining military readiness. Military readiness depends on being able to conduct forcible entry from the sea. Sustaining the ability to train in the littoral zone requires knowledge of MCBH's significant natural resources within the coastal and marine zones. The offshore maritime ecological zone within MCBH's littoral area includes coral reef, benthic, and pelagic areas and their associated marine and transitory species (e.g., Federally-listed endangered Hawaiian monk seals and threatened and endangered sea turtles, State-listed endangered humpback whales, and Federally-protected spinner dolphins) in adjacent bays and/or the open ocean.

Marine Life. A primary component of MCBH's coastal and marine resource management focuses on managing the marine life, which includes native invertebrates, fish, reptiles, and marine mammals, some with endangered or threatened status. Protected species that directly benefit from active conservation and management by MCBH include humpback whales that seasonally migrate through littoral waters surrounding the Mōkapu Peninsula, Hawaiian monk seals and sea turtles that utilize beaches and off-shore areas, and at least 16 species of native fish found in the Nu'upia Ponds. See Appendix C1 for known marine species in MCBH waters.

Coral Reefs. Coral reefs are one of the oldest forms of life on earth. Coral reefs buffer the land and coastal environment from the ocean, mitigate destructive wave action that causes shoreline erosion, provide natural harbors, and are home to one-quarter of the world's fish species. The natural breakdown of coral provides sand for beaches, and coral reef plants and animals are important sources of new medicines. MCBH's coastal and marine resources management responsibilities focuses on protecting and preserving Hawai'i's unique coral reef ecosystem and the need for MCBH to enhance this resource. Avoiding adverse effects that would counteract the countless benefits provided by having healthy coral reef ecosystems in the region is a critical component of managing our marine resources. MCBH's concern for the health and appropriate

[1] Authority is found at 18 USC 1382 and Executive Order 8681 of February 1941.

management of the surrounding coral reef ecosystem is heightened by the facts that: (a) EO 13089 directs Federal agencies to protect coral reefs; (b) a large number of corals within Hawai'i's reef ecosystems are endemic species; (c) MCBH is the only Marine Corps installation with coral reef ecosystems within its management jurisdiction; (d) the coral reef ecosystem of Kāne'ohe Bay adjacent to Mōkapu Peninsula is unique and scientifically important; and (e) inadvertent fuel spills, military vessel groundings, and aircraft crashes can and have occurred on occasion for which MCBH plays an important role as a first responder, assists in cleanup, and unfortunately is sometimes the causative entity. In 2014, NOAA Fisheries completed the *Final Listing Determinations on Proposal to List 66 Reef-building Coral Species;* no Hawai'i corals were listed, but several remain as species of concern.

The coral reefs within the greater Kāne'ohe Bay ecosystem region, of which Mōkapu Peninsula is a part, are among the most unique, studied, scientifically valued, and prominently regarded marine ecosystems in Hawai'i. Kāne'ohe Bay is the only bay in the Hawaiian archipelago that contains all three types of reefs: fringing, patch, and barrier (D. Gulko, pers. comm.; and Shafer et al. 2002). Kāne'ohe Bay contains marine life that is rare or unique and of particular management concern to MCBH resource managers. This includes the endemic corals *Montipora flabellata*, *Montipora patula*, and *Porites duerdeni*, as well as rare species that have been documented within the buffer zone such as endemic sea grasses (*Halophila hawaiiana*) and sea horses (*Hippocampus kuda*).[2] *Lingula reevii,* a brachiopod known to occur in shallow, sandy reef flats in Kāne'ohe Bay, and *Montipora dilitata*, a rare, endemic coral, have been recorded in areas adjacent to the 500-yard security buffer zone. Both *Lingula reevii* and *Montipora dilitata* are listed by NOAA Fisheries as Species of Concern.

Marine Resources Surveys. In 2003 MCBH initiated the first comprehensive and detailed surveys of its marine resources at Kaneohe Bay (USFWS 2008a; USFWS and USGS 2013) (Figure 9, Appendix B). In 2013 surveys of the coastal waters at MCTAB were initiated – the final survey report is expected by May 2017 (Section 6.1.3 & 6.2.3; Figure 20, Appendix B). The surveys are coordinated by USFWS and involve an experienced, interdisciplinary, interagency team of marine biologists from Federal and State agencies (e.g., USFWS, NOAA Fisheries, USGS, and Hawai'i DLNR). They follow an ecosystem-based approach, which uses qualitative and quantitative methods to identify and spatially locate marine communities, habitats and features, providing a working knowledge of specific types and locations of coastal and marine resources within MCBH jurisdiction. Photo-documentation provides clues to the current health and abundance of marine resources as well as the threats and risks. Results enhance the ability to forecast, measure, and mitigate potential impacts due to military training exercises, development, and recreational activities. The information is valuable for assisting with regulatory reporting and managing response to spills or other potential threats. For example, the training area at MCTAB includes beach frontage bordered by open water that is extremely valuable to amphibious operational training. It is heavily used during RIMPAC exercises to support LCAC (Landing Craft Air Cushioned, *a.k.a.* hovercrafts) landings, and affords training for the Marine Corps' Special Operation force's rigid-hulled inflatable boats (*a.k.a.* Zodiacs or RHIBs) and 3d Marines Combat Assault Company's AAVs. The MCTAB survey provides a picture of the underwater environment so in-water training and ship-to-shore movements can be planned so as not to impact marine resources, thus avoiding incidents that could shut down training. The results will also assist in rapidly identifying resources in the area that may be impacted should an incident occur. Additionally, the surveys help identify opportunities for habitat restoration (i.e., removal of leather mudweed (*Avrainvillea amadelpha*), a highly invasive non-native algae) that may be accomplished by MCBH or outside entities (with permission).

[2] See Figure 9, Appendix B; Table C1 Species Inventory; and USFWS 2008a and USFWS and USGS 2013.

Policies

A set of policies protect resources within MCBH's coastal and marine environment.

Kaneohe Bay 500-yard Buffer Zone. Boats within the 500-yard buffer zone are subject to inspection by Military Police, CLEOs, or Waterfront Operations harbor patrol personnel at any time without notice.

Marine Life Protection. MCO 5090.2A Section 11200.1.e states that "The Marine Corps shall apply stewardship to non-installation natural resources, including marine mammals, coral reefs, land, and water potentially affected by Marine Corps military training and testing." MCBH coordinates and consults with NOAA Fisheries, USFWS, and Hawai'i DLNR on management of marine fish and wildlife and their habitats. Protection for marine life is provided by the ESA, the MMPA, and Essential Fisheries Habitat (EFH) as designated under the amended Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). State marine laws are governed by Hawai'i DLNR under HAR Title 13. A recent update to State laws protecting marine life is the additional restrictions that have been placed on large-scale commercial harvesting of sea cucumbers (HAR §13-86.1).

Critical Habitat Designations. Critical habitat is the geographic area that contain features essential to the continued existence of a threatened or endangered species and that may require special management and protection. The ESA allows military lands to be excluded from being designated critical habitat if a military installation's INRMP demonstrates it provides a conservation benefit to the species as determined by USFWS or NOAA (ESA Section 4(a)(3)) and the INRMP provides certainty that the conservation measures will be implemented. MCBH documents the presence of protected marine species and the areas they use. Management actions are undertaken to ensure protective measures to support the continued health and viability of Hawaiian monk seals and sea turtles. These actions include and are detailed in standard response procedures to be followed in the event of a Hawaiian monk seal or sea turtle occurrence at MCBH, procedures to be followed to avoid contact during military maneuvers and large scale recreational events, and ongoing conservation measures for enhancing the protection of Hawaiian monk seals and sea turtles at MCBH (Appendix C2 & D5). All procedures and conservation measures were developed following NOAA Fisheries' recommended BMPs to protect Hawaiian monk seals and the USFWS' conservation measures to protect sea turtles.

Hawaiian Monk Seal. The final rule designating Hawaiian monk seal critical habitat was issued in June 2015 (Section 6). It states that conservation measures implemented under the *MCBH INRMP* preclude designating critical habitat from the high high water mark on the beach out to the 500-yard buffer zone surrounding Kaneohe Bay. Pu'uloa RTF beach is precluded from critical habitat designation for the same reason as Kaneohe Bay's beaches. The waters seaward of Pu'uloa RTF fall within the jurisdiction of the Navy and are covered by their INRMP. MCTAB's terrestrial environment (shoreline) is precluded from critical habitat designation, however the waters seaward of MCTAB from mean lower low water mark to 200m depth were designated critical habitat (Appendix D6). NOAA Fisheries stated that the designation should have no impact on amphibious landings or parachute water drop operations conducted at MCTAB since most of the foraging habitat of the Hawaiian monk seal is far off-shore and at a safe depth.

Green Sea Turtle.[3] The final rule to list 11 DPSs of the green sea turtle under the ESA went into effect on May 6, 2016. The Hawai'i population, which falls under the Central North Pacific DPS, remains listed as threatened under the ESA. The final rule states that critical habitat is not

[3] NOAA Fisheries and USFWS sometimes refer to the green sea turtle as simply the green turtle.

determinable at this time and there is a need to further evaluate areas that contain physical and biological features that are essential to each DPS and may require special management considerations or protection. Because the ESA requires designation of critical habitat concurrent with a listing determination or within one year, if the determination of critical habitat requires more information, critical habitat designation will likely occur during this INRMP implementation period. The economical evaluation for the proposed designation of critical habitat for the Central North Pacific DPS is currently underway. This INRMP contains specific conservation measures implemented by MCBH to protect green sea turtles and their habitat in the same manner as protection is afforded for Hawaiian monk seals (Appendix C2 & D5).

Coral Reef Protection. The most severe threats to coral reefs stem directly from human activities and environmental factors, including the following that are leading causes of coral reef degradation:

- invasive marine species
- coastal development
- destructive fishing practices
- over-fishing and over-exploitation
- pollution, vessel groundings, and anchoring
- recreational activities
- sedimentation
- climate change.

Successful coral reef conservation requires adaptive management that responds quickly to changing environmental conditions. EO 13089 Coral Reef Protection sets forth policies by which the Federal government is directed to strengthen its stewardship of the nation's reef ecosystems and coral reefs around the world (Appendix A3). The *National Action Plan to Conserve Coral Reefs* is a detailed, long-term strategy for implementing the EO. It identifies impacts of military activities as being potentially adverse and concludes that "...every military installation whose operations may affect a coral reef ecosystem must prescribe and include protective measures in the installation's Integrated Resources Management Plan" (U.S. Coral Reef Task Force 2000).

DoD developed a *Coral Reef Protection Implementation Plan* detailing the DoD's policies, actions and programs related to coral reef conservation and protection.[4] DoD policy is "To protect U.S. and International coral reef ecosystems and to avoid impacting coral reefs to the maximum extent feasible". Identifying and reducing potential impacts on coral reef ecosystems is accomplished through a variety of mechanisms, including the use of existing programs to comply with NEPA; the Sikes Act (through the development and implementation of INRMPs); CWA; ESA; the Coastal Zone Management Act (CZMA) (through Coastal Zone Consistency Determinations); EFH requirements, the Marine Protection, Research, and Sanctuaries Act; and the River and Harbors Act.

State laws provide protection of coral reefs. HAR Chapter 13-95 prohibits taking, breaking, or damaging, with any implement, any stony coral or live rock.[5] Additionally, HRS Title 12 Section 171-58.5, prohibits the mining and taking of sand, dead coral or coral rubble, rocks, soil, or other marine deposits seaward from the shoreline or from the shoreline area. Some species of coral are Federally-protected under the ESA, although no ESA protected species are known to occur in MCBH jurisdiction. *Hawai'i's State Wildlife Action Plan* (H.T. Harvey and Associates 2015), lists all stony corals as Species of Greatest Conservation Need. While the Sikes Act requires DoD to provide for conservation and rehabilitation of natural resources on

[4] http://www.denix.osd.mil/nr/upload/dodbk5.pdf

[5] Stony corals are marine corals that generate a hard skeleton and include all reef corals. Live rock means any rock or coral to which marine life is visibly attached or affixed.

military installations, protection of coral resources at MCBH could benefit from formal policy prohibiting intentional harm to corals while engaging in recreational use.

Nonpoint Source Pollution Control. Control of nonpoint source pollution is a concern at all MCBH properties. BMPs are included in construction projects to minimize potentially harmful discharges (e.g. sediment) that reach waterways. However, MCBH does not have control over upstream, off-Base activities that may be impacting waterways on-Base (i.e., farming, illegal dumping upstream of MCTAB on Waimānalo Stream). Under the CZMA, MCBH is required to conduct its marine coastal activities consistent with the State's Coastal Zone Management Program "to the maximum extent practicable", including the development and implementation of coastal nonpoint source pollution control programs (Sections 8.2.3.2 and 8.3.2.3). Degradation has been partially controlled by the fact that Kāne'ohe Bay is zoned Class AA, the most pristine classification under the State's Water Quality Standards. New point-discharge permits into the bay are virtually impossible to attain and existing permits are stringently monitored. Both Kailua Bay and Waimānalo Bay are zoned Class A. MCBH has recently updated its *Storm Water Management Plan* that supports the promotion, development and implementation of comprehensive Base-wide practices that prevent, reduce, and eliminate pollutants in storm water discharges generated by MCBH, to the maximum extent possible. The HIDOH-approved plan identifies potential sources of pollutants and outlines measures for decreasing discharge of these pollutants (Section 8.1.11).

Climate Change. EO 13653 and DoD Directive 4715.21 direct Federal agencies to carry out assessments necessary to improve preparedness and resilience to, as well as manage risks associated with, the impacts of climate change. The directive calls for "deliberate preparation, close cooperation, and coordinated planning by the DoD to help safeguard the U.S. economy, infrastructure, environment, and natural resources" and directs DoD to take actions to enhance preparedness and resilience for the impacts of climate change. DoD Manual 4715.03 directs DoD Components to address potential impacts to changing climate conditions in INRMPs and provides a list of tools and considerations. It acknowledges that effects may be difficult to distinguish and assess, and therefore development of new and improvement of existing management strategies targeted at both physical and biological components will be an adaptive process in both the short and long-term. Additionally, NOAA Fisheries is developing guidance for treatment of climate change as it affects endangered marine species. These factors mean that MCBH needs to be making its INRMP include more robust looks at climate change, potential mitigation measures, and adaptive management related to listed or candidate species that are sensitive to the effects of climate change (pers. comm., HQMC LF, S. Goodfellow, Nov 2016). USFWS is not currently developing similar guidance; however, in the future it is likely MCBH will need to address climate change impacts as part of its Section 7 consultations.

Threats to Coastal and Marine Resources

MCBH's coastal and marine resources management efforts address marine threats, both direct and indirect, human and natural in origin, which presently or potentially affect MCBH's military readiness and its natural resources. Water pollution, invasive species, marine debris, overharvesting of fish and other marine animals, direct impacts to coral, and intense recreational use pressures all pose challenges for resource managers concerned with controlling habitat degradation and maintaining the training value of waters within MCBH's jurisdiction.

Spill Risk. Spills of oil and hazardous substances threaten potential adverse consequences to both coastal and marine resources and military training activities. MCBH manages spill risk as a part of its Natural Resource Trustee Responsibilities and complies with NRDA and spill response obligations (Section 8.1.17). The potential for fuel spills may increase as MCBH Kaneohe Bay is

planning to resume fuel barging operations. Loaded fuel barges (1,176,000 to 1,344,000 gallons) would arrive every four to five weeks, depending on mission requirements. MCBH has a fuel pier booming strategy in its *Integrated Contingency Plan*, with boom pre-staged at the pier and the Waterfront Operations Facility Response Team trained on how to boom the pier during fueling operations (Section 8.1.13). Operations have not begun due to unavailability of sufficient fuel storage.

Invasive Marine Species. Uncontrolled spread of foreign invertebrate and plant marine species impact MCBH coastal zones and marine waters, including coral reef ecosystems.[6] Observations from recent USFWS marine surveys have resulted in recommendations for management actions.

Invasive algae can outcompete native algae and seagrass for space, resulting in the loss of native benthic habitat and reduced species diversity. Leather mudweed, a highly invasive, fast growing, and highly adaptive algae found in large communities along the southern shore of O‘ahu, was identified in several locations offshore of MCTAB in unconsolidated sediments. Non-mechanical removal is recommended to reduce potential for spreading.[7]

Invasive algae also outcompete slower growing corals for space in Kāne‘ohe Bay. Recent marine resource surveys in Kāne‘ohe Bay provided increased knowledge of the distribution of invasive algae (*Acanthophora spicifera, Gracilaria salicornia*, *Kappaphycus* spp., and *Hypnea musciformis*), and an invasive sponge *Mycale armata*. Green bubble algae (*Dictyosphaeria cavernosa*) was also mapped. This native algae has shown invasive tendencies in reef communities experiencing nutrient enrichment and overfishing and has been documented in mats in Kāne‘ohe Bay since the 1960s.

Five invasive algae-infested seaplane ramps along the MCAS ‘aircraft hangar shoreline’ adjoining Kāne‘ohe Bay are a serious concern since various recreational events utilize these ramps. Three of the ramps are partially covered with corals and all have heavy silts as well as invasive algae mats. Cultural Resources staff will be conducting surveys of the boat ramps to determine their structural soundness as the O&T Directorate is interested in putting them back into operational use. The 2012 marine surveys by USFWS documented two non-native invasive red algae communities and an invasive sponge growing on the seaplane ramps. It is preferred that recreational events utilize seaplane ramps 1 and 2 as they have been the most heavily disturbed and the area seaward of these ramps has few corals that could be impacted.

With the potential return of fuel barges to MCBH Kaneohe Bay, issues of ballast water, ballast sediment, and hull fouling organisms, including those that are potentially invasive, are a biosecurity concern.

Additional work is needed to more thoroughly inventory alien species and assess the extent of their threat to protected marine natural resources and military uses. Since these threats often transcend jurisdictional boundaries, and MCBH does not have the in-house expertise to fully address them, Sikes Act partners assist with identification and control efforts. On-going dialogue with partners provides the basis for tackling marine invasive species removal projects, pending available staff,

[6] Alien species threats and impacts are further described in Section 11.2 of the *MCBH Coral Reef Ecosystem Management Study* (Shafer et al. 2002) and in the more recent USFWS reports (USFWS 2008a; USFWS and USGS 2013, 2017 in prep).

[7] Recommendation 14 from the *Inventory of Coastal and Marine Resources*, USFWS 2008a: “Regularly remove the algae (attached and unattached) to reduce the biomass. Reduction of the biomass of both species will decrease the spread of undesirable invasive algae and reduce negative impacts to corals, native algae and seagrass.”

funds, and cooperative agency assistance. These efforts will align with MCBH's overall approach to biosecurity (COA 7.0.2, Appendix C3).

Marine Debris. Various forms of marine debris are deposited or drift into MCBH's jurisdictional waters or wash up on its beaches. For example, a significant amount of plastic washes ashore on all Mōkapu Peninsula beaches every year. Most of it has been degraded by saltwater and sunlight and is broken down into smaller pieces. Small plastics are often consumed by sea and shorebirds and can jeopardize their health. Plastic may also be inadvertently consumed by marine animals while feeding. For example, sea turtles have been known to ingest plastic bags, likely mistaking them for jellyfish. Marine debris threatens marine life and should be removed.[8] To this end, MCBH maintains an on-going practice of removing illegal and derelict fishing gear, as well as entanglement materials. Between 2012 and March 2016, over three tons of entanglement material, including approximately 8,000 ft of unattended gill (lay) nets, were recovered and removed at MCBH. An additional 3,500 ft of prohibited but attended gill net was confiscated.

Nonpoint Source Pollution. Nonpoint source pollution from increasingly urbanized surroundings continues to threaten the health of coral reef ecosystems in Kāneʻohe Bay. Nonpoint source pollution lowers the resistance and resilience of marine ecosystems to impacts from other threats including invasive species and climate change. MCBH focuses its management efforts on reducing nonpoint source pollution, mainly through erosion control and storm water management to limit the effects on the nearshore marine environment (COA 7.3).

Nonpoint source pollution in the form of community trash is also problematic. Unsecured trash is regularly found blowing around in shoreline and beach areas where fishermen and beachgoers recreate. Due to changes in Base priorities, many of the trash and recycling receptacles have been removed from the less developed areas of the beaches and shorelines where there are no facilities. Recreationers will now be expected to pack out all items carried in, including trash. Outreach education and signage will likely be needed to inform users of the "Pack it in, Pack it out!" practice to ensure abandoned trash does not become an increasing problem in these areas. Additionally, the MCDC that captures and transports Base storm water to Kāneʻohe Bay, carries discarded trash from Base housing and urbanized parts of the Base (COA 7.3). Periodic volunteer clean-up efforts prevent some of this trash from reaching Kāneʻohe Bay's mudflats and coral reefs or from being deposited into the Nuʻupia Ponds.[9]

Beach and Shoreline Erosion. Beach and shoreline erosion is the dominant trend of shoreline change in Hawaiʻi. It is mainly the result of intense residential and commercial development that has hardened shorelines or removed vegetation that would normally protect shorelines from flooding and storm surges, and provide some mitigation for adverse effects from sea level rise related to climate change. Sea level rise, increased temperatures, unpredictable rainfall, and severe storm generated wave action are external factors that cannot be controlled. However, implementing sound conservation measures locally can minimize, and in some instances reverse, shoreline damage.

MCBH coastal properties include approximately 13 miles of shoreline, some more erodible than others. Coastal erosion is a serious problem at MCBH as loss of shoreline and beaches can impact

[8] Recommendation 11: the *Inventory of Coastal and Marine Resources*, USFWS 2008a: "Conduct surveys to locate and remove abandoned fishing gear and marine debris (nylon fishing lines, gillnets, metal/plastic debris, golf balls, etc.) within the 500 yd security zone."

[9] Semi-annual three day Base-wide clean-ups, known as "Malama i ka aina" ended in early 2014. These events were responsible for collecting a significant amount of rubbish from the Base beaches, shorelines, and waterways.

the ability to train and conduct amphibious operations. Coastal erosion can have negative consequences for marine animals that need to haul-out to rest, lay eggs, or give birth. For example, it has taken over 15 years for the dunes adjacent to Pyramid Rock Beach to recover much of their vegetation after suffering years of uncontrolled training and off-road activities because of the dry, harsh conditions that slow vegetative growth. Exposed burials were becoming commonplace along the Fort Hase shoreline because of the loss of vegetation due to uncontrolled vehicle activity. Since stopping all vehicle traffic on the Fort Hase shoreline, no burials have been exposed, vegetation now covers the Ulupa‘u dunes down to the water’s edge, and sand is slowly accreting on the shoreline.

Over 40 ft of beach and shoreline has been lost at the Hale Koa Recreational Area due to years of uncontrolled vehicle activity, damage to the protecting coral reef, and loss of shoreline vegetation from storms and recreational activity. Additionally, two recreational pavilions were lost to the eroding shoreline. Since there is very little shoreline vegetation today, the shoreline continues to erode. Portions of the Hale Koa campground would have to close temporarily, or even permanently, for shoreline revegetation to have some chance of success. Keeping future construction set well back from shorelines – 100 ft or more, maintaining vegetation on the sand dunes, controlling recreational activities that damage shoreline vegetation, and allowing the recovery of vegetated areas damaged by training can limit the loss of beaches and shorelines. Creating designated pathways and limiting their numbers is also necessary. Strong enforcement is also required for the protection of coral reefs that moderate wave and storm activity that damages shorelines and is a source of beach sand.

Recreational Activities. Impacts to marine and coastal resources due to recreational activities, both sponsored events and individual/group activities, are a concern at MCBH. For example, over the years events that involve hundreds of people crossing the shoreline to run down beaches have created pathways devoid of vegetation. Socializing and drinking on beaches results in debris (glass bottles and plastic) being left behind, which either becomes ground into the sand, potentially injuring beach users, or washed out to sea, where it may end up on coral reefs or in fragments that may be ingested by seabirds or marine animals. Construction of additional cottages on Kaneohe Bay shorelines brings additional people in close contact with sensitive marine resources, including coral reefs. Shoreline fishing sometimes results in people walking on coral reefs or getting their fishing line and hooks entangled in corals. Kayaks, canoes, and paddleboards damage corals in shallow areas by scraping against them or knocking them loose with paddles. Unaware snorkelers or scuba divers harm corals by grabbing coral heads to pull themselves along as they observe reefs and fish.

Ongoing education through pamphlets, signs, and videos is the most readily available means of spreading the word about how to recreate responsively around marine resources. Partnering with MCCS, who maintains responsibility for renting recreational ocean equipment and beach cottages, to get the word out via educational pamphlets or videos is an important part of the educational program. MCCS is working with Natural Resources staff to place a copy of a 15 minute video in each rental cottage and temporary lodging room. This video informs visitors and new arrivals about the Base’s natural resources (including marine resources) and explains how they can safely interact and help minimize impacts to protect and preserve these valuable resources. MCCS has also embedded links to the Natural Resources webpages in information on their public website.

Climate Change. There is a need to consider long-term effects and processes outside of the project-level span of control, such as climate change and sea level rise—global trends that will increasingly affect sustainability of training and natural resources under MCBH stewardship responsibility.

Climate change is expected to have significant impacts on Hawai'i, especially low lying coastal areas such as Mōkapu Peninsula that are particularly vulnerable to inundation by rising sea levels.[10] As a consequence of climate change, sea level on O'ahu is expected to rise significantly in the next 100 years. Research suggests global mean sea level may rise ~32 cm (1 ft) by 2050 and a range of 0.75 to 1.9 m (2.5 to 6.2 ft) by end of century (Rignot et al. 2011, Vermeer and Rahmstorf 2009). Shoreline erosion would magnify this problem and allow sea levels to encroach further inland. With continued climate change, Mōkapu Peninsula should expect to see parts of Nu'upia Ponds WMA inundated by sea water, more flooding, and perhaps by mid-century the runway could be flooded during parts of the day (Figure 11, Appendix B). Other coastal properties (i.e., MCTAB, Pu'uloa RTF) will likely experience increased shoreline erosion.

Monitoring to detect impacts of these trends is particularly important for the dynamic shoreline areas that are subject to continual change due to seasonal or long-term erosion or accretion and are now even being impacted by changing climate. Climate change may result in:

- Habitats of endangered waterbirds, migratory shorebirds, Hawaiian monk seals, and sea turtles threatened by the increased water levels, erosion, salinity, and flooding associated with sea level rise (Kane et al. 2013).
- Higher average temperatures that may stress native animals and plants and impact vegetation communities, potentially increasing the spread of invasive species and fire-prone grasses.
- A decrease in trade winds, which would disrupt the rainfall patterns across the islands and create periods of drought and heavy rain and flooding.
- Warmer oceans and higher ocean acidity, which could trigger massive coral bleaching, marine migration, and affect the ocean's circulation and the way it distributes nutrients.
- Loss of beaches and shoreline erosion that may increase at an accelerated rate.

IMPLEMENTATION

GOAL 7.4: Coastal and Marine Resources Management

Protect, enhance, and manage the shoreline, beaches, and nearshore environments and off-shore marine resources within MCBH control and/or use.

The set of objectives and projects/actions described below is designed to help reach Goal 7.4. The rationale and background for each of the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

[10] UH School of Ocean and Earth Science and Technology. http://www.soest.hawaii.edu/coasts/sealevel/

Objective 7.4.1: Inventory and monitor coastal and marine biological resources and geophysical conditions.

Sustaining ability to train in coastal and marine areas is a core priority for the Marine Corps mission. Inventory and monitoring of biological and geophysical features, processes, and conditions in MCBH's coastal zone is a crucial component of maintaining compliance with Federal and State regulations and determining how military operations may be influencing or be influenced by these resources and conditions.

ROUTINE MANAGEMENT ACTIONS

Marine Protected Species Monitoring. Natural Resources staff monitor the occurrence and status of protected marine species in the nearshore environment and on beaches (Appendix C2). Hawaiian monk seal and sea turtle sightings are documented. The location, health, and any other important characteristics (e.g., molting or nesting) are noted. Natural Resources staff coordinate with NOAA Fisheries and the Hawaiian Islands Humpback Whale National Marine Sanctuary to conduct annual humpback whale open ocean counts from two locations on the Mōkapu Peninsula during the seasonal migration that occurs from December to April. Natural Resources staff also works with the Hawai'i Marine Mammal Alliance who operate under a grant from NOAA to perform volunteer Hawaiian monk seal verification, assessment, and data collection, along with community outreach.

Monitoring of Military and Recreational Exercises. Natural Resources staff monitor ship-to-shore and shoreline training activities to ensure appropriate documentation and response procedures are followed should a Hawaiian monk seal, sea turtle, or whale be found in the area. This includes the biennial RIMPAC military exercises. Prior to the start of any exercises or training events, nearshore waters are surveyed for the presence of protected species as their presence can alter or cancel a planned military exercise (Appendix C2). For example, training missions in 2015 and 2016 along the KBRTF eastern shoreline whereby a Special Forces team planned to conduct a stealth beach assault and shoot targets inland of the beach were cancelled due to a Hawaiian monk seal hauled-out on Fossil Beach in the immediate area of the training. AAV trainings on Pyramid Rock Beach have been rescheduled as Hawaiian monk seals haul-out to rest near the beach access point. Large scale recreational events (e.g., beach fun-runs, surfing contests) are also monitored and the same procedures apply.

PROJECTS

Coastal and Marine Resource Survey – MCBH Kaneohe Bay (STEP – in planning)

Considering the dynamic nature of the marine environment, especially under current climate change trends, regular updates of marine resources surveys (about once every ten years subject to availability of funding) are needed to assess changes, detect new threats and inform management. In the intervening years since the baseline surveys were performed (completed in 2007 and 2012), the number of personnel on Base has increased, building construction has increased (housing training, and recreational facilities), more recreational activities are available (more boats at the marina; MCCS concessions selling food, drink and renting equipment at Pyramid Rock Beach; additional beach cottages on the west-northwest side of the Base), and contained fires and alcohol use have been authorized on all Base beaches. These changes will likely have an effect on the coastal and marine environment as a result of increased trash production; increased surface run-off; and more people in the water, around and on the reefs and on the beaches. New

qualitative and quantitative surveys within Kaneohe Bay's 500-yard buffer zone will be conducted and results compared with previous surveys.

Biological Study of Nu'upia Ponds (STEP – in planning)

A biological study is planned to identify the species of native and non-native fish, shellfish, invertebrates, and algae in Nu'upia Ponds. Previous studies are over 20 years old (Brock 1994). The study will classify species as native, non-native, endemic and/or invasive. Relative abundance will be determined if feasible. The study will also measure sedimentation that has occurred as a result of mangrove removal and "Mud Ops" management activities conducted in support of endangered species habitat improvement. Increased siltation of the ponds may be degrading its health. Information provided by this study will be used to assess if management actions are necessary to protect marine life in the ponds.

Shoreline Assessments to Address Erosion (STEP – in planning)

MCBH has relied on limited assessments and opportunistic monitoring to identify specific shoreline erosion problems. No recent systematic assessment of offshore littoral movements of sand and sediment as it influences MCBH Kaneohe Bay shoreline features has been conducted. Limited assessments have been conducted in connection with site-specific shoreline erosion-mitigation projects (SRGII 2007a). Opportunistic monitoring has been conducted as specific erosion problems are noticed and addressed and some management actions are being considered to address this problem. In some cases site-specific shoreline erosion-mitigation projects have been accomplished but have been met with varied degrees of success. For example, an unimproved roadway that provides access to the red-footed booby colony and the historic Battery Pennsylvania in KBRTF is again experiencing significant degradation; previous repairs were implemented in 2009. A project to restore a barren slope located to the east of KBRTF overlooking Monument Point on the Fort Hase shoreline met with greater success to abate erosion and limit the amount of sediment being carried to the ocean from this site.

There is a need to evaluate the previous erosion mitigation projects to determine what worked or did not work and the way forward. There is an additional need to develop a systematic assessment of shoreline erosion especially at highly-dynamic areas such as North Beach, Pyramid Rock, and Fort Hase shorelines at MCBH Kaneohe Bay. These assessments will be used to identify site-specific erosion repair projects to mitigate against future problems in the coastal and marine zones, as well as track seasonal and human-induced changes to shorelines. The assessments will also provide a baseline to evaluate the potential erosive effects of sea level rise associated with climate change. Shoreline assessments will be a recurring action and the knowledge gained will allow for site-specific erosion repair projects to be programmed as necessary.

Assess Seaplane Ramps (STEP – in planning)

Five non-operational seaplane ramps at MCBH Kaneohe Bay are being considered made operational again, pending assessment of structural integrity. Seaplane Ramps 1 and 2, which are closest to the beach, the marina, and the fuel pier, have been regularly used over the years for various MCCS sponsored events (e.g., Koa Kai triathlon, Splash and Dash, and canoe races). Use of Seaplane Ramps 3, 4, and 5 is discouraged due to the presence of corals in the adjacent area and native seagrass beds in the near vicinity. Heavy sediment and invasive algae are present on all five ramps. A detailed assessment of all the ramps and surrounding area is needed to determine if it is feasible to clean the ramps. Potential impacts related to disturbing the deep fine sediments, relocating corals, protecting vulnerable seagrass beds that are used by threatened green sea turtles for foraging, as well as the potential presence of other vulnerable marine

life (i.e., sea horses) need to be considered.[11] In October 2016, the USFWS and MCBH Senior Natural Resources Manager conducted a survey of all five seaplane ramps fronting the hangars. The survey found invasive algae and sedimentation covering all the ramps. There was little to no coral or other significant biologics found anywhere near Seaplane Ramps 1 and 2. However, coral was found growing on, to the side of, or in the waters a short distance from the end of Seaplane Ramps 3, 4, and 5. While this dive provided greater knowledge of the conditions of the seaplane ramps, agency input is needed regarding the impacts and effects of using these ramps for future recreational events, as well as proposed conservation measures to guide protective measures to minimize marine resources impacts.

Monitor for Sea Level Rise (STEP – in planning)

Photo monitoring involves repeat photography of an area of interest over a period of time, with photographs taken from the same location and with the same field of view. This project will develop a monitoring protocol and establish a series of photo points to monitor sea level rise and document landscape changes. Initial work includes development of the protocol and collection of photos to serve as a baseline for future reference. The protocol will detail the objective of monitoring; how to choose sites; environmental factors to consider; photo types; photo techniques, photo management; and mapping and analysis. Ongoing work will include photo capture and data analysis to identify changes. Shorelines showing significant loss are located on Kaneohe Bay and at Pu‘uloa RTF.[12]

On-site monitoring will be used in conjunction with other available tools, such as the DoD Sea Level Rise and Extreme Water Level Scenario database.[13] This tool provides localized information on future sea level rise and extreme water levels for three time horizons based on five global sea-level rise scenarios that range from 0.2 meters to 2.0 meters rise by 2100, starting from 1992. Scenarios will assist with climate change adaptation planning for DoD coastal and tidally influenced sites worldwide. These scenarios provide a decision-maker with temporal and physically-based information to assess future vulnerabilities. The tool has been prepopulated with specific installations and facility data from the real property database. These scenarios provide bounding values and are intended to be used for screening and not detailed engineering design. Their development represents several advancements in scenario development for coastal locations that can serve as a starting point for other applications.

Develop Climate Change Vulnerability Assessments (STEP – in planning)

DoD Manual 4715.03 directs that the best available science and existing tools be used to assess the potential impacts of climate change to natural resources on DoD installations. Although in-house capacity is limited, MCBH has access to some resources to help further analyze expected impacts and risks of sea level rise.

In 2014, a Facilities GIS contractor used elevation data to model what type of inundation a 3, 6, or 9 ft sea level rise might result in for all MCBH properties.[14] The results indicated that impacted areas would include

[11] USFWS and NOAA Fisheries are evaluating areas to be designated critical habitat for green sea turtles, to include additional conservation measures beyond what are currently in place for Hawaiian monk seals and turtles. Any Federal action that may affect sea turtles and their habitat will incur greater scrutiny and likely require greater protective measures.

[12] An EA is being conducted at Pu‘uloa RTF to evaluate a method for stabilizing and restoring the shoreline and a “last ditch effort” to preserve the impact berms that will be affected if the shoreline erodes away (Objective 7.4.2).

[13] This tool is based off of a SERDP-ESTCP report that was developed in conjunction with NOAA and the USACE (Hall et al. 2016). https://www.serdp-estcp.org/Program-Areas/Resource-Conservation-and-Climate-Change/Climate-Change

[14] The assessment did not take into account shoreline erosion, tidal influences, storm surges, etc.

Nu‘upia Ponds WMA and wetlands at Kaneohe Bay; the beach and TA-1 at MCTAB; and the beach, shoreline, and impact berms at Pu‘uloa RTF. In 2016, screening-level vulnerability assessments for DoD coastal and tidally influenced sites were developed by a cooperative partnership with SERDP-ESTCP (Hall et al. 2016).[15] These assessments used more current scientific data and methodologies to develop much more realistic assessments and scenarios of possible seal level rise. The Coastal Geology Group at the UH School of Ocean and Earth Science and Technology is another important resource for information about the effects of climate change and sea level rise.[16]

Many Federal agencies are currently using Vulnerability Assessments to help determine expected impacts related to climate change. The assessments analyze expected impacts, risks, and the adaptive capacity of a region or certain ecosystem components (water, oceans, and specific species). The results guide adaptive management planning and implementation. Vulnerability Assessments are a decision-making tool used to help resource managers prioritize conservation actions and allocate funding. MCBH will dialogue with other agencies to obtain Vulnerability Assessments that are relevant to MCBH natural resources.[17] One course of action may be to conduct species specific Vulnerability Assessments according to current methods. Natural Resources staff can use this information to help decide which species should be regularly monitored for early detection of changes, and what might be done to prepare for the increased pressures from rising sea level.

Objective 7.4.2: Manage and enhance coastal and marine biological resources and geophysical conditions.

There is a continuing need to apply new information and explore new methods for managing coastal and marine resources at MCBH. Adaptive management needs to consider changing parameters including increasing occurrences of protected wildlife, expansion of invasive marine species, and the unknown effects of climate change.

ROUTINE MANAGEMENT ACTIONS

Marine Resources Protection Initiatives. Natural Resources staff review current Base regulations and practices related to coastal and marine resources as needed and determine if recommendations should be made to revise existing regulations or practices or initiate new ones. Current issues to be reviewed include: the harvest of sea cucumbers and octopus (*tako*) within MCBH jurisdictional waters, shoreline rod and reel fishing, and increased protection of corals found in the cove off-shore of the Pali Kilo cottages. Establishing designated areas where kayaks, paddleboards and divers may enter the water will be considered. Procedures will be developed outlining actions that damage coral reefs and describing a code of conduct to be followed when recreating or training in order to lessen impacts on coral reefs.

[15] SERDP is DoD’s environmental science and technology program, planned and executed in partnership with DOE and EPA, with participation by numerous other Federal and non-Federal organizations. ESTCP is DoD’s environmental technology demonstration and validation program.

[16] http://www.soest.hawaii.edu/coasts/

[17] USGS, USFWS, The Nature Conservancy in Hawai‘i, UH Hilo, the Hawaii Cooperative Studies Unit, and NRCS have collaboratively devised a flexible, tailored approach for conducting Vulnerability Assessments for Pacific Islands. http://www.usgs.gov/ecosystems/pierc/species-vulnerability.html

Recreational Activity Control. CLEOs, along with Waterfront Operations active-duty Navy staff, MPD Animal Control Officers and their cadre of auxiliary volunteers, and State Division of Conservation and Resources Enforcement (DOCARE) officers, work to control illegal fishing, net laying, and reef diving activities within surrounding bays.

Marine Debris Removal. Periodic beach and in-water cleanups are conducted by Natural Resources staff and others to retrieve marine debris and derelict fishing gear that would otherwise harm marine life within MCBH jurisdictional waters. CLEOs conduct regular surveillance patrols and confiscate illegal gill nets and various marine entanglement material (e.g., commercial lay nets). Volunteer service projects such as beach clean ups are sponsored to assist with efforts (COA 7.6; Appendix G1 & G2).

Invasive Marine Species Removal. Invasive plants (e.g., cyanobacteria, red algae) have invaded the coral in the cove near the Pali Kilo shoreline cottages at MCBH Kaneohe Bay. Removal of these threats to MCBH marine resources will be accomplished with the help of volunteers and possibly support from Sikes Act partners. This will be accomplished as time, other priorities, and available personnel allow.

Marine Protected Species Management and Response. Natural Resources staff respond and direct others in the event protected marine species occur in MCBH coastal areas. Appropriate response procedures are followed to ensure protection of marine mammals and reptiles (e.g., haul-out of Hawaiian monk seals or sea turtles to rest on MCBH beaches, monitor for protected species on land or in water during training exercises) (Appendix C2 & D5).

Hawaiian monk seals can be observed hauling-out to rest on MCBH beaches, mainly at Kaneohe Bay. Although sea turtles infrequently come ashore on MCBH beaches and shorelines, they have been documented nesting on MCBH beaches.[18] MCBH employs conservation measures to benefit and protect Hawaiian monk seals and sea turtles (Appendix C2 & D5). In the event that Hawaiian monk seals or sea turtles are present on land or in the nearshore waters, specific procedures are followed to limit human and pet disturbance or injury during training evolutions (Appendix C2 & D5).

Any seabird, marine mammal, or reptile that is sick, injured, stranded, entangled, or dead in MCBH waters or on beaches is reported, protected, and if necessary transferred to appropriate authorities at NOAA Fisheries for rehabilitation and/or necropsy. These actions are carried out by qualified Natural Resources staff, CLEOs, and/or trained MPD Animal Control Officers working closely with the Environmental Department.

Coral Reef Mitigation. Impacts to coral reefs are increasing in frequency and extent due to direct and indirect factors, including bleaching and die off, the presence of invasive algae, and damage due to spills, recreational activities, or training impacts. MCBH will continue to explore, develop and implement coral reef mitigation strategies (e.g., relocation, seeding, avoidance) and procedures to minimize impacts.[19] For example, the use of and ability to obtain collector urchins to help with control of invasive algae will be investigated.

[18] In 2009 an olive ridley sea turtle nested on Pyramid Rock Beach. The MCBH nesting was only the third documented nesting in Hawai‘i and was the most successful. In 2015 a green sea turtle nested along the Fort Hase shoreline. This was the first time a green sea turtle has been recorded nesting at MCBH, though signs have indicated past attempts. Environmental Department staff collaborate with NOAA Fisheries and USFWS biologists during any nesting events.

[19] Coral reef seeding involves growing corals in coral nurseries and then planting these corals in the ocean. Reef restoration work has the potential to boost rates of recovery and improve the outlook for coral. MCBH plans to explore partnering opportunities with the UH Hawai‘i Institute of Marine Biology to conduct a coral seeding project in Kāne‘ohe Bay. This would likely be accomplished as a research collaboration.

PROJECTS

Pu‘uloa RTF Shoreline Erosion Repair Project Environmental Assessment (STEP – in progress)

The *Pu‘uloa Shoreline Erosion Study* (HI2013C22PP3616) investigated the severe loss of beach and shoreline at Pu‘uloa RTF in Ewa Beach (Figure 34, Appendix B) (SSFM International, Inc., Sea Engineering, Inc., and Brownlie & Lee 2015). The study provides projections of shoreline erosion in 10-year increments, identifies possible mitigation measures to stem and possibly reverse the shoreline erosion, and develops cost estimates for implementation. Two recommendations for the near term were development and implementation of a shoreline monitoring program, and ‘soft’ solutions that involve revegetating the shoreline areas and creating distinctive walkways over and pathways through vegetated areas to reduce impacts of foot and vehicle traffic. Two long-term ‘hard’ solutions involve installing structures to mitigate erosion. These would require NEPA compliance; Section 7 consultation under the ESA; and permitting to comply with the Clean Water Act, Section 10 of the River and Harbors Act, and the Coastal Zone Management Act.

An EA has been funded (early 2016) and will take approximately a year and half to complete. It will evaluate recommended restoration and stabilizing courses of action to slow or reverse the erosional processes occurring along the Pu‘uloa RTF shoreline.

Shoreline Erosion Repair – Pu‘uloa RTF (STEP – programmed)

This project will implement the preferred action for slowing erosion and stabilizing the shoreline at Pu‘uloa RTF after the EA has been completed and required permits have been obtained.[20]

Sand Dune Stabilization – North Beach (STEP – in planning)

The North Beach sand dunes at MCBH Kaneohe Bay not only maintain the shoreline area but contain a significant number of ancient Hawaiian remains that could become exposed by the loss of sand cover. Recreational foot traffic, use of water safety ATVs, unauthorized training in which people climb up the steep sand dune face, and seasonal high surf events that break on the shoreline are all causing the loss of vegetation that stabilizes the sand dunes. There are three authorized pedestrian access points to reach the beach at North Beach – an access off Pond Road, a newly constructed boardwalk and stairway near the shower and changing station just east of the golf course, and a worn pathway accessed by an opening in the Klipper Golf Course perimeter fence.[21] To try and halt unauthorized access to the sand dunes, a temporary cordon has been placed at the base of the dunes in vicinity of the lifeguard tower to deter people from climbing on or over them. However, because this is a very actively used beach, a more permanent solution needs to be implemented. This project involves installation of a sand fence or similar structure to prevent dune incursions and capture sand against the existing dunes.

[20] USACE Section 10 permits are usually acquired by the Navy for MCBH projects. NPDES permits are the contractor’s responsibility.

[21] With the opening of the new boardwalk, foot traffic through the fence opening to the Klipper Golf Course will stop and the pathway made accessible only by water safety equipment.

Shoreline and Sand Stabilization – MCTAB (STEP – in planning)

Historically, until the military took over the area during early 1900s to establish airfield operations, MCTAB had extensive sand dunes. Extensive construction leveled most of the dunes. Years of training and illegal off-roading have taken a toll on the shoreline vegetation, allowing sand to encroach further inland and making it unavailable to the beach. Re-establishing sand dunes is necessary to preserve the beach and shoreline areas. Natural dune rebuilding can take several years. Sand fencing, other proven techniques, as well as new technology will be used to capture wind-blown sand to build a dune and keep people off fragile dune vegetation. This action will likely incur resistance as parts of the shoreline will restrict recreational activities and possibly some training activities.

7.5 LANDSCAPE MAINTENANCE AND VEGETATION MANAGEMENT

Change in Organization. All projects and actions associated with vegetation (e.g., plant surveys, invasive plant removal, plantings, habitat modifications, and tree maintenance) will be captured in this section. Marine and coastal plants are addressed in COA 7.4: Coastal and Marine Resources Management.

MANAGEMENT ENVIRONMENT

MCBH is continuing its efforts to perform landscape maintenance and vegetation management in a way that provides sustainable realistic landscapes for training, is responsive to conservation concerns, and improves quality of life. Since the early 1980s, MCBH has invested in 'sustainable landscaping' projects that: (1) plant more trees and bushes, emphasizing use of native and regionally-indigenous[1] species, to provide for shade, cooling, and beautification, and to replace trees lost to construction; and (2) remove high-maintenance, pyrophytic, and invasive vegetation in protected wildlife and military training areas, thus reducing fire and erosion risks.

With increased Federal emphasis on the control of invasive species (EO 13112), the use of native plant landscaping, and the need to follow sustainable landscape practices, the level of sophistication required to monitor and manage MCBH vegetation has risen. There is a need for continued monitoring and control of invasive vegetation in ecologically sensitive and priority military training areas. Control of invasive plant species receives emphasis as a primary management tool in sustaining suitable habitat for protected species as required by executive order and military directives. These efforts align with MCBH's overall approach to biosecurity (COA 7.0.2 and Appendix C3). Efforts also focus on continuing to modify landscaped areas and promoting the use of native plantings. Native plants require less water, fertilizer, and chemicals to grow. Both the *MCBH Invasive Species Management Study* (Garrison et al. 2002) and the *MCBH Landscape Manual* (MCBH Environmental Department 2014) provide relevant direction with information specific to MCBH properties.

This COA addresses management for all vegetated areas on MCBH properties. Management is primarily focused on facilitating continuous improvement to vegetation management throughout the 'built' landscapes of all MCBH properties, in or near MCBH's two sensitive wildlife management areas, and in Marine Corps training areas (KBRTF, MCTAB, and Pu'uloa RTF).

Policies

Policies related to invasive species control and promotion of landscaping that preferentially treats regionally native plants and promotes water use reductions for Federal lands provide overarching goals and direction:

- Executive Order 13112, Invasive Species;
- 60 FR 40837, Environmentally Beneficial Landscape Practices on Federal Landscaped Grounds;
- Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes (Appendix E3);
- Executive Order 13693, Planning for Federal Sustainability in the Next Decade.

[1] Refers to plants that are indigenous to the Hawaiian Islands, not the larger Pacific Basin.

MCO P5090.2A, Section 11201.2, Use of Native Plants in Landscaping, internalizes this guidance. In practice, landscape maintenance and vegetation management is directed by Base-level directives (e.g., Base Orders, Master Plan, Landscape Manual, IPMP, contract specifications, and landscaping studies). Overall, these documents require sustainable practices that capitalize on nature's free 'goods and services' to perform essential functions (e.g., water conservation, erosion control, filtration of nonpoint source pollution from storm water runoff, noise absorption, and aesthetics).

The *MCBH IPMP* details rules and regulations governing the use of pesticides, which includes all insecticides, herbicides, fungicides, and molluscides, and clearly states that only pesticides included on the installation's pesticide authorized use list may be applied (Section 8.1.9). Labeling instructions, approved by the EPA, detail if pesticides are for terrestrial use only and should not be applied directly to water, or to where surface water is present. HAR Title 11 Chapter 55 Appendix M requires that if application of approved pesticides to waterways (including wetlands) is desired, a request for *Individual NPDES Permit* coverage must be approved by HIDOH (Appendix E2).[2]

MCBH Landscape Manual

The *MCBH Landscape Manual* was completed in 2014, and is aimed at: ensuring a "no net loss of trees", reaffirming the policy of a one-for-one replacement of removed trees, and prescribing the use of at least 50% native plants as a part of all landscape projects to the greatest extent practicable. The manual is the authoritative document for planting and maintaining trees and shrubs in landscaped environments at MCBH properties (Section 8.1.8). It was developed to provide clear guidance on the selection, care, use, installation, maintenance, and protection of landscape plants during construction. Natural Resources staff emphasize that the protective practices identified in the chapter titled *Tree Preservation & Protection During Construction* must be incorporated into all construction projects on Base, from the design phase through the actual construction, to preserve and protect existing trees within and in close proximity to the project site.

A key vehicle for ensuring that a more sustainable landscape is achieved is to require adherence to lists of approved regionally indigenous plants and prohibited invasive, high maintenance plants for all landscaping projects on MCBH properties.[3] The manual contains lists of *Approved Plant Material – Native Hawaiian & Polynesian Introduced Plants* and *Approved – Non-Native Plants*. Any plant not on one of these lists must be approved by Natural Resources staff before introduction onto any MCBH property. Plants on the *Prohibited Plant Material* are strictly prohibited from being planted on MCBH properties. These plant lists have been distributed widely (e.g., to Facilities planners and grounds maintenance personnel, family housing staff, contract specialists) to help attain compliance. Rigorous reference to these regularly updated lists occurs in all Natural Resources staff reviews of landscaping projects. Current lists, which are periodically updated, are maintained by Natural Resources staff as part of the manual.

[2] Form M. Point source discharges from the application of pesticides to State waters.

[3] HQMC guidance (2006) requires that each installation establish a Base-wide master plant list that identifies native and non-native plants suitable for landscaping, and invasive plants that are prohibited for any use on their installation. Starting with the 2001 INRMP/EA, and in subsequent updates, guidance has been set forth on landscaping at each MCBH property, to follow a specified list of prohibited and preferred plant species when planning various projects. Beginning with this 2016 INRMP, the *MCBH Landscape Manual* should be the definitive reference for this information (Section 8.1.8).

MCBH Vegetation

Vegetation cover on nearly all MCBH properties consists primarily of non-native (many invasive) plants; some native and Polynesian-introduced vegetation are intermixed across developed and undeveloped lands. Maintained landscaped areas make up a the majority of vegetated areas surrounding buildings and parking lots, while training areas and other large green spaces (e.g., Kaneohe Bay's Nu'upia Ponds WMA and the former MACS 2 training area, Camp Smith, Pu'uloa RTF, and Waikane Valley) contain a mixture of species (mainly non-native) that are not routinely maintained, but rather managed to avoid increased fire risk and the spread of invasive species, and conserve soil.

The only known natural occurrence of plants currently ESA-listed or pending listing on MCBH properties is 'ohai (*Sesbania tomentosa*) – there are two volunteer plants in Nu'upia Ponds WMA (Figure 12a, Appendix B). First identified in 2008 by the USFWS during a biannual State waterbird count, the plants continue to thrive and the area is regularly monitored. There are two endemic State of Hawai'i species of conservation concern rare plant communities on MCBH properties: (1) maiapilo (*Capparis sandwichiana*) found on the lava fields by the beach cottages at MCBH Kaneohe Bay, and (2) nama (*Nama sandwicensis*) found on the coastline dune area overlooking Pyramid Rock beach (Figure 12b, Appendix B).

Both native and non-native vegetation can support ecologically important features and functions (e.g., wetlands, fish and wildlife habitat, erosion control, ethnobotanic uses, and quality of life). However, the predominance of non-native and invasive vegetation in many areas poses management concerns. For example, non-native invasive grass cover in Ulupa'u Crater and on MCTAB's training areas enhances the risk of brush fires during dry months, which threatens military training activities and protected wildlife habitat. At MCBH wetlands and coastal shoreline areas, encroachment by invasive trees, (i.e., mangrove) degrades water quality, causes sediment build-up, reduces habitat available for native fish, and has provided a hidden haven that invites illegal behavior (as documented through arrests of poachers and drug-dealers by security personnel). Landscaped areas that currently contain a mixture of lawns and plantings requiring continual maintenance, such as regular mowing and irrigation, could be further modified to continue to meet and exceed current policies on sustainable landscape practices.

Landscape Maintenance

At MCBH properties, Navy contracted landscape services perform much of the landscape maintenance on the built environs, MCCS manages the green space around their facilities, and their Public-Private Venture partner contracts out their landscape and grounds maintenance. Natural Resources staff advises on appropriate vegetation for landscaped areas (i.e., *MCBH Landscape Manual*) and deals with invasive plants as well as pest control for landscape plants (Appendix D7).

The dumping of soil and green waste in open spaces not designated for that specific purpose (i.e., Base landfill, off-site private landfill) is not authorized.[4] In addition to potential CWA violations, dumping of these materials may spread seeds of highly invasive plants that are not naturalized in other areas (e.g., devilweed (*Chromolaena odorata*) at Camp Smith), and can create conditions for breeding of the recently introduced invasive pest species coconut rhinoceros beetle (CRB). Currently there is a two mile CRB quarantine area extending out from JBPHH, where this species was first discovered on O'ahu. This area encompasses Pu'uloa RTF, Manana, Pearl City Annex, and Camp Smith. All green waste from this area is either taken to

[4] Exceptions can be made for 'soil only' at locations like MCTAB where, upon O&T approval, it could beneficially reused for military training (e.g., heavy equipment training that requires moving around large volumes of soil).

Kalaeloa Barbers Point or to the Navy at Pearl Harbor for disposal in air curtain burners. This could change in the future due to manpower and equipment availability, storage capacity, and changing relationships and regulations with the Navy and State. Concerns related to the spread of devilweed and CRB prompted the creation of BMPs for landscape maintenance (Appendix D7).

Vegetation Management

Vegetation management efforts, with an emphasis on control of invasive species, are focused on improving habitat for protected species and creating a less fire-adapted plant regime to support military operations. Natural Resources staff, with interagency assistance, stays current on management issues and regularly monitors MCBH properties to detect and remove invasive weeds. Invasive plants are controlled using manual, mechanical, and chemical methods, with in-house, State, and contractor resources, and through volunteer activities. Constraints may dictate the methods, timing, and use of volunteers for vegetation control efforts. For example, access to portions of the Nu'upia Ponds wetland complex where recurring vegetation control efforts take place, is currently limited to certain authorized personnel due to the presence of chemical contaminants from munitions as well as MEC (Section 6.1.2; Figure 7a & 7b, Appendix B). In waterbodies and surrounding areas, including wetlands, only herbicides approved for use in and around surface waters may be used (Appendix E2).

Natural Resources staff provides technical assistance on reducing fire risk when vulnerable natural resources are involved (e.g., red-footed boobies and their habitat adjacent to the range's impact area; fire adapted invasive grass species that cover MCTAB). The O&T Directorate performs some mechanical vegetation management at their ranges (i.e., mowing) and the Facilities Department plays a role in controlling invasive vegetation at the KBRTF (e.g., mechanical vegetation removal/mowing, herbicide application).

The Federal Fire Department has primary responsibility for response and suppression of wildland fires at KBRTF and MCTAB under Base Order 3302.1 (Section 8.1.6). Due to the prevalence of flammable non-native vegetation in areas where Marines train, the use of pyrotechnic devices and tracer rounds is prohibited. Currently, MCBH policy is to suppress wildland fires. Prescribed burning is not currently used as a regular management tool for controlling flammable vegetation as the Base does not have qualified trained staff or adequate suppression equipment to perform such action. This unique management tool will be addressed in the *Integrated Wildland Fire Management Plan* (IWFMP).[5]

Efforts to control fire on KBRTF in Ulupa'u Crater are concentrated on pre-suppression activities. Completed projects provide defense-in-depth against fire risk to the birds and their habitat. They also reduce erosion effects of repeated brushfires that degrade the landscape and reduce its capacity to support weapons training (Table 7.5-1; Figure 13b, Appendix B). Vegetation management and fire management practices are periodically evaluated and updated so military training and bird protection needs can continue to be met.

[5] Prescribed burning can reduce the intensity and spread of wildfires by reducing the amount of fuel available. Although MCBH does not regularly employ prescribed burning as a management tool, prescribed burns have been conducted twice on KBRTF and never on MCTAB. Prescribed burns can be utilized only under very specific conditions (weather, fuel load, and moisture). Several factors must be taken into account when considering their use, with safety being the highest priority, followed by concerns of erosion. A procedure for conducting prescribed burns at MCBH will be developed in the *IWFMP*. The procedure will specify that those in charge of the burn have the requisite Federal Wildland Fire Qualifications and that all requests for prescribed burns will be technically reviewed by Natural Resources staff. It will also detail coordinated actions and efforts with other agencies such as HIDOH Clean Air Branch and USFWS.

Table 7.5-1. Burned Acreage at KBRTF (2012-2016)

CY	# of Fires	Acres Burned
2012	1	1.396
2013	2	0.644
2014	4	4.066
2015	4	4.323
2016	3	11.804

IMPLEMENTATION

GOAL 7.5: Landscape Maintenance and Vegetation Management

Maintain landscaped areas and manage natural vegetation through cost-effective, environmentally sound, sustainable practices, emphasizing use of native plants, habitat integrity, coastal protection, and water and soil conservation in a manner that supports training needs and natural resources conservation.

The set of objectives and projects/actions described below is designed to help reach Goal 7.5. The rationale and background for each of the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

Objective 7.5.1: Survey, inventory, characterize, and monitor vegetation.

This objective focuses on characterizing and mapping the vegetation on MCBH properties to assess the current status and help guide and prioritize management. Opportunities to perform vegetation mapping studies for MCBH properties will be sought based on need and availability of funds.

PROJECTS

GIS – Vegetation Feature Class (STEP – programmed)

A key part of vegetation management is characterizing and mapping vegetation cover on all MCBH properties as a baseline for evaluation of the health of vegetation communities, ecosystem stability, and the effectiveness of management actions. Examples of the potential utility of vegetation cover analysis include: BASH management, predator and nuisance animal management, storm water management, wildland fire management, NEPA compliance, and erosion control. Spatial information can be incorporated into existing SOPs and added to GIS, allowing for continual updating.

Vegetation types at each of the properties will be determined by gathering physical data attributes at random plots. Plots will be mapped to repeat measurements over time. A vegetation feature class or classes compliant with SDFIE 3.0 data standards that classifies terrestrial flora according to National Vegetation Classification Standard (Version 2) will be developed based on the field data.

Invasive Vegetation Inventory and Management Plan (STEP – programmed)

MCBH properties at Camp Smith, Pu‘uloa RTF, and Pearl City Annex have never been surveyed for invasive species; the focus of effort has always been Kaneohe Bay and MCTAB because that is where the most sensitive natural resources reside or where Marines train in vegetated areas.

An inventory is needed to comply with the National Invasive Species Act and to identify the occurrence, distribution, and status of invasive vegetation species that could degrade training sites or potentially spread to off-Base locations through recreational activities or construction activities (e.g., transporting soil with seed material off-Base). The inventory will support the development of vegetation management strategies. The field-based inventory will cover five properties and training areas: Kaneohe Bay, Waikane Valley, Camp Smith, Pu‘uloa RTF, and Pearl City Annex; MCTAB was inventoried in 2006.[6] Site specific management strategies will utilize information from the field-based inventory, *MCBH Invasive Species Management Study* (Garrison et al. 2002), cooperating entities (e.g., OISC, Hawai‘i DLNR), and other related studies and management activities.

Objective 7.5.2: Take a sustainable approach to managing and enhancing natural and man-made landscapes.

This objective focuses on implementing projects that take a sustainable approach towards landscape maintenance and vegetation management, including landscaped areas, naturally vegetated areas, and training areas. Since Natural Resources staff are not in direct control of landscape maintenance, this involves regular consultation with the Facilities Department, Family Housing, building managers, MCCS, Public-Private Venture partner (residential property manager), military operators, etc. to evaluate and recommend relevant improvements to their on-going practices for adherence to Base directives. This is usually implemented in the form of reviews of work requests, contract SOWs, and CATEX applications for projects to remove, replace, or plant trees, shrubs, and ground covers in specific areas. For other areas, including the WMA and training landscapes, Natural Resources staff focuses on vegetation management to remove invasive plants and install native plants to enhance endangered species and migratory bird habitats and reduce the risk of fire. Natural resources projects also include enhancing and beautifying the Base through landscaped tree plantings; over 150 trees have been planted since 2009.

ROUTINE MANAGEMENT ACTIONS

Landscape Beautification. Tree planting projects at MCBH have been ongoing since 1999 and will continue to be included in INRMP implementation. Projects are focused on incorporating native or non-native, non-invasive plants into military construction and landscaped project areas. These types of plants require minimal maintenance, are adapted to the hot dry environment of the Base, are drought tolerant, provide shade and cooling, support mental health with more green space, and enhance Base aesthetics.

[6] Several landscape studies have been conducted at MCTAB with the primary goal of managing wildfire risk. A property-wide study identified and mapped vegetation coverage that represent the highest wildfire risk zones (GII 2004). A follow-on strategy report recommended a ten-year prioritized approach to implementing vegetation management schemes in priority locations based on factors including military operator use and frequency and degree of wildfire risk (SWCA 2007).

Tree Maintenance Workshop. In June 2015, the Environmental Department conducted a one-day tree maintenance workshop for personnel who perform tree maintenance for the Facilities Department, MCCS, and Public-Private Venture partner. The class covered: tree biology; appropriate planting, staking, guying, and pruning techniques; a hands-on pruning demonstration; and proper chainsaw maintenance techniques. The workshop was well received and is planned to be repeated bi-yearly, or more frequently if requested.

Clear Roads and Trails to Provide Access. There are numerous roads and trails where vegetation must be cleared regularly to provide access for management activities such as bird counts, trapping, wetland monitoring, and sponsored recreational events.

Plant Trees at KBRTF. Trees at KBRTF provide nesting areas for the red-footed booby that inhabit the WMA located at the top part of the active range. Tree heliotropes, a Polynesian naturalized species, have been planted and this effort will continue as the existing highly invasive and very thorny kiawe trees die and/or are removed as needed to provide habitat. Any new trees planted at KBRTF will either be native or Polynesian introduced species (e.g., tree heliotrope, naio (*Myoporum sandwicense*), and naupaka (*Scaevola sericea*)). A consistent water supply during the establishment period of newly planted trees is critical to their survival. Tree planting is performed in conjunction with creating and maintaining artificial nesting platforms at KBRTF (COA 7.1). The intent is to eventually rid KBRTF of the undesirable kiawe as it is spreading to other locations on the range, especially into the impact area, where it may attract the red-footed boobies.

Operation of Wireless Controlled Water Cannons that Protect the Red-footed Booby Colony. The wireless controlled water cannons protecting the red-footed booby colony are operational (Figure 13c, Appendix B). Procedures for their operation will be developed in concert with the *IWFMP*. The current management issue is regular maintenance and operation of the water cannons. Since this is unusual technology with multiple maintenance requirements (plumbing, electronics, batteries, solar panels), obtaining a contract or in-house services to troubleshoot and maintain the equipment in good working order is proving a challenge.

Invasive Vegetation Control Activities. Natural Resources staff remains vigilant with respect to on-going invasive weed surveillance and control efforts.

Mud Ops. The annual “Mud Ops” event supported by the Combat Assault Company, 3d Marines’ AAV normally occurs in February, but may occur as early as late January or as late as the first week of March, just before the Hawaiian stilt (*Himantopus mexicanus knudseni)* nesting season to help control invasive pickleweed (*Batis maritima*) and enhance stilt habitat. This event has been conducted since its first trial run in 1970; timing is dependent upon the Combat Assault Company’s deployment schedule. In addition to providing unique and valuable training to Marines, this mutually beneficial action helps control the invasive non-native pickleweed and reshapes the mudflat substrate to provide a more attractive foraging and nesting habitat for the endangered Hawaiian stilt. This exercise also raises community awareness of the protection the Marine Corps affords the Hawaiian stilt and its habitat.

Weed Warriors. The Weed Warrior program was developed in the late 1980s. Regularly scheduled Weed Warrior events utilize the Sierra Club - a significant partner of this program for over 30 years, windward community individuals, military service members, and Base civilian volunteers to remove highly invasive non-native plants that encroach on and degrade endangered species and migratory bird habitat, fill in wetlands, and overwhelm trails and roads that provide access to various parts of Nu‘upia Ponds WMA. Target invasive plants include: mangrove (*Rhizophora mangle*), silver buttonwood (*Conocarpus erectus*), ironwood, koa haole, kiawe, Christmasberry, pluchea (*Pluchea spp*.), and Guinea grass (*Megathyrsus maximus*).

Sea Grape. Sea grape (*Coccoloba uvifera*), an invasive plant present in the area near the wedge-tailed shearwater colony known to harbor the invasive yellow crazy ants, is removed as part of general invasive plant control efforts at Kaneohe Bay. Access to this area is currently limited to authorized personnel (volunteers are not permitted) due to the presence of MEC, unexploded ordnance (UXO) and other hazardous munitions materials left behind from military live-fire training or testing decades ago (Figure 7b, Appendix B).

Fountain Grass. Fountain grass (*Cenchrus setaceum*) surveys, to include opportunistic identification of other unknown/undiscovered plants, are conducted biannually to identify and remove incipient populations at MCTAB (Figure 22g & 22h, Appendix B).[7] Monitoring surveys are conducted by Natural Resources staff with the help of HIARNG, OISC, and Bellows AFS—whose land at Bellows is included in the search. Fountain grass has heavily populated the ridgeline and downslope areas that separate Lanikai from MCTAB and Bellows AFS. Since 2014, pockets of fountain grass have been removed from peripheral areas of the MCAS airfield. In 2015, fountain grass was discovered on the back side ridgeline of Ulupaʻu Crater at Kaneohe Bay.

Fireweed. Fireweed (*Senecio madagascariensis*) is a species that is considered very invasive and is on the Hawaiʻi State Noxious Weed List. It was detected at MCTAB within TA-1 in 2009, however the exact location was not documented. Although fireweed continues to be surveyed for in conjunction with fountain grass, it has not been detected again.

Devilweed. In late 2014, OISC contacted MCBH to survey Camp Smith for a highly invasive plant known as devilweed (*Chromolaena odorata*), which was found along the State's Aiea Loop recreational trail. The Aiea Loop trail comes within 600 feet of the Camp Smith property boundary where there is no security/boundary fence to define the two properties. From 2014-2016 numerous surveys were conducted on Camp Smith by the OISC field crew because of the close proximity to Aiea Loop trail. A significant population of devilweed was found on Camp Smith, mainly in the forested areas. Seedlings and adult plants were also discovered in grassed mediums between roadways and parking areas. OISC has proactively supported MCBH by continuing to conduct surveys, map and GPS the locations, and, along with the occasional support of a U.S. Army contractor, conduct herbiciding operations.

Purchase of specialized equipment to perform invasive vegetation control. In some instances specialized equipment not currently owned by MCBH is required for vegetation management, in particular invasive species control. The need would arise if a new method or machine is found to be most effective, or if a new species not previously managed for is detected. This need would be above what has been included in the annual budget for equipment and supplies for Natural Resources Program support (COA 7.0.1). Currently, Natural Resources staff borrows a Facilities-owned chipper, when available, to dispose of woody vegetation removed during Weed Warrior events.

Harvest of Invasive Plants. Procedures (or possibly an SOP) will be developed for authorized harvesting of kiawe trees on MCTAB's training areas by the local and Base community to reduce the amount of kiawe spreading across TA-2 and TA-3. Procedures may also apply to Nuʻupia Ponds WMA. On MCTAB, this activity will need to be closely coordinated with the O&T Directorate.

[7] Annual fountain grass patrols at MCTAB began in 2001 when HIARNG Natural Resources staff first found an incipient fountain grass population on their leased parcel.

PROJECTS

MCBH Base Landscaping (STEP – programmed)

The latest scientific evidence indicates that the Hawaiian Islands will be getting hotter as a result of climate change. In addition, MCBH is losing green space and trees due to construction. Buildings and other non-reflective surfaces absorb radiation and release it as heat, forming 'heat islands', as opposed to cooler green spaces. It has been shown that temperatures under tree canopies can be significantly cooler, as vegetation intercepts radiation and produces shade, which helps to reduce heat release.[8] The INRMP promotes adding trees to reduce cooling costs in buildings and to provide cooler, shaded areas for those engaged in outdoor physical activity. This project will plant approximately 50 native or non-native, non-invasive trees bi-yearly or as funding allows, across green spaces on the Kaneohe Bay, Pu'uloa RTF, and MCTAB properties to help moderate temperatures and improve the quality of life for Base residents and workers.

Invasive Vegetation Control: H3-Kāne'ohe Bay (STEP – programmed)

Encroachment of invasive vegetation (e.g., mangrove, kiawe, Christmasberry, koa haole, Guinea grass) on a strip of land located between H-3 and the Kāne'ohe Bay shoreline, has deleterious effects on Nu'upia Ponds and other wetlands throughout the Kāne'ohe Bay ecosystem. Mangrove captures sediment around its roots that affects the health of nearby corals and invades natural mudflats. Invasive vegetation also blocks the view of Kāne'ohe Bay, allowing illegal netting and fishing to occur within MCBH's security buffer zone. Security concerns involve homeless people who have been found living in the vegetated strip and subsequently evicted by CLEOs.

This project will remove and maintain approximately seven acres of invasive vegetation along the Kāne'ohe Bay shoreline. Preferably, a contractor with a mulcher will be hired to remove the majority of the vegetation. Volunteers with hand tools will remove the remaining plants along the shoreline. Removal is necessary to improve water quality, help restore the health of the nearby corals, reduce security threats to MCBH, and protect natural resources under MCBH jurisdiction. Removal would also meet the requirements of the National Invasive Species Act to control invasive species on Federal lands. It will have benefits that transcend jurisdictional boundaries and help improve the health of the larger Kāne'ohe Bay ecosystem.

Invasive Vegetation Control: Nu'upia Ponds and Base Wetlands (STEP – programmed)

Invasive species are encroaching on the trails and unimproved roads in and around Nu'upia Ponds WMA. These trails and roads are critical to conducting management activities associated with endangered species, such as conducting bird surveys and counts and monitoring ESA species. The dense vegetation also makes it difficult to monitor illegal activities, conduct volunteer projects, and perform educational tours. Most of the educational exhibits that have been installed around the ponds are slowly disappearing from view, blocked by the heavy growth of vegetation.

Due to limited equipment and manpower, control of this 'jungle' of vegetation is no longer a scheduled maintenance item of the Facilities Department's Pest and Labor shop. The amount of area to conduct invasive vegetation control work is impossible to tackle with volunteers alone, nor does the Environmental

[8] https://www.epa.gov/heat-islands/using-trees-and-vegetation-reduce-heat-islands

Department have the personnel and equipment to perform these actions in-house on regular basis. This project requires biannual recurring funds to support a contractor to conduct invasive vegetation control.

Invasive Tree Replacement: Pu‘uloa RTF (STEP – in planning)

The highly invasive and very thorny opiuma (*Pithecellobium dulce*) has a formed a dense stand in the southwest corner of Pu‘uloa RTF. This tree has encroached on the shoreline spanning Pu‘uloa and on the impact berms of Alpha and Bravo Ranges. It is also spreading to other green spaces around the training area. It is shallow rooted and is extremely difficult to manage due to its prominent thorns. This project will eradicate the opiuma stand and replant with more favorable and appropriate native and non-invasive naturalized plants.

Integrated Wildland Fire Management Plan (STEP – in progress)

Marine Corps installations with burnable acreage, or bordered by burnable acreage, must fund, maintain, and implement an IWFMP that is consistent with the installation INRMP and Integrated Cultural Resources Management Plan (ICRMP) (MCO P5090.2A Section 11204.2.a) (Section 8.1.6). The need to complete this plan remains a finding as part of the biannual Environmental Compliance Evaluation. The *MCBH IWFMP* was initiated in 2008 by the O&T Directorate, with assistance from the Environmental Department’s previous Senior Natural Resources Manager, but was never finalized. Cooperating entities include USFWS, Federal Fire Department, and other Base Departments (i.e., Base Safety, Facilities). In early 2016 funding was secured, but subsequently withdrawn, to review the previous work, update or expand where necessary, and finalize the *IWFMP*. However, new funding is anticipated in 2017. Two new components to be added to the *IWFMP* will be to develop (1) procedures for conducting prescribed burns; and (2) an SOP for operating the new wireless controlled water cannons that protect the red-footed booby colony. The *MCBH IWFMP* will be cross referenced with Base Order 1500.9B SOP Ranges and Training Areas and the range’s internal SOPs. It is planned for completion by September 2018.

Maintenance and Repair of KBRTF Water Cannons Supporting Migratory Bird Conservation (STEP – programmed)

KBRTF provides training in small arms, direct and indirect weapon systems, fire and maneuver options, as well as high angle training capabilities. Thousands of Marines, soldiers, and law enforcement personnel train on this range annually. Ulupa‘u Crater is also home to a colony of a Federally-protected red-footed boobies; a colony that is well known to the local community, State representatives, and Federal partner agencies. The Crater is hot and dry, and covered with fire adapted grasses that burn readily once ignited. Since the colony is located in the heart of an impact range, fire suppression capabilities are limited. USFWS almost shut the range down in 1990 when a devastating fire swept through the colony as Marines prepared for Desert Shield/Desert Storm. Without the four water cannons, risk of a catastrophic fire sweeping across the booby colony would put a halt to all training, in the short-term at a minimum, quite possibly for years as the Marines could be engaged in lawsuits or have to fight injunctions to training. The death of hundreds of birds would incur a significant public outcry and agency recriminations.

The water cannon system, designed to act as a secondary fire suppression system to protect the migratory red-footed booby colony from fire, became operational in March 2016. The water cannons are strategically placed near several of the primary nesting areas to provide a secondary protective measure against an approaching fire. This capability also indirectly protects wildland fire response personnel from the dangers of being exposed to exploding ordinance. This system replaces the former wired-controlled water cannon

system, which became fully operational for a brief time.[9] The old system was replaced with four new wireless remote controlled solar powered water cannons, a new command console installed in a lifeguard tower, and an IR camera to detect hot spots. The water cannons are the last component to MCBH's "defense in depth" strategy to protect the colony and preserve our training capability.

Biannual maintenance and/or repair of the wireless remote controlled water cannons is necessary to keep them operational in the high salt environment in which they operate. Since the cannons will not be in constant use, and will only be tested quarterly, they would quickly become corroded and dysfunctional if they do not receive regular servicing. This project requests annually recurring funds to support a contractor to conduct regular maintenance and repair of the water cannons.

KBRTF Fire Suppression System (STEP – in planning)

Although the water cannon system acts as a secondary fire suppression system, there are gaps in coverage that make parts of the red-footed booby colony vulnerable to fire. This project would identify and design other potential fire suppression systems that would address these gaps in coverage and strengthen existing protective measures. Such systems may include a ground-based pop-up irrigation system.

[9] Water cannons were recommended in the *Ulupa'u Crater Fire Management Study* (BCH 2002). INRMP Project HI21008 Improve Water Delivery/Reduce Brushfire Risk was initiated in FY2003, and the water cannons were installed in 2005. Technical difficulties identified in a January 2006 performance test were resolved. In 2007, the cannons were successfully inspected and tested and Federal Fire Department staff were trained on their proper use (SRGII 2007b, 2007c). Final modifications to the equipment and a maintenance manual for the cannon system were under development by Navy staff in 2008, when a contractor working on a separate project to install erosion BMPs along the crater access road inadvertently cut the buried electrical lines servicing the cannons in multiple locations. MCBH then decided to proceed with a wireless operating system.

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7.6 NATURAL RESOURCES-BASED OUTDOOR RECREATION, OUTREACH, AND PUBLIC ACCESS MANAGEMENT

Change in Organization. This section has been reorganized to include outreach conducted in support of natural resources-based outdoor recreation, education, and public access activities. Outreach is the activity or process of bringing information or services to people, and includes developing educational materials and interpretive signs, conducting environmental tours and environmental service projects, providing natural resource briefs, and manning booths at community events (e.g., Earth Day). Outreach had previously been addressed in each COA, but given the overlap in both the type and way of distributing information, especially educating the public and active duty service members across a range of topic areas, it was more efficient and less redundant to consolidate the information.

MANAGEMENT ENVIRONMENT

Providing natural resources-based outdoor recreation opportunities has a significant role in enhancing quality of life for military personnel and their families and for the MCBH civilian workforce that supports the military mission. Use of natural resources for recreation and training carries stewardship responsibilities, which involves learning about and interacting responsibly with the natural environment without causing damage or harm to sensitive and unique wildlife, wetlands, plants, coastal, and marine resources.

Providing appropriate types and levels of public access to on-Base natural resources-based outdoor recreation opportunities is a requirement of the Sikes Act and is specified in MCO P5090.2A Section 11104.c: “Marine Corps lands will be available to the public for enjoyment and use of natural resources, except when a specific determination has been made by the installation CG/CO that a military requirement prevents such use for safety or security reasons, or when such use would cause substantial environmental degradation. A non-access or limited access determination will be explained in the installation’s INRMP.” Limited access at MCBH properties is outlined below:

All MCBH properties have limited access due to Base security requirements.

At **Kaneohe Bay**, WMAs have been established to protect sensitive resources (Figure 2, Appendix B). Access to these areas is limited and must be coordinated with Natural Resources staff. Some types of access also require Natural Resources staff and/or a safety and possibly medical escort to be present.

- Nu‘upia Ponds WMA is a controlled access area due to endangered waterbirds, endangered plants, ground nesting seabirds, buried Hawaiian remains and cultural artifacts, MEC, and chemical contamination from past use of munitions. On-going issues in this area include shoreline erosion, invasive species, illegal fishing, unauthorized training, unauthorized mountain bike use, people trespassing into the area with pets or for surfing off-shore, and hazards (e.g., unseen obstacles, holes, uneven terrain, deep mud along the shoreline).
- Ulupa‘u Head WMA is a controlled access area due to its location within an active weapons firing range, as well as the habitat it provides for protected migratory seabirds. Access is dependent on the range training schedule, and in many cases the availability of EOD and medical support.

At **MCTAB**, a recreational hunting program is in place that allows licensed and permitted individuals limited access to designated hunting areas (Section 4.3.2, Appendix E6 & E10). Public access to the beach, shoreline, and offshore areas of TA-1 is provided on weekends and holidays (Section 6.2.4) (Figure 23, Appendix B). Access to other areas of MCTAB is prohibited due to ongoing training exercises.

Waikane Valley Impact Area is a controlled access area due to the potential presence of unexploded ordnance. Access to traditional Hawaiian sites in the southern part of the property is allowed on a case-by-case basis with prior request and coordination through the Environmental Department (Section 4.3.3) (Figure 26, Appendix B).

Other than general access restrictions to the properties, there are no natural resources-related non-access or limited access determinations at Camp Smith, Pu'uloa RTF, Manana Housing Area, Pearl City Annex, or the Molokai Training Support Facility.

MCBH invites public participation in its INRMP implementation (Section 9, Appendix G1 & G2). All public access and volunteer activities are conducted within limits set by mission, safety, personnel availability, and natural resource sensitivities.[1] This is especially true at Ulupa'u Head WMA, which is adjacent to, and only accessible through, an active live-fire training range.

Natural Resources-Based Outdoor Recreation

Popular natural resources-based leisure pursuits on MCBH properties include swimming, snorkeling, diving, boating, kayaking, surfing, hunting, fishing, birding, camping, and scenic enjoyment. Per Section 11105.33 of MCO P5090.2A, outdoor recreation within the scope of an INRMP is to include any "program, activity, or opportunity dependent on the natural environment." It further states: "Developed or constructed facilities such as golf courses, tennis courts, riding stables, lodging facilities, boat launching ramps, and marinas are not included." These types of recreational activities are normally provided through MCCS. MCCS operates and maintains structures (e.g., marinas, camp sites, picnicking pavilions) and programs (e.g., fun runs, camping permits, scuba gear, and boat rentals) that facilitate public access to natural resources-based outdoor recreation.[2]

Base regulations provide overarching guidance on where and how the on- and off-Base public can participate in outdoor recreation leisure pursuits (Figure 14, Appendix B). Natural Resources staff plays a key role in environmental monitoring of recreational use impacts and periodically reviewing and evaluating the regulations. Natural Resources staff works with Military Police and the Base Inspector's office to modify and update guidance to remain compliant with military directives and Federal and State laws and regulations under fluctuating environmental conditions and security regimes. Natural Resources staff also focuses on protection and prevention that "such access does not conflict with military readiness and does not harm sensitive installation natural resources" (MCO P5090.2A Section 11200.3.c). Environmental Department staff evaluates MCCS activity-oriented outdoor recreation developments largely through the NEPA process. CLEOs play a lead role in enforcing natural-resources based outdoor recreation rules (e.g., fish harvesting limits, off-road activities, hunting). Relevant Base Orders include:

Base Order P5233.2: Pet and Wildlife Regulations. Details authorized and prohibited animals, control of pets, licensing and registration requirements, prohibited activities with regard to wildlife, violations and penalties, and staff responsibilities (Appendix E8).

[1] See also Section 5.4 for details on how the MCBH INRMP is implemented with consideration for health and safety risks to children.

[2] Contained fires and alcohol consumption for those of legal drinking age on all MCBH Kaneohe Bay beaches were authorized by the MCBH Commanding Officer in 2016. Through a CATEX and related consultation, NOAA Fisheries and USFWS provided concurrence that fire rings may affect, but are not likely to adversely affect, monk seals or sea turtles as long as mutually agreed upon conservation measures are implemented (Appendix C2).

Base Order P1710.1: Base Recreational Activities. Details recreational activities including locations and types of activities that are permitted and prohibited. Section 1004 details the current fishing regulations, permit requirements, species take limits, and areas where fishing is permitted and prohibited. Includes maps depicting areas open to fishing and water sports as well as the Nu'upia Ponds Recreational Running Trail (Appendix E4, E5, and E9).

Base Order 5090 Environmental Compliance & Protection Standing Operating Procedures (ECPSOP). The ECPSOP includes all applicable organizational and environmental compliance policies and procedures and establishes environmental program roles and responsibilities. Chapter 8: *Wildlife, Marinelife, Land, and Water Resources* specifically establishes policy and responsibilities for compliance with Federal statutes, and MCBH and Marine Corps regulations that govern protection and preservation of natural resources at all MCBH installations.

Fishing. The MPD Animal Control Officers manage the public fishing permit program on Base as well as the Military Police volunteer auxiliary program that helps provide oversight of fishing regulations.[3] The Animal Control Officers may issue up to 200 fishing permits to non-DoD civilians each quarter on a first-come, first-served basis subject to a background check and required classroom training on State and Base fishing regulations. CLEOs provide enforcement when necessary. Rules and regulations, many of which are aimed at protecting marine resources, are strictly enforced. A flyer outlining MCBH Fishing Regulations is distributed with permits, during community events, and at mandatory briefings like the New Arrivals Orientation (Appendix E4). Copies are also provided to the Marina and Base dive shop and posted on the Environmental Department website.

Nu'upia Ponds Recreational Running Trail. A running trail winds its way around the southern perimeter of Nu'upia Ponds. Rules and regulations for the Nu'upia Ponds Recreational Running Trail are provided on the Environmental Department website and to military personnel and family members at informational briefs (Appendix E5). Due to environmental concerns, any sponsored organized group activities planning to conduct a run utilizing this trail must have NEPA review and receive approval from the Environmental Department. Use is permitted only during daylight hours; no pets or unaccompanied children and young adults (under age 16) are allowed on the trail; no cadence chanting is allowed; harvesting or collecting of natural or cultural resources and harassing or disturbing wildlife is prohibited; and motorized vehicles are allowed only on the perimeter service road if they are involved in maintaining Base facilities (effluent main, underground utilities), associated with environmental projects, or by permission of Natural Resources staff (per Base Order P1710.1 and conditions agreed to with USFWS under a Section 7 ESA informal consultation).

On-site interpretive exhibits are used to raise awareness about the Base's natural resources and their threats. The Nu'upia Ponds Recreational Running Trail has signs indicating it is a noise restricted area, stipulating that no dogs or other pets are allowed, marking prohibited areas, and conveying natural resources interpretive information. Natural Resources staff regularly monitor the ponds to ensure that unauthorized personnel or community pets have not accessed the WMA.

MCTAB Recreational Area. MCTAB TA-1 beach, shoreline, and seaward offshore areas are open to the public for day use and permitted camping on weekends and Federal and State holidays through a license of use agreement with the CCH Department of Parks and Recreation (Figure 23, Appendix B).[4] The most

[3] Active duty, retired and reserve military personnel, their dependents and house guests, civilian personnel employed aboard MCBH, current MPD Animal Control Officer auxiliaries, civilian personnel who were employed and retired aboard MCBH, and children younger than 13 years old when accompanied by a person entitled to fish do not need fishing passes. Persons in this category may fish 24 hours a day.

[4] Public use is permitted from 1200 Friday through 0800 Monday.

current license agreement with CCH to manage recreational use of the lands at MCTAB open to the public was in effect from October 1, 2004 through September 30, 2009. It is currently in holdover status, automatically renewing monthly until the Base takes action to enforce the new terms of the agreement that were identified (and mostly adopted) in the *Marine Corps Training Area Bellows Training Area 1: Recreation Use Feasibility Study* (Helber Hastert & Fee 2010). This study was conducted due to the illegal activities and severe degradation of the natural resources occurring in TA-1 but not being addressed by CCH. The license agreement outlines activities that CCH must control and manage and dictates coordination with the Honolulu Police Department for patrol and enforcement during periods when the beach is open to the public. While the license agreement requires proper management of recreational use of the campground and beach in MCTAB TA-1, CCH has a poor record of management and enforcing the rules and regulations. They primarily clean the bathrooms and pick up large amounts of trash left behind after the weekends, as required, but are not meeting the other provisions of the license agreement. For example, neither the "no pet" policy nor the "no ground fires" rules are enforced. The campground is poorly organized, promoting a "free-for-all" parking situation when open to the public. One of the more damaging issues that has been ignored by CCH is illegal off-road driving on the beaches and within the day-use area. Natural Resources staff installed a line of boulders and procured warning signs to be installed along Tinker Road to inform the public regarding what activities are not permitted beyond the rock barrier that lines TA-1/Tinker Road (i.e., no ground fires, no off-road vehicles, no pets, no camping) (Appendix G3).

Recreational Hunting. In September 2014 MCBH initiated a recreational hunting program at MCTAB to expand the types of available recreational opportunities (Section 6.2.4). The program allows bow hunting for feral pigs for a limited number of people in designated hunting areas at MCTAB (Appendix E6 and E10). Rules and regulations for hunting are contained in Base Order 1711, Hunting Regulations for MCBH.

Base Order 1711: Hunting Regulations for Marine Corps Base Hawaii.[5] Details regulations and procedures governing hunting at MCBH including requirements for securing hunting permits, prohibited activities, and off-limit areas. Includes a description and map of the hunting areas at MCTAB, as well as information on hunter ethics and safety.

The hunting program is open to DoD affiliated personnel, active or retired civilian employees of MCBH, other uniformed services, and sponsored civilians. All hunters are required to pass a background check for access to MCBH, and have a valid Hawai'i State hunting license and a Base hunting permit. To obtain a Base hunting permit the applicant must pass a written exam on the Base Order and demonstrate archery shooting proficiency.

Hunting times are scheduled on weekends and holidays when there is no training taking place. Access for hunting is allowed from one half hour before sunrise to one half hour after sunset and is currently limited to six hunters at a time. Hunters are required to check-in and check-out with MCBH. No-shoot areas and off-limit areas have been established to protect people, property, and natural and cultural resources.

The recreational hunting program at MCTAB is administered by the O&T Directorate with technical guidance from Natural Resources staff. As provided for in the Sikes Act, recreational hunting programs on military installations may be implemented, provided they are consistent with the conservation of natural resources. Per the Engle Act of 1958, all hunting, fishing, and trapping activities on military installations must be conducted in accordance with State fish and game laws and appropriate State licenses must be obtained for these activities on the installation. Recreational hunting, a natural resource-based outdoor

[5] Issuance of this Base Order cancelled Base Order P1710.1 Section 1001.1.c prohibiting hunting.

recreation activity, required a policy change and completion of an EA, as hunting was previously prohibited on all MCBH properties.

Recreational hunting is not allowed at any other MCBH property, with an exception made for Camp Smith.[6] The O&T Directorate has penned a draft order to revise hunting regulations associated with Camp Smith, however there are some concerns with allowing this activity at this location. Natural Resources staff has been working with partners to control devilweed, a highly invasive plant that has spread throughout the forested area to the north of Camp Smith. The impact of a hunting program on the ability to control the spread of this invasive plant is of concern as it reproduces easily, and may be dispersed through seeds and vegetative pieces hitchhiking on shoes, clothes, and equipment of hunters. Hunting pressure may also have an impact on USDA Wildlife Service's ability to effectively trap feral pigs that forage on Camp Smith.

Off-Base Recreation. Many Marine Corps service members and their families participate in a variety of off-Base recreational activities that have the potential to impact natural resources. Given the high turnover of Base personnel, MCBH assists in educating individuals about relevant State rules and regulations to ensure protection of these resources and helping to ensure that persons associated with the Base engage in safe and legal activities. Participation in illegal recreational activities can result in a criminal citation that can adversely impact a service member's career and reflect negatively on MCBH.

Off-road vehicle (ORV)/off-highway vehicle (OHV) activity is popular with service members and the off-Base community. MCBH prohibits ORV/OHV use on-Base since there are no suitable areas. Evidence of this illegal activity has been noted on MCTAB's shoreline and beach and at Waikane Valley. The Environmental Department has worked in collaboration with others to disseminate information about legal and illegal locations to use ORVs/OHVs. Ka‘ena Point State Park, located on the northwestern end of O‘ahu, has seen years of uncontrolled illegal ORV/OHV use that has impacted natural and cultural resources and disturbed park users. To combat this, in 2014 a portion of the park was established as a controlled vehicle access area where ORVs/OHVs are permitted on designated routes. Users are required to obtain a free permit that allows users to access the regularly changing gate combination online. Disregard for the conditions of the permit can result in revocation of the permit and other penalties.

Haiku Stairs (also known as "Stairway to Heaven") is a steep hiking trail in the Ko‘olau mountain range in Kāne‘ohe on the windward side of O‘ahu. Thousands of people illegally access the 3,922 step route each year. It has been closed to the public for safety reasons and because access requires trespassing on private property. In February 2016, the Honolulu City Council requested via letter (Appendix E7) to the CO, that MCBH help disseminate information to Base personnel that the Honolulu Police Department is committed to a zero tolerance approach to those caught trespassing on and around the Haiku Stairs area, and that criminal citations will be issued for violators.

Natural Resources-Based Outreach

MCBH has a rich abundance of natural resources that are accessed by the general public and the Base community for recreational and training purposes. There are many activities that utilize natural resources or put people, both off-Base and on-Base, in close proximity to them. It is important to educate people on these resources and how to interact with them responsibly to protect these resources from degradation due

[6] Camp Smith is mainly an administrative area confined by public housing, a State recreational hiking trail (no hunting allowed), and Halawa Valley. In March 2016 the MCBH CO authorized five active duty service members to bow hunt pigs on Camp Smith through July 1, 2017 (Section 6.4.3).

to overuse, misuse, or inadvertent harm. This will help ensure the natural resources are available now and for future generations.

Outreach regarding MCBH natural resources assists in building interest in stewardship, raising awareness of management issues, continued participation in service projects, and responsible use of outdoor recreational resources. Educational material (pamphlets and interpretive exhibits) covers the range of natural resource types and related activities. It includes information on protected species (plants, birds, marine resources), invasive species, endangered species habitats, wetlands, beaches, vegetation management, conservation measures, reporting procedures, and permitted and prohibited activities. The overarching goal of outreach efforts is to disseminate this information to as wide of an audience as possible in an effort to limit the impact of human activities on natural resources.

The target audience for outreach is broad and is reflected in the way that educational materials need to be developed and presented. It includes all individuals living and working on-Base, visitors to areas with sensitive resources that might not be aware of them (e.g., Nu‘upia Ponds WMA, Ulupa‘u Head WMA, Pali Kilo beach cottages, beaches), and people engaged in natural resources-based recreation (e.g., fishing, snorkeling, boating, scuba diving, hunting).

In addition to educational tours and natural resources service projects during which participants receive a brief pertinent to their activity from Natural Resources staff, educational materials are distributed during orientations and briefings, and both temporary and permanent signage are used to inform. There are four main types of educational materials that are used, depending on the venue.

Printed material. Informational pamphlets, flyers, and posters are particularly useful for conveying information when there may not be any direct contact with a person (e.g., poster hung in a common area), if there is a large audience (e.g., brochures at orientations), or the information is associated with permissions and the user must remain informed (e.g., fishing flyer with regulations). The Base newspaper, *Hawai‘i Marine*, which provided a regular forum to educate the public on natural resources issues and events included the ‘Environmental Corner’ as well as feature articles, ended production in 2015.

Signage. Signs are a relatively low cost way of conveying information to target audiences as signs usually remain in place for years. In developing and placing signs MCBH considers the most effective location to reach the target audience. For example, temporary warning signs inform beach users it is illegal to bother nearby resting monk seals and sea turtles if they haul-out in an area people frequent. Permanent interpretive signs at the Temporary Lodging Facility and along the Nu‘upia Ponds Recreational Running Trail inform users of prohibited activities.

Websites and Videos. Websites and videos remain one of the best ways to convey information to a large number of people. Natural Resources staff maintains the information posted on the natural resources webpages of the Base website. MCCS also has links to the natural resources webpages on their public website. MCBH has produced a 15 minute video that highlights the Base’s natural resources and explains how to protect and responsibly interact with them. Three five minute videos (webisodes) were developed that focus on Mōkapu Peninsula’s resident migratory and endangered birds, its coral reefs, and on the annual event known as Mud Ops. The shorter videos were produced with the intention of posting on the internet.

Natural Resources-Based Public Access

Natural Resources staff provides limited staff-escorted, public access to MCBH's sensitive natural resource areas to engage in service projects and/or participate in environmental education-focused tours and presentations. Thousands of individuals from on- and off-Base, mostly in groups such as military service members; Boy Scout troops; Sierra Club; Audubon Society; and a variety of school, church, and civic organizations, have enjoyed activities including: enhancing wildlife habitat by clearing invasive vegetation; participating in annual Audubon Christmas bird counts; conducting nature trail maintenance; and cleaning up shoreline trash. Many of these activities recur regularly (Table G1-1). For example, a local native Hawaiian *halau* was granted Base access to collect leaves from indigenous *hala* (*Pandanus tectorius*) trees. Participants help maintain the health of the trees and beautify the landscape at no cost to MCBH, and acquire material for use in non-profit, educational activities that perpetuate the Hawaiian art of *hala* weaving. The Natural Resources section has hosted the Sierra Club High School Hikers multiple times beginning in the 1980s. For details on numbers and types of groups, projects, and places where these activities have taken place, see Appendix G2. The legal authority under which Natural Resources staff can accept public volunteers to engage in service projects as described in this paragraph and in Appendix G1 and G2 is contained at 10 USC 1588(a)(2).

Public access programs have reaped many rewards in terms of enhanced quality of life, community awareness, and respect for the many special natural resources under MCBH care. Funding is being sought for a contracted Outreach Coordinator to maintain consistency in these efforts. The following goals, objectives, and management actions are being implemented to provide continuous improvement in this area.

IMPLEMENTATION

GOAL 7.6: Natural Resources-Based Outdoor Recreation, Outreach, and Public Access Management

Support high quality, natural-resource-based (not activity-based) outdoor recreation, outreach and education, and controlled public access, consistent with natural resource conservation.

The set of objectives and projects/actions described below is designed to help reach Goal 7.6. The rationale and background for each of the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

Objective 7.6.1: Inventory and monitor public engagement activities and their potential impact on natural resources

This objective focuses on identifying the types of natural resource-related activities that the public engages in and whether they directly or indirectly impact natural resources.

PROJECTS

Recreational Use Assessment: Beaches of MCBH Kaneohe Bay (STEP – in planning)

A recreational use assessment will focus on MCBH Kaneohe Bay, and will inventory and evaluate natural resources-related outdoor recreation activities occurring on and around beaches. This will include determining how many people are using the beaches, what kinds of activities they are engaging in, and how recreational activities are affecting natural resources. It will include assessment of some off-shore uses, including scuba or free diving for spear fishing and octopus harvesting, and potential impacts on corals (COA 7.4). The assessment will recommend improvements in management (e.g., improved education, enforcement) to minimize impacts on sensitive natural resources and to maintain recreation at sustainable levels. Restrictions on access and activities will be considered for locations with sensitive resources (e.g., Beach Cottage Cove, Pali Kilo Cove). The evaluation is necessary to balance pressures of outdoor recreation with priority uses of land and water spaces to support the military mission while minimizing impacts to sensitive natural resources under MCBH stewardship.

Recreational Fishing Survey (STEP – in planning)

A creel, or angler survey, is used to gather information from recreational fishers. Data, including number, types, and size of fish; fishing methods; and hours fished, is collected from individual anglers. Analysis provides information about the effort, harvest, and size distribution of target species of fish, along with an idea of fishing quality and recreational pressure. Creel surveys were recommended in the *MCBH Coral Reef Ecosystem Study* (Shafer et al. 2002). A limited creel survey was conducted in 2011, following an approach similar to and building upon baseline data gathered in 2002 (Carnevale and Allen 2011). Repeating surveys over time provides managers with information to engage in adaptive management.

Objective 7.6.2: Promote and enhance opportunities for public engagement in natural resources management-related activities

This objective supports providing opportunities for natural resources-related recreation, outreach, and public access in a manner consistent with MCBH's military mission, security concerns, natural resources sensitivities, and quality of life goals. Related programs are operated both by Natural Resources staff and coordinated through other MCBH units (e.g., MCCS, MPD, O&T Directorate).

Outdoor Recreation

ROUTINE MANAGEMENT ACTIONS

Routine management actions are aimed at improving awareness of recreation uses, impacts, and constraints regarding MCBH natural resources.

Nu'upia Ponds Recreational Running Trail. Natural Resources staff opportunistically assess and improve user awareness of environmental constraints associated with the Nu'upia Ponds Recreational Running Trail, including, but not limited to those associated with rules and regulations outlined in Base Order P1710 (Appendix E5 & E9). Signs detailing the rules are located at each end of the trail. Guidance

on using the running trail for events (i.e., a group larger than 10 people) is accomplished through NEPA or permitting review for each event.

Review/Update Base Fishing Regulations. Input from the Environmental Department helps refine parameters included in Base Order P1710.1: Base Recreational Activities based on regulatory responsibilities and information on sustainable fisheries (Appendix E4 & E9). Information from opportunistic surveys, State regulations, and anecdotal information gained from queries to Natural Resources staff regarding approved fishing locations, appropriate fishing practices, catch limits, appropriate fishing gear, and obtaining permits help guide this input.

MCTAB Recreational Hunting. Natural Resources staff plays a technical advisory role in managing the recreational bow-hunting program for feral pigs at MCTAB (Appendix E6 & E10). On-going coordination with the O&T Directorate is conducted. Natural Resources staff periodically evaluates the hunting program to ensure this activity is not degrading training lands, streams, or wetlands; impacting protected species; or impeding nuisance animal control efforts.

Outreach

ROUTINE MANAGEMENT ACTIONS

MCBH will continue to improve existing environmental education, communication, and on- and off-Base public participation activities to enhance awareness and appreciation of natural resource-related sensitivities in a manner consistent with MCBH's military mission and quality of life goals.

Informational Sessions. Natural Resources staff participate in informational briefs to convey and discuss MCBH natural resources and management issues. For example, Natural Resources staff supports the Environmental Department's bi-monthly "Environmental Awareness" class in which each of the department's component areas (e.g., Compliance, Natural Resources, Cultural Resources) provide an hour long brief on their subject matter area. Natural Resources staff provides briefings to any unit on Base upon request. Common requests include a natural resources presentation in support of safety stand-downs and "Back in the Saddle" briefings.

Planned Base or Community Events. Natural Resources staff has manned a booth at Base-wide events (e.g., Earth Day, Volunteer Opportunity Fair, National Night Out), as well as supported off-Base community events (e.g., Bishop Museum's "Science Alive"). These types of activities are meant to reach broad cross sections of the on- and off-Base communities to make them aware of the natural resources over which MCBH has stewardship responsibility; to educate them on how to interact with resources without causing damage or harm; and to advise them how they can help protect and preserve sensitive and unique wildlife, habitat, and marine resources.

Educational Materials. Natural resources interpretive information used for outreach must be reviewed regularly for currency with regard to laws and regulations, species status, and protection and conservation measures. Many agencies and organizations in Hawai'i use interpretative information and often work together to develop these materials. MCBH uses a combination of in-house and contracted resources to accomplish updates and production, sometimes in conjunction with information provided by outside agencies and organizations.

Printed Material. MCBH currently has little printed material available for distribution. The available material was developed about a decade ago and needs updating. Informational pamphlets on other natural resource concerns need to be developed, with a priority on developing materials that inform what people aboard MCBH can do to help address ongoing issues. Examples would be a pamphlet detailing issues related to free-roaming and feral cats and the negative effects of feeding wildlife; and a brochure to be placed in all Pali Kilo beach cottages to educate people about the sensitive nature of marine resources (e.g., coral reefs, marine mammals), fishing regulations, and appropriate behavior to avoid impacts. MCBH is working with Federal, State and private (Bishop Museum) partners to produce a guide for terrestrial, marine, and paleontological resources conservation. These agencies have existing material that could be co-opted for use in other MCBH informational material.

Signs/Exhibits. Regulatory, warning, or interpretive signs and exhibits are used at MCBH properties to inform users at a particular location about items of interest as well as prohibited activities. Production and installation of signs is on-going as needed. Most signs are permanent, but a few are placed temporarily (e.g., when a Hawaiian monk seal or sea turtle hauls-out onto a beach). The condition of signs is monitored, and they are updated and replaced as time, staff, and funds allow. Warning signs about on-going issues such as beach/shoreline erosion, coral reef protection, dogs on beaches, removing sand, unauthorized ground fires, etc. need to be developed, fabricated, and installed. Areas where certain behavior is illegal/unauthorized need to be clearly identified for the CLEOs to be able to enforce Base, State, and Federal regulations and dispense citations that will hold up in a court of law or to the Base magistrate. This has resulted in an increased necessity to install numerous signs in the vicinity of sensitive natural resources to inform the general public of unacceptable and harmful behavior.

Videos. Videos produced in 2015 are being reproduced in quantity for distribution to unit training sections, MCCS, the Public-Private Venture partner, schools, and at public venues and briefings. Units can incorporate them into orientations or training sessions. Mōkapu School would find them valuable for educating students. MCCS marketing is working with Natural Resources staff to develop ways to get the 15 minute natural resources video out to a wider audience. Development of more natural resource videos is planned.

Website. Several years ago the Marine Corps changed to a standard website format that has proved challenging for organizing natural resources information. The natural resources webpage of the Environmental Department's website needs updating, revisions, and better organization to make information more readily accessible and easier to find. Ongoing maintenance and revision of the natural resources webpage is also necessary. Improvements will include providing more detail on existing natural resources, ongoing management issues and applicable laws and regulations; and better organization and display of information. The site should be user friendly, making information easily accessible and providing enough detail to inform yet not overwhelm. Webisodes can be posted on the web for ease of distribution and to increase viewer access.

PROJECTS

Outreach Coordinator (STEP – programmed)

At present, Natural Resources staff coordinate public outreach and volunteer partnering. In general, there are more opportunities and volunteers than there are staff and time to effectively coordinate them. By funding additional staff or creating a cooperative partnership involving public outreach and volunteer

coordination, an increased segment of the community could be engaged. Public outreach and volunteer engagement are important to developing a shared community ethic of environmental stewardship and responsibility.

A person dedicated to performing outreach and education is needed to brief military and non-military personnel on a variety of natural resource issues (e.g., invasive species, coral reefs, ground fires, feral and domesticated animal control, beach use, pet owner responsibilities, native plants and landscaping, and endangered species). The Outreach Coordinator would coordinate volunteer projects and give educational talks and seminars for schools, community groups, and members of the public; lead volunteer field trips; develop outreach/educational materials (pamphlets, videos); maintain, improve and manage the natural resources website, and work collaboratively with Federal and State partner agencies (e.g., NOAA, USFWS, DLNR) and affiliate organizations (i.e., OISC).

Main responsibilities of an Outreach Coordinator would be:

- Develop information pamphlets and interpretive exhibits pertaining to MBTA and ESA-listed terrestrial and marine species.
- Design and install protective measures (e.g., regulatory and interpretive signs) to safeguard endangered species and their habitats.
- Educate the Base community about MCBH's wildlife and marine life and the need to protect and preserve these species and their habitat.
- Provide educational briefings to civilian and military members.
- Coordinate volunteer activities to control invasive vegetation encroaching on endangered species habitat.
- Coordinate volunteer activities to conduct shoreline/beach/waterway clean-up events.
- Coordinate all requests for tours and access to Nu'upia Ponds and Ulupa'u Crater WMAs.
- Conduct tours of Nu'upia Ponds WMA and migratory seabird colonies.
- Manage all outreach events involving the general public (e.g., Earth Day, National Night Out, Environmental Awareness briefs).

Environmental Learning Center (STEP – in planning)

Natural Resources staff operates out of Building 1359 at MCBH Kaneohe Bay. The building is regularly utilized for meetings and trainings with people from various departments and agencies. Although the building already has some wall displays, Environmental Department staff envision developing it into more of a "learning center". The learning center would inform people about the Base's natural and cultural resources, management activities, and upcoming events using posters, displays, hands-on items, and take-away brochures and flyers. An underutilized room in the building would be the hub of the learning center with the hallways containing professionally produced wall displays.

Nu'upia Ponds Recreational Running Trail Signage (STEP – in planning)

Existing signage along the Nu'upia Ponds Recreational Running Trail identifies restrictions (e.g., noise, pets) and provides interpretive information. Additional signage is needed to clearly identify the pathway, entry and exit points, prohibited areas, and update natural history/interpretive information. Some signs have already been fabricated but, due to staff shortage and heavy workload, have not yet been installed (Appendix G3).

MCTAB TA-1 Educational Material (STEP – in planning)

Existing signage at MCTAB instructs the public about prohibited activities (Section 6.2.4 and Appendix G3). Interpretive exhibits and educational materials are needed to inform the public about sensitive natural resources in the publicly accessible campground and beach areas of TA-1.

Public Access

ROUTINE MANAGEMENT ACTIONS

Regularly engaging the on- and off-Base public in natural resources-related activities raises community awareness of the unique species and habitats at MCBH, along with management prescriptions that are in place to protect them.

Support for Scientific Research. Natural Resources staff is frequently called upon to review and comment on requests for outside organizations and individuals (e.g., USFWS, PhD students) to conduct research on MCBH properties. Requests to perform scientific research must have a nexus to the natural resources program and support its management objectives in order to be approved. MCBH has standard procedures for requesting permission to conduct research activities (Appendix D8).

An example of an approved research project, conducted during the summer of 2016 at MCBH and other O‘ahu locations, is banding and tracking of endangered Hawaiian common moorhens. The project, conducted by a PhD candidate from Tufts University, seeks to inventory O‘ahu’s population of Hawaiian common moorhens, understand inter-wetland movement patterns, and ascertain the connectivity between separate populations of these birds. Bands placed on the birds will be left on after the study is completed, providing opportunity for on-going monitoring. The project will also yield genetic data from feather samples, which will enable direct estimation of bird origin (by comparing bird genotype with the gene pools of other wetlands on O‘ahu) and population-level estimation of movement rates (how often, on average, birds move between Mōkapu Peninsula and surrounding wetlands).

Support for Educational Tours and Service Projects. Natural Resources staff accommodates on- and off-Base public access requests for resource-compatible educational tours and service projects as limited time and staff permit (Appendix G1 & G2). MCBH has standard procedures for requesting access for educational tours and service projects (Appendix D9).

Visitation to the colony of red-footed boobies at Ulupa‘u Crater is one of the most requested natural resources related tours at MCBH. Due to the colony location, access to view the birds requires a military EOD and possibly medical escort. Tours to the core of the colony are very limited during nesting season and on a staff-available basis for all other times. Tours view the colony from Lollipop Road access unless otherwise permitted. The Christmas bird count, which falls outside of nesting season, is conducted from the core of the colony. Activities that are part of the military mission that require access through the booby colony (e.g., water cannon maintenance, military target placement or removal) are performed as needed.

MCBH has a long history of engaging the public in service projects, particularly habitat enhancement projects that benefit protected species (Section 9). While invasive vegetation removal is the most common type of service project, volunteers may also conduct beach clean-ups and repair artificial nesting habitat. Monitoring activities (e.g., bird counts, whale counts) are also conducted.

As most of the duties to perform feral and free-roaming animal control were passed to USDA Wildlife Services, the GS-09 Wildlife/Bioscience Technician position was refocused and the position description revised to include outreach duties (Section 4.4.1). Should the Outreach Coordinator position be funded, the Wildlife/Bioscience Technician would continue to assist in performing outreach duties. By refocusing some of the Wildlife/Bioscience Technician's duties and obtaining a dedicated Outreach Coordinator, the intent is to improve outreach program coordination and support with on- and off-Base stakeholders who participate in natural resource-based projects and tours.

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7.7 RESOURCE INFORMATION MANAGEMENT

MANAGEMENT ENVIRONMENT

Resource information management at MCBH has several components: archival storage and document management; natural resources databases; and spatial GIS data. Though partially overlapping, each plays a key role in supporting planning, technical assistance, training, encroachment management, public access, and community outreach in multiple topic areas and properties covered by MCBH's INRMP. Both geographic and non-geographic data must be readily available, in digital or hard copy format, for effective and efficient decision support for military training exercises, sustainable land/water/air uses in support of military needs, addressing natural resources regulatory compliance concerns, and resource management. Having natural resources data in electronic format makes them readily accessible for rapid retrieval, required reporting, interagency sharing, and evaluating effectiveness of natural resource management activities. Without a natural resources data storage and retrieval system, MCBH would be at increased risk of losing valuable 'corporate memory' needed to meet compliance required reporting requirements and address future management needs.

Archival Storage and Document Management

A wealth of data has been accumulated since the mid-1960s beginnings of a natural resources management program at MCBH (e.g., text, images, video, artwork, oral histories) in multiple media formats (e.g., electronic, magnetic, paper). The information is graphic (e.g., cartographic, audiovisual, artistic) and non-graphic (e.g., textual, numerical, statistical) in nature.

There is a continuing need to inventory, organize, and store data to facilitate accessibility for historical reference, trend analysis, and decision support. Significant progress has been made to inventory, archive, scan (paper documents), convert to more modern and stable electronic formats, store (e.g., acid free containers), and retrieve data (e.g., electronic inventory and retrieval system). INRMP Project HI20015 Natural Resources Data Archive/Electronic Retrieval System, started by the previous Senior Natural Resource Management Specialist, was funded in phases from FY03 – FY11. Upon her departure and resultant staff transition, additional information that had been collected over a thirty year period and stored in file cabinets, was digitized, but has yet to be organized and catalogued.

Natural Resources Databases

The Environmental Department collects a range of data, regularly and opportunistically, in support of its natural resources management program. Types of data required to support management include: wildlife population sizes and distribution, vegetation types and distribution, fire frequency and affected areas, and quantitative and qualitative information on marine species.

At MCBH databases are used to track natural resources information including bird counts, predator control activity, unique species sightings, and volunteer efforts (Table 7.7-1). They are also used to track the status of projects, budgets, and INRMP actions to 'benchmark' progress, improve INRMP implementation, and help complete compliance reporting. Databases are maintained in a range of formats – Microsoft Word tables, Microsoft Excel spreadsheets, Microsoft Access databases, and GIS databases, and include spatial and non-spatial information. Most of the work in developing, maintaining, and updating the databases has

been performed by Natural Resources staff or in-house contractors. New data are entered into electronic databases as collected, while historic data are transposed into electronic format based on need as time allows.[1]

Table 7.7-1. MCBH Natural Resources Databases[2]

Database	Data in Database From[3]	Database Format
Birds		
Bird-Handling Data (Includes Shearwater Fallout Data)	1984	Excel
Hawai'i DLNR Semi-Annual Waterbird	1993	Access
Opportunistic Waterbird Data	2006	Access
Audubon Christmas	2001	Access
Laysan Albatross Observations/Handling	1984	Excel
Marine Species Haul-outs		
Monk Seals	2010	Excel
Sea Turtles	2010	Excel
Predator/Nuisance Animal Control		
Cage-Trapping	1992-2006	Excel
Cage-Trapping (Pigs and Chickens)	2007	Excel
Cage-Trapping (Cats and Mongoose)	2007	Access (GIS-linked)
DOC250-Trapping	2009	Excel
Rodenticide Application	2005-2013	Excel
DOC250/Bait Station Locations	2010	GIS
Recreational Pig Hunting	2014	Access
Natural Resources Service Projects & Labor Hours	2006	Excel
Natural Resources Access, Tours & Presentations	1999	Excel

Geographic Information System Data

Spatial data is essential for natural resource management, including land use planning, habitat assessment, protected species management, and nuisance species and predator control. The detailed spatial data that has been maintained for years will also be a valuable resource in monitoring for and adapting to climate change. Spatial data enhances the value of survey data and supports analysis of changes over time. Data should be current and regularly updated, accurate, documented using metadata, and maintained in a format that facilitates sharing.

A GPS unit is an important tool for gathering spatial information pertaining to natural resources. The Environmental Department uses Garmin and Trimble GPS units to collect spatial data in support of natural resource management and emergency response.

[1] MCBH houses all data electronically. Hardcopies of any data collected prior to 2006 are only destroyed after being entered into the electronic system.

[2] The table identifies the span of years for which MCBH has electronic records of these data and the format of the data in the database. Additional detail, including descriptions and data summaries, is available from Natural Resources staff.

[3] In some instances data was not collected every year following the initial data collection.

The Environmental Department uses an ESRI ArcGIS platform to manage and manipulate geospatial information. Geospatial information is currently housed in the national level Marine Corps GIS data repository GEO*Fidelis* and managed at the Base-level by the Facilities Department.[4] The Environmental Department subject matter experts (e.g., natural and cultural resources managers) work closely with the in-house Geographer/GIS Specialist and Facilities Department personnel to review and confirm accuracy of any GIS layers in GEO*Fidelis* within their areas of expertise and ensure updates as needed. In addition, Natural Resources staff maintains a separate set of natural resource GIS data that is required for local use, but does not need to be or is not 'ready' to be integrated into the Base-wide or Marine Corps repository. The Environmental GIS (EGIS) may contain monitoring data, working files, sensitive information, etc. It is important for this data repository to maintain similar standards as GEO*Fidelis* in terms of data quality.

Table 7.7-2. MCBH Natural Resources EGIS Databases[5]

Layer Name	Data	Preferred Data
Features Developed and/or Maintained by Natural Resources Staff		
WildlandFire	Fires at Ulupa'u Crater	Current Data
LandManagementZoneWildlife	Ulupa'u Crater and Nu'upia Ponds WMAs	Current Data
NestingPoint	Bird nesting locations	Current Data
SpeciesRangeFauna	Monk Seal critical habitat areas, ineligible areas, and excluded areas.	Current Data
TrappingLocation	DOC250 locations	Current Data
Vegetation	Empty	NVCS vegetation[6]
SpeciesRangeFlora	Empty	Current Data
SpeciesRangeFloraPoint	Fountain Grass points, Trees planted in 2010	Current Data
SpecialStatusSpeciesArea	Nama area	Current Data
SpecialStatusSpeciesPoint	Maiapilo locations, Ohai locations	Current Data
NaturalResourceResRecProject	Waimānalo Stream Floodway Restoration	Current Data
Wetland	Delineated wetlands	Current Data
WetlandPoint	Wetland delineation sampling locations	Current Data + link to datasheet pdf files
NaturalWaterbody	Nu'upia Ponds and the open water portions of other wetlands	Current Data
WaterFeatureArea	Waimānalo Stream and MCDC	Current Data

[4] GEO*Fidelis* is the USMC Installation Geospatial Information and Services program for Installation and Environmental geospatial products and services. MCBH is supported by the GEO*Fidelis* West Regional Center, which provides data and application hosting. Installation data is stored in a central database environment and only accessible by authorized staff. The system disseminates GIS data and software to MCBH users via Intranet Web Mapping and Citrix portals. MCBH retains data ownership and can focus on GIS analysis and data management. https://www.sdsfieonline.org/Components/USMC

[5] MCBH Data Dictionary 3.0.0.1, May 2016

[6] To be gathered by STEP Project *GIS – Vegetation Feature Class* (COA 7.5.1).

Layer Name	Data	Preferred Data
Watershed	Incomplete: Some of the watersheds for the Koolaupoko Region	All watersheds for O‘ahu (available from State)
NaturalResourceSurveyArea	A polygon that covers TA-2 and TA-3 at MCTAB	Benthic Mapping Data (2008 and 2013 and MCTAB data)[7]
NaturalResourceSurveyLine	Audubon Christmas Count route	Benthic Mapping Data (2008 and 2013 and MCTAB data) Christmas Bird Count Route
NaturalResourceSurveyPoint	Empty	Benthic Mapping Data (2008 and 2013 and MCTAB data)
Features Co-Managed by Environmental and other MCBH entities (MCCS, O&T, Facilities)		
FishingArea	Fishing and Water Sports layer (Base Order P1710.1)	Current Data
RecreationTrail	Official Recreational Trails	Official Recreational Trails (need Camp Smith)
RecreationArea	Courts, fields, etc., MCTAB hunting areas	Current Data
RecreationFeature	MCTAB hunting parking locations, KBay archery range	Current Data

IMPLEMENTATION

GOAL 7.7: Resource Information Management

Develop and use information management ‘tools’ to assist in implementing the INRMP and supporting integrated natural resources management on MCBH properties.

The set of objectives and projects/actions described below is designed to help reach Goal 7.7. The rationale and background for each of the management actions are explained as necessary. Details on STEP projects can be found in Appendix F2 (e.g., project ID, costs).

[7] Data to be provided by USFWS upon completion of survey and reporting (COA 7.4).

Objective 7.7.1: Inventory and maintain natural resources information and data for currency, accessibility, reporting, and management decision support.

Maintaining a comprehensive inventory of information to support natural resources management requires consistently adding new information and conducting recurring inventories of natural resources data. Ensuring archival storage of these data (in hard copy and/or electronic form), and that bibliographic catalogues and ready retrieval systems to access these data are current, understandable and accessible, is imperative to maintaining information that is easy to find. Standardization of data collection, entry, and filing processes also assists in ease of use.

ROUTINE MANAGEMENT ACTIONS

Archival Data Maintenance. Natural Resources staff archive information (e.g., project reports) in digital format categorized by INRMP COA. Existing bibliographies need to be updated to include historical information that has been digitized, but not organized and catalogued. These databases will be improved to make future additions, data searches, accessibility, and document retrieval easier.

Natural Resources Data Maintenance. Management of MCBH's protected species and associated habitats and pest species relies on accurate, up-to-date information. Natural Resources staff routinely use and maintain currency of existing natural resources databases to track information. Natural Resources staff also review existing databases to ensure relevant and timely information is being collected. Natural Resources staff coordinate with external partners as needed to obtain new information relevant to MCBH natural resources management (e.g., data collections by Federal and State agencies).

Spatial GIS Data Maintenance. Inventory of spatial data identifies new information as well as gaps that need to be filled. Natural Resources staff develop new spatial data layers as needed. The EGIS is periodically reviewed to evaluate natural resources data for inclusion into GEO*Fidelis*.

Manage GIS Data According to Latest DoD Standards. There is an on-going need to regularly review and update all relevant natural resources GIS data files and associated metadata to ensure compliance with established DoD standards. These include Spatial Data Standards for file management, file naming and version control, and Federal Geographic Data Committee compliant metadata. In addition, data should be evaluated for accuracy and to ensure that essential database information is included with the data layers.

PROJECTS

Historical Natural Resources Information Archiving (STEP – in planning)

Progress has been made to digitize and catalogue historical natural resources information collected over the years. There is a need to continue this process for the remaining and future documents.

Objective 7.7.2: Improve natural resources information and data.

The Environmental Department must have access to current information for decision-making. Changes to the status of natural resources may create a need for additional information to guide management decisions. This can involve adding new types of information to existing databases or files, or creating new databases or files detailing emergent issues.

ROUTINE MANAGEMENT ACTIONS

Natural Resources staff make on-going improvements in data collection protocols and processes to insure data is available in a timely manner and in a format useful for decision-makers.

Natural Resources Database Management. New databases are developed as needed. Existing databases may be revised or updated to incorporate information not previously included but necessary to guide management decisions under changing conditions. For example, if monk seal haul-outs increase, as is predicted for many areas in the main Hawaiian Islands, recording additional information such as length of stay or pupping events may be desirable to help guide decisions regarding military training and recreational uses.

Spatial GIS Data Management. Although much progress has been made in standardizing natural resources-related spatial data, there are ongoing issues related to the need for consistency in applying naming conventions, documenting metadata, maintaining current data sets, and defining protocols, including interdepartmental responsibilities, for geodatabase maintenance. These topics are regularly addressed in coordination with the Facilities Department and management of the GEO*Fidelis* system.

Digital Data Exchange. Within MCBH, geospatial data is accessible via the GEO*Fidelis* system and the Environmental Department maintains control over additional natural resources databases. In addition to being used internally, this information should be available to other agencies, contractors, and various stakeholders, where appropriate, in a timely manner, with appropriate controls over ownership, distribution, and update. Some data may be unsuitable for public sharing due to security concerns or other sensitivities.

The Environmental Department ensures that contractors requesting natural resources data follow established protocols for requesting and providing natural resources digital data. Standard language is included in all contracts involving natural resources-related investigations to ensure delivery data sets that are compliant with the *MCBH Specifications for Digital Data* (Appendix D10). This protocol is updated per HQMC or other Federal guidance as needed.

Project Documentation and Closeout. When projects managed by Natural Resources staff are completed, select files are maintained for documentation. An internal procedure for project closeout is needed to outline what happens when a project ends, what types of files need to be saved, and where saved files should reside (e.g., Sharepoint). The procedures would also contain instructions for ensuring that proper documentation from NEPA compliance is retained in an Administrative Record.

SECTION 8
RELATIONSHIP OF OTHER PLANS AND PROGRAMS TO INRMP

MCBH attempts to be a good steward of its lands and natural resources as "it is imperative to sustaining and enhancing mission readiness and maintaining access to training areas".[1] In addition to complying with environmental laws, regulations, and policies, five practices are identified in the Commanding Officer's Statement on Environmental Stewardship for all MCBH personnel to demonstrate commitment to environmental stewardship.

Continually improve its environmental performance through a systematic environmental management program. This will be an integral part of our day-to-day decision-making and long-term planning.

Continue to assess our activities to determine their impacts on the environment and actively seek opportunities to improve the effectiveness and efficiency of our environmental management.

Protect our natural and cultural resources to the maximum extent possible. We will meet this challenge with dedication and focus to conserve the natural and cultural resources with which we have been entrusted. We will also work to identify and clean up contaminated sites.

Integrate a pollution prevention ethic into all activities through source reduction, resource recovery, and recycling. Sound pollution prevention practices improve the efficiency and effectiveness of our operations while preserving the environment.

Maintain strong community relations by partnering with our neighbors and regulatory agencies to enhance stewardship of the environment, create goodwill, and build trust. The environment affects everyone.

The Environmental Department plays a key role in facilitating stewardship, both Base-wide and with off-Base entities. MCBH has a presence in several regions around O'ahu. As a responsible environmental steward, MCBH must ensure compatibility of its land use activities with those of others. This section summarizes the key interrelationships of other on- and off-Base plans and activities to the MCBH INRMP that are consistent with and complementary to the management actions detailed in Section 7. It references where the other plans may be obtained for more information.

8.1 CONSISTENCY WITH OTHER MCBH PLANS

Guidance on INRMP preparation stipulates that INRMPs shall be prepared or revised in coordination with other installation plans including, but not limited to: installation master plans, range plans, training plans, ICRMP, pest management plans, Bird/Aircraft Strike Hazard reduction plans, and installation restoration plans (HQMC 2006).

8.1.1 MCBH STRATEGIC PLAN

The *MCBH Strategic Plan* (MCBH 2016) outlines the Base's mission, lines of effort, and vision to set the conditions for readiness of operating forces. They are achieved by ensuring a safe and secure operating environment, and providing tenant operational and organizational support. The plan states that "MCB Hawaii is dedicated to responsible management of our resources. This goes well beyond acting as good

[1] Commanding Officer's Statement on Environmental Stewardship
http://www.mcbhawaii.marines.mil/Portals/114/WebDocuments/IEL/Environmental/Environmental Stewardship.pdf

stewards of our taxpayer-provided resources – people, funding, and property. MCB Hawaii's faithful commitment to preserving our environment, supporting innovative sustainable energy initiatives, and conserving resources wherever possible is embedded in many aspects of our operations. We realize that long-term viability is not achievable without long-term preservation of our operating environment and the surrounding buffer areas." Execution of the *MCBH Strategic Plan* is assessed by the CO. The plan is maintained by the Business Performance Office.
Website: http://www.mcbhawaii.marines.mil/Portals/114/WebDocuments/SPE/StrategicPlanApr16.pdf

8.1.2 MCBH MASTER PLAN

The *MCBH Master Plan* is the official planning document for MCBH (HHF Planners 2016 in prep). The plan describes existing facilities, development constraints, and recommended land uses to be carried out in future facilities planning and development. It cross-references relevant sections of the MCBH INRMP. The Master Plan covers MCBH Kaneohe Bay, MCTAB, Camp Smith, Manana Housing Area, Pu'uloa RTF, Pearl City Annex, and Molokai Training Facility. The Master Plan is maintained by the Facilities Department. It is currently being updated and should be finalized by the end of Calendar Year (CY) 2016.

8.1.3 MCBH INTEGRATED SUSTAINABILITY PERFORMANCE PLAN

Section 14 of EO 13693: *Planning for Federal Sustainability in the Next Decade*, requires Federal agencies to develop, implement, and annually update an integrated Strategic Sustainability Performance Plan. The *MCBH Integrated Sustainability Performance Plan* provides perspective on how sustainability is strategically integrated into the overall operation of MCBH to supplement and reinforce existing Base strategies and initiatives (MCBH 2013b). This plan outlines: the completed sustainability baseline assessment; goals and objectives; action plans; important roles and functions; integration with strategic planning; integration with other plans and management systems; sustainability team development and roles; and sustainability training and culture.

8.1.4 RANGE AND TRAINING PLANS

Integration of the INRMP with the military mission is important to sustaining training opportunities. This is accomplished, in part, by coordinating INRMP management actions with military operators in the O&T Directorate and designing INRMP actions to be compatible with military training actions and plans. Range and training plans are maintained by the O&T Directorate, manager of the MCBH training areas (Table 4-1, MCBH Organizational Chart) as per Base Order P1500.9B: Standing Operating Procedures for MCBH Ranges and Training Areas (Short Title: SOP for Ranges and Training Areas).[2] MCBH performs range environmental vulnerability assessments (REVA) every five years as required by DoD Directive 4715.11 *Environmental and Explosives Safety Management on Operational Ranges within the United States* and DoD Instruction 4715.14 *Operational Range Assessments*. The purpose of the REVA program is to identify whether there is a release or substantial threat of a release of munitions constituents from the operational range or range complex to off-range areas. The most recent REVA covers the period of munitions loading from 2008 through 2013 (Arcadis 2014).

8.1.5 ENCROACHMENT CONTROL PLAN

MCO 11011.23 establishes the Marine Corps Encroachment Management Program to prevent, mitigate, and repair mission constraints caused by encroachment in order to support and enhance the readiness of Operating Forces and tenant commands on Marine Corps installations. "Encroachment refers to the factors

[2] Base Order P1500.9B is currently being updated.

that degrade or have the potential to degrade the Marine Corps' capability to conduct current and future military testing, training, and general mission activities". The MCO directs Installation Commanders to prepare an Encroachment Control Plan to describe their encroachment management strategy and actions. The *Encroachment Control Plan Marine Corps Base Hawaii* details installation and community actions that may obstruct military missions currently and in the future and sets forth a plan for addressing those encroachment issues (Marstel-Day, LLC 2012).

8.1.6 INTEGRATED WILDLAND FIRE MANAGEMENT PLAN

MCO P5090.2A mandates that Marine Corps installations with burnable acreage, or bordered by burnable acreage, develop and implement an Integrated Wildland Fire Management Plan (IWFMP) and that it be consistent with the installation's INRMP and ICRMP. Although MCBH does not currently have an approved IWFMP, there are various studies, SOPs, and plans that address fire risk and response methods. This includes the O&T Directorate's wildland fire management and response protocols embodied in Base Order 3302.1, All Hazards Force Protection Plan, Appendix 11: Fire Response Management to Annex C (Operations) and the *Ulupa'u Head WMA Fire Management Plan* (BCH 2002). MCO P5090.2A provides clear guidance for the standards, components, and programs to be consolidated into a centralized IWFMP.

In 2008 the O&T Directorate initiated the development of an IWFMP/EA covering Range and Training Areas, including Ulupa'u Head WMA and MCTAB. Colorado State University's Center for Environmental Management of Military Lands was contracted as they have prepared similar plans for the U.S. Army and other clients in Hawai'i and are very familiar with Hawai'i's unique ecology and wildland fire issues. The IWFMP is still in draft form and the Environmental Department has assumed responsibility for finalizing the Plan and associated EA (COA 7.5) (Center for Environmental Management of Military Lands in prep.). MCICOM provided funding in November 2016 to complete the development of the IWFMP; it is anticipated to be finalized by June 2018. Complementary to these initiatives, INRMP actions focus on identifying areas of highest wildland fire risk through such projects as vegetation mapping studies; developing a vegetation management strategy for MCBH ranges; and funding activities and projects to reduce invasive, fire-prone grasses (COA 7.5). These INRMP actions are primarily the responsibility of the Environmental and Facilities Departments.

8.1.7 INTEGRATED CULTURAL RESOURCES MANAGEMENT PLAN

The *Integrated Cultural Resources Management Plan (ICRMP), Marine Corps Base Hawaii 2014-2019* encompasses the entire range of cultural resources issues at MCBH and provides guidance to direct them and meet legislative as well as military mission requirements. The ICRMP provides a forum to examine long-term management goals, to establish short- and long-term priorities, and to develop strategies to meet these goals. The Environmental Department staff work together to ensure that natural resource projects receive appropriate reviews under cultural resource laws and regulations, and vice versa. The ICRMP is maintained by the Cultural Resources Managers in the Environmental Department and was last updated in 2014 (Tomonari-Tuggle 2014).

8.1.8 MCBH LANDSCAPE MANUAL

The *MCBH Landscape Manual* was completed in 2014 (MCBH Environmental Department 2014) and supersedes the *Landscape Study for Marine Corps Base Hawaii* (HDA 2002). The manual is maintained by Natural Resources staff. It is the authoritative document for planting and maintaining MCBH trees and the landscaped environment. The manual promotes the use of native plants, identifies appropriate planting and pruning techniques, and provides guidance in protecting and preserving trees in construction zones. The manual includes three plant lists for use in landscaping projects on MCBH properties: *Approved Plant*

Material – Native Hawaiian & Polynesian Introduced Plants, Approved – Non-Native Plants, and *Prohibited Plant Material* (containing invasive and/or high maintenance species). The most current lists (2014) include approximately 200 plants approved for use on MCBH properties and about 125 plants that are prohibited. Any plant considered for a landscape project not identified on the approved plant list must be reviewed and approved by Natural Resources staff.

8.1.9 MCBH INTEGRATED PEST MANAGEMENT PLAN

An update of the *MCBH Integrated Pest Management Plan* is currently undergoing final review (NAVFAC Pacific 2015). The IPMP covers pest management programs including integrated pest management principles (for invertebrate pests, weeds, and vertebrate pests such as rodents), health and safety considerations, environmental considerations, and schedules of pest control and authorized pesticides. The plan describes pest management requirements; outlines the resources necessary for surveillance and control; and describes the administrative, safety, and environmental requirements of the pest management program including the laws, regulations, and military instructions for proper use and disposal of pesticides. The IPMP describes significant invasive species of concern and outlines recommended precautions for reducing risk of spread. The GS-11 Natural Resources Management Specialist in the Environmental Department is the Installation Pest Management Coordinator and works with the Facilities Department and a NAVFAC Pacific or Naval Environmental and Preventative Medicine Unit 6 (NEPMU-6) entomologist to maintain and implement the IPMP. The GS-09 Wildlife/Bioscience Technician in the Environmental Department assists in implementing aspects of the plan. These staff have relevant certification in pesticide application.

8.1.10 BIRD AIRCRAFT STRIKE HAZARD PLAN

MCAS at MCBH Kaneohe Bay is subject to BASH requirements (COA 7.1; and Section 4.5.3 of the *MCBH Invasive Species Management Study*, Garrison et al. 2002). Reducing the threat to human lives and aircraft and sustaining aircraft safety are key aspects of MCBH's military mission. Birds such as cattle egrets, mynas, doves, owls, and shorebirds on and near runways could damage aircraft and pose a risk to human safety. A *BASH Plan* is maintained by MCAS personnel, who provide oversight of the BASH program (Marine Corps Air Facility 2006). The plan, which requires regular updates, was last reviewed in 2014 and found to be compliant. This plan mirrors the organization of BASH programs at other Navy airfields. Annex B, Section 7 of the BASH Plan identifies tasks and responsibilities to be conducted by the Environmental Department, Facilities Department, and the MPD Animal Control Officers.[3] Environmental Department staff coordinates regularly with the MCAS airfield manager to ensure that the policies and guidelines outlined in the plan are implemented to reduce the bird and mammal hazards by making airfields and areas adjacent to runways less attractive to wildlife. USDA Wildlife Services provides their services to manage potential BASH incidents from the airfields, runways, and taxi approaches.

8.1.11 STORM WATER MANAGEMENT PLAN FOR MCBH KANEOHE BAY

The *Storm Water Management Plan for MCBH Kaneohe Bay* (SWMP) was developed to meet Federal and State storm water compliance regulations (Title 40 of U.S. CFR: Protection of Environment; NPDES Permit Program; HAR Title 11, Chapters 54-55; Clean Water Act) (MCBH 2016). The SWMP is designed to describe and ensure the implementation of practices to reduce the pollutants in storm water discharges associated with certain activities and to ensure compliance with the NPDES permit issued for MCBH. The

[3] The activities (e.g., manage grass height, minimize standing water, remove dead animals) are primarily the responsibility of the Facilities Department and the MPD Animal Control Officers, with Natural Resources staff playing an oversight role.

NPDES permit requires the preparation of a SWMP. The MCBH SWMP contains both a Storm Water Pollution Control Plan and a Monitoring and Reporting Program Plan, as required. The SWMP describes: the industrial facilities associated with MCBH; potential sources of storm water pollutants; the storm water drainage system and receiving waters; the storm water pollution prevention team; the program related to non-storm water discharges to storm water systems; BMPs for minimizing and eliminating the discharge of pollutants into storm water runoff; and activities associated with monitoring and reporting. The SWMP was commissioned and is maintained by the Commander, Pacific Division, Naval Facilities Engineering Command.

Many of the management actions described in Section 7 of the INRMP are complementary to and overlap in their intent with the SWMP. Implementation of wetland and watershed improvement/erosion control projects have and will continue to assist in reducing nonpoint source discharges to storm water systems or to waterways (COA 7.2 and 7.3).

8.1.12 Solid Waste Management

Solid waste policies at MCBH are guided by executive orders and DoD plans and implemented through the *Integrated Solid Waste Management Plan MCBH* (ISWMP) (NAVFAC 2012) and the *Trash Reduction Plan* (MCBH 2015). The ISWMP describes the historic and existing sources of solid waste generated by MCBH activities; how and where they are disposed of; and recommendations for improving solid waste management. MCBH has an aggressive solid waste reduction program and an active Recycling Center under Environmental Department management that have been instrumental in significantly reducing the volume and types of waste streams that enter the landfill, thus extending its useful life. The *Trash Reduction Plan* is required to comply with the conditions of the NPDES Municipal Separate Storm Sewer System Permit (MS4) and outlines control measures and BMPs to reduce solid waste (trash) loads into the storm sewer system.

The *MCBH Kaneohe Bay Sanitary Landfill Operations Plan* (MCBH 2012a); the *Update Sanitary Landfill Implementation Plan MCBH Kaneohe Bay* (MCBH 2012b); and the *Groundwater Protection Plan MCBH Kaneohe Bay Municipal Solid Waste Landfill* (MCBH 2004) provide guidance on the operation of the MCBH landfill, where some solid waste is disposed of.

8.1.13 Spill Prevention, Control and Countermeasure Plan and Integrated Contingency Plan

In compliance with the Oil Pollution Act (1990) and other Federal directives as summarized in MCO P5090.2A (Chapter 7), MCBH maintains response capability with a *Spill Prevention Control and Countermeasure Plan* (MCBH Environmental Department 2011) and an *Integrated Contingency Plan* (MCBH Environmental Department 2012). Both plans are currently being updated and are expected to be finalized during CY2016. The *Spill Prevention Control and Countermeasure Plan* establishes procedures to prevent an oil spill and to document existing oil spill prevention structures, procedures and equipment with recommendations for additional equipment if needed. The plans specify response strategies, including the resources required (manpower, boats, booms), water depths at response locations, and ecological sensitivity of response locations. MCBH activities that pose spill threats are also identified. Under the *Integrated Contingency Plan*, regular spill drills are conducted with other agency partners involved in implementing the *Area Contingency Plan* (ACP). While the ACP identifies some of the environmental sensitivities in Kāne‘ohe Bay, it does not adequately address reef ecosystems. All participating agencies in the ACP share in the burden to more adequately address reef ecosystems – not just MCBH. The U.S. Coast Guard is the primary agency responsible for emergency oil spill response in Hawaiian waters and has the authority to take control if appropriate action is not being taken by the responsible party. In the

event of a major spill from a non-MCBH responsible party that threatens Kāneʻohe Bay, the Coast Guard would initiate a coordinated response among local stakeholders under the ACP, including agents from USFWS, NOAA Fisheries, Hawaiʻi DLNR, and HIDOH.

8.1.14 ANTI-TERRORISM/FORCE PROTECTION PLAN

MCBH maintains Base Order 3302.1, All Hazards Force Protection Plan, which includes coverage of emergency response protocols in the event of natural disasters such as tropical cyclones, hurricanes, tsunami, storms, floods, and earthquakes. The Environmental Department spill response coordinator is a member of the team of MCBH functional managers that must be available on a 24-hour basis to help implement appropriate response actions.

8.1.15 INSTALLATION RESTORATION PROGRAM

The Installation Restoration (IR) Program identifies, investigates, cleans up, or controls hazardous substance releases from past waste disposal operations and spills for contaminated sites on Navy/Marine Corps lands. The USFWS is particularly interested that military installations address possible effects to natural resources from environmental contaminants due to past or contemporary releases to the environment.[4] Cleanup is mandated by CERCLA (Comprehensive Environmental Response, Compensation and Liability Act) and SARA (Superfund Amendments and Reauthorization Act) to protect public health, welfare, and the environment. MCBH is an active participant in this program. The MCBH IR Program policy and responsibilities are detailed in MCO P5090.2A Chapter 10. Details of the IR Program covering MCBH lands are coordinated under the Compliance section of the Environmental Department and in cooperation with the U.S. Air Force IR Program covering MCTAB lands transferred from Bellows AFS to MCBH. The IR Program coordinators ensure that appropriate internal staff and stakeholder agencies provide review and comment during the development of decision-strategies on cleanup actions. These stakeholder agencies include, but are not limited to, USFWS, NOAA Fisheries, and Hawaiʻi DLNR, whose staff have particular expertise and concern about the release of environmental contaminants and their effects on natural resources.

IR sites are present at MCBH Kaneohe Bay, MCTAB, and Camp Smith. There is some overlap between IR sites undergoing contamination investigation and removal, and ongoing INRMP actions. For example, the area covered by IR site #1 (H-3 Landfill) includes the Temporary Lodging Facility Wetland; the area covered by IR site #2 (Quarry Pit Landfill) includes the Motor Pool Wetland; and IR site #8 (Salvage Yard Waste Storage Area) is adjacent to the Salvage Yard Wetland. In these and other IR sites, close coordination is maintained between IR staff and Natural Resources staff to ensure that the contamination studies and any remedial action recommendations are coordinated and consistent with INRMP goals, objectives, and management actions.

Some INRMP actions may involve soil disturbance at locations where past soil contamination may be present to some degree but are not eligible for IR consideration. In these areas, the appropriate mitigation is pre-disturbance soil testing, ensuring that chosen methods of soil removal and disposal are legally approved to match the level and type of contaminants that may be present, and conducting interagency consultation during the planning and environmental review process. There are no inconsistencies or conflicts between the INRMP and the IR Program. USFWS is interested in ensuring that the environmental

[4] As stated in a USFWS Memorandum of July 31, 2001 on Regional Internal Review Procedures and Coordination of Department of Defense Sikes Act Integrated Natural Resource Management Plans (generated by the California/Nevada Operations Office), and further discussed at an August 2, 2001 meeting between USFWS and Hawaiʻi-based military coordinators of INRMPs.

effects of contaminants on affected wildlife are adequately addressed. Management actions in this INRMP specifically address this area of concern related to minimizing likelihood of contemporary releases of oil or hazardous substances and ensuring MCBH performs appropriate actions as a Natural Resources Trustee (COA 7.4). Website: http://www.mcbhawaii.marines.mil/Departments/Installations,EnvironmentLogistics/Environmental/EnvironmentalRestorationProgram.aspx

8.1.16 MILITARY MUNITIONS RESPONSE PROGRAM

After DoD uses munitions for their intended purposes, explosive, health, and environmental hazards may be left behind. Munitions response sites are discrete locations that are known or suspected to contain unexploded ordnance, discarded military munitions, or munitions constituents. The MMRP, a comprehensive program within the Defense Environmental Restoration Program, was established to address the potential health, safety, and environmental issues caused by past DoD munitions related activities.[5] The program establishes which sites, located in areas other than operational ranges, are considered munitions response sites. The sites undergo response actions to investigate where and how much of this material is still present and set priorities for removal and remedial actions. Several areas at MCBH are part of this program.

Under the MMRP, focused clean up occurred at Waikane Valley Impact Area in 2014 and 2015 (Section 4.3.3). Proposed plans for clean up and controlling use of the former moving target range (MTR) and the former Trap and Skeet Range, both located within Nu'upia Ponds WMA, have been presented for public review and MCBH is in the process of coordinating the final remedy in coordination with HIDOH (Section 6.1.2). The former MTR contains important nesting and feeding habitat utilized by birds protected under the MBTA, principally wedge-tailed shearwaters. Plans were developed in close coordination with Natural Resources staff to identify alternatives that would cause the least amount of disturbance to these species and ensure that remedial action recommendations are coordinated and consistent with INRMP goals, objectives, and management actions. Website: http://www.mcbhawaii.marines.mil/Departments/Installations,EnvironmentLogistics/Environmental/EnvironmentalRestorationProgram.aspx

8.1.17 NATURAL RESOURCES TRUSTEE AND NATURAL RESOURCES DAMAGE ASSESSMENT

MCO P5090.2A, Sections 11104.6.a. and b. explain that CERCLA as amended by SARA (Part 101, Section 6) provides a Federal 'Superfund' to clean up uncontrolled or abandoned hazardous waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. CERCLA designates the U.S. President as trustee for Federally-protected or managed natural resources on behalf of the public. Natural resources include: "land, fish, wildlife, biota, air, water, groundwater, drinking supplies, and other such resources." In addition, the National Oil and Hazardous Substances Pollution Contingency Plan designates DoD as one of the Federal agencies to be a Natural Resources Trustee. Hence, MCBH must act as a Natural Resources Trustee for those resources it manages in its lands and water parcels. Trustee responsibilities include, but are not limited to: notification of a natural resource injury, loss, or threat when it occurs or is first discovered, and follow on response actions; cooperating with on-scene coordinator/regional project manager in coordinating assessments, investigations, and planning; and carrying out a plan for restoration, rehabilitation, replacement, or acquisition of equivalent natural resources (Section 7.4.2, 2001 INRMP/EA).

[5] For information see: http://www.denix.osd.mil/mmrp/.

Information collected as part of ongoing inventory and monitoring practices at MCBH contribute to Natural Resources Damage Assessments if and when resources are impacted by oil spills, hazardous waste sites, or vessel groundings. For example, marine resource inventory surveys that have been conducted in the last eight years (USFWS 2008a; USFWS and USGS 2013, 2017 (in prep)) provide an improved working knowledge of specific locations of coastal and marine resources that may help tailor responses to threats, more quickly identify and evaluate possible damage, and facilitate restoration, rehabilitation, and replacement of marine or coastal resources.

8.2 CONSISTENCY WITH OTHER LAND USE PLANS, POLICIES, AND CONTROLS

8.2.1 FINAL INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR BELLOWS AIR FORCE STATION (AFS), O'AHU, HAWAI'I

The MCBH MCTAB property lies adjacent to Bellows AFS, necessitating coordinated management of natural resources issues of shared concern. Bellows AFS is under the jurisdiction of the Detachment 2, 18th Force Support Squadron of the 18th Mission Support Group based at Kadena Air Force Base, Okinawa, Japan. An INRMP Update for Bellows AFS (2013-2017) was prepared as a stand-alone document (Bellows AFS 2013).[6] It identifies management goals and objectives, operational component plans, and natural resource inventories necessary for natural resources management. Although there is no formal agreement between Bellows AFS and MCBH for cooperative management of mutual natural resource concerns, the Bellows AFS INRMP does acknowledge this need. It identifies specific natural resources projects at Bellows AFS that MCBH has implemented and lists potential areas for coordination (e.g., control of invasive species, outdoor recreation management, and geobase/data management).

8.2.2 CITY AND COUNTY OF HONOLULU

While City and County of Honolulu ordinances and standards such as zoning and Special Management Area review do not apply to Federal actions or land uses on Federal reservations, the City does consider land uses on military installations in its development planning process and does exercise management authority over lands on the perimeter of an installation that are not the domain of the State. Details on the compatibility of each MCBH property with CCH designations for surrounding areas are provided in Section 10.1.2 of the 2001 INRMP/EA. No significant changes have occurred and no inconsistencies are anticipated.

8.2.3 STATE OF HAWAI'I

8.2.3.1 Land Use

State of Hawai'i land use management regulations apply to lands surrounding MCBH parcels covered under this INRMP at MCBH Kaneohe Bay, MCTAB, Waikane Valley Impact Area, Camp Smith, and Pu'uloa RTF. The State Land Use Commission established land use district boundaries within the State in accordance with HRS Chapter 205 and HAR Title 15, Subtitle 3, Chapter 15. There are four possible land use districts: Urban, Rural, Agricultural, and Conservation. Land uses within Urban districts are managed by the Land Use Commission and the respective counties, land use jurisdiction over the Rural and Agricultural Districts is shared between the Land Use Commission and respective counties, while Conservation lands are administered by the State Board of Land and Natural Resources. Details on the compatibility of each MCBH

[6] The previous INRMP, published in 2007, was written when Bellows AFB was still under the control of Hickam AFB and covered Hickam AFB, Bellows AFB, Hickam POL Pipeline, Ka'ala AFS and Kōke'e AFS.

property with State designations for surrounding areas are provided in Section 10.1.1 of the 2001 INRMP/EA. No significant changes have occurred and no inconsistencies are anticipated.

8.2.3.2 Coastal Zone Management

One of the Federal laws affecting coastal Marine Corps activities is the Coastal Zone Management Act (CZMA) of 1972. Under this Act, MCBH is required to conduct its marine coastal activities in a manner that is consistent with the State's Coastal Zone Management (CZM) Program "to the maximum extent practicable." MCO 5090.2A, Section 11104.1.e also requires each Marine Corps installation to ensure that its operations, activities, projects, and programs affecting the coastal zone in or on coastal lands or waters are consistent to the maximum extent practicable with the Federally-approved CZM Plan of the State. While the coastline, marine waters, and resources within MCBH Kaneohe Bay's 500-yard jurisdiction are not within the bounds of the State's enforceable coastal zone program, complying to the "maximum extent practicable" with State CZM standards must be demonstrated through filing of CZM consistency determinations. Such determinations are required when any Federal activities might have a "spillover effect" outside of MCBH properties and Federally-controlled areas. Land, air, aesthetic, and water-based MCBH actions with transboundary effects beyond MCBH's coastal zone (e.g., storm water discharges, sedimentation from eroding shorelines, large-scale structures with off-Base scenic impacts, excessive noise, and bright night light emissions) are subject to CZM Federal consistency review by the Hawai'i CZM Program.

An additional aspect of littoral zone concern is nonpoint source pollution. Amendments to the CWA of 1972 and the 1972 CZMA emphasize this category of coastal zone concern. 1987 CWA amendments focus on controlling polluted runoff and the Coastal Zone Act Reauthorization Amendments of 1990 require states with CZM programs (including Hawai'i) to develop and implement coastal nonpoint source pollution control programs. The requirements are designed to protect coastal waters from polluted runoff from terrestrial (land) sources or nonpoint source pollution, now considered to be the largest single category of marine pollution worldwide. Website: http://planning.hawaii.gov/czm/

8.3 REGIONAL PLANNING INITIATIVES

The following regional planning initiatives of other agencies are consistent with and complementary to many of the management actions in the MCBH INRMP. MCBH maintains close communication with counterparts in other agencies through direct interaction (e.g., project specific, interagency meetings, working groups, and task forces) and information sharing (e.g., exchange of relevant reports and/or guidance, receipt of information through list-serve participation).

8.3.1 LOCAL AGENCIES

8.3.1.1 City and County of Honolulu Development Plans

Development Plans, a mandate of the City Charter, have been adopted by ordinance for eight geographic regions of O'ahu since 1985. Development Plans provide general guidelines and policies for development by identifying permissible land uses on the Development Plan Land Use Map and various public facilities and improvements on the Development Plan Public Facilities Map. The *Ko'olau Poko Sustainable Communities Plan*, which covers the Ko'olaupoko District of O'ahu, is of particular interest to MCBH because of its land holdings in the region. The plan, which updates a previous version adopted in 2000, has been revised and is currently awaiting approval from the City Council (CCH 2000, 2016). The general policies pertaining to Ko'olaupoko's drainage system in the City's plan are particularly complementary with MCBH's INRMP (COA 7.2 and 7.3). These policies include: promote drainage systems to minimize nonpoint source pollution; make flood control modifications in such manner as to maintain habitat and aesthetic

values; avoid and/or mitigate degradation of stream, coastline, and nearshore water quality; plan drainage-way improvements to integrate into the regional open space network; and view storm water as a valuable resource for retention and recharge of the aquifer rather than a nuisance to be quickly moved to coastal waters. Website:
http://www.honoluludpp.org/Planning/DevelopmentSustainableCommunitiesPlans/KoolaupokoPlan.aspx

8.3.1.2 Koʻolau Poko Watershed Management Plan

In 1990 the State Commission on Water Resource Management adopted the first *Oʻahu Water Management Plan*. It consists of overall policies and strategies that guide planning, management, conservation, use, development and allocation of surface and ground water resources. The plan requires City and County departments, the Board of Water Supply, and the Department of Planning and Permitting, to prepare eight regional watershed management plans for inclusion in the overall plan. Of interest to MCBH is the *Koʻolau Poko Watershed Management Plan*, which covers the Koʻolaupoko District of Oʻahu. The objectives of the plan include: promote sustainable watersheds; protect and enhance water quality and quantity; protect Native Hawaiian rights and traditional and customary practices; facilitate public participation, education and project implementation; and meet futures water demands at a reasonable cost. Many of the objectives of this plan are similar to those in the MCBH INRMP. The *Koʻolau Poko Final Watershed Management Plan* was completed in 2012 (Townscape, Inc. 2012). Website: http://files.hawaii.gov/dlnr/cwrm/planning/wudpoa2012klp.pdf

8.3.1.3 Kāneʻohe Bay Regional Council

Kāneʻohe Bay, adjacent to MCBH Kaneohe Bay, covers approximately 11,800 acres in the Koʻolaupoko District and is considered one of Hawaiʻi's most precious natural resources. Kāneʻohe Bay provides productive fisheries, excellent diving and snorkeling, protected areas for power boating and sailing, and beautiful shores for seaside living and recreation as well as military training. Historically, resource use conflicts in Kāneʻohe Bay have arisen because of its value to many different interest groups. Regional planning began in the 1970s, and the Kāneʻohe Bay Regional Council was established by statute in the 1993 State Legislature to facilitate the implementation of the *Kāneʻohe Bay Master Plan* (Section 10.1.3.5, 2001 INRMP/EA). Beginning in 2008, support of the Council became the responsibility of Hawaiʻi DLNR DAR. An amendment to HRS Section 200D-2 passed in 2010, dictates that Hawaiʻi DLNR representatives shall participate as ex-officio non-voting members. As a Federal agency with considerable presence in the Kāneʻohe Bay environs since 1951, MCBH actively participated in the Kāneʻohe Bay Task Force work during 1990-1992 in an ex officio capacity. MCBH has an ex officio, non-voting seat on the Council. No inconsistencies between implementation of MCBH's INRMP management actions and the work of the Kāneʻohe Bay Regional Council are anticipated. Since many of the INRMP actions are aimed to improve wildlife habitat, water quality, and flow into Kāneʻohe Bay from Mōkapu sources, the goals and objectives to maintain the relatively pristine character of Kāneʻohe Bay waters are consistent between the two plans. Website: http://dlnr.hawaii.gov/dar/kaneohe-bay-regional-council/

8.3.2 State of Hawaiʻi[7]

8.3.2.1 The Rain Follows the Forest

In November 2011, Hawaiʻi DLNR published a plan, *The Rain Follows the Forest,* to outline methods of forest protection in an effort to secure and replenish Hawaiʻi's water supply. This plan arose from Hawaiʻi DLNR being tasked to ensure upland portions of watersheds are fully functioning so fresh water resources are protected in perpetuity. It discusses the needs and benefits of Hawaiʻi forest and watershed protection,

[7] Selected plans are included for reference in Appendix A9 on the Reference CD.

identifies priority watershed areas, and outlines actions and projects to protect and sustain Hawai‘i’s water sources. Seven actions are identified to protect and restore priority watershed areas: (1) Remove all invasive hoofed animals; (2) Remove or contain damaging invasive weed threats; (3) Monitor and control other forest threats including fires, predators, and plant diseases; (4) Restore and plant native species in priority areas and buffer areas; (5) Establish benchmarks and monitor success of the on-the ground actions; (6) Educate residents and visitors about the cultural, economic, and environmental importance of conserving native forests; and (7) Promote consistent and informed land use decision-making that protects watersheds. Management decisions made within all divisions of Hawai‘i DLNR must take elements of this plan into consideration. Website: http://dlnr.hawaii.gov/rain/

8.3.2.2 Hawai‘i Ocean Resources Management Plan

The *Hawai‘i Ocean Resources and Management Plan* is a statewide plan, last updated in July 2013, mandated by HRS Chapters 205A and 225M, and implemented by the CZM program and the State Department of Business, Economic Development and Tourism (Hawai‘i Coastal Zone Management Program 2013). The plan presents guiding principles and recommended actions for the State to achieve comprehensive and integrated ocean and coastal resources management. It uses an integrated, place-based approach for management of ocean resources, stressing recognition of the ecological connections between the land and sea, incorporation of current and future challenges (e.g., competing human uses and climate change), and the importance of collaboration and stewardship in natural resources governance. Although implementation is primarily the responsibility of State agencies, the plan acknowledges that success will require the active participation by Federal and county agencies and communities across the State. The plan outlines management priorities, goals, and actions for ocean resource management. MCBH activities that support the plan include: erosion control projects; restoration and protection of wetlands; taking measures to monitor and reduce pollutant loads into coastal waters; enhancing conservation of marine protected species; minimizing introduction and spread of marine alien and invasive species; enforcing existing rules and regulations related to ocean resource protection; encouraging community participation in natural resource management; and addressing significant natural resources and management responsibilities within the coastal marine zone.
Website: http://planning.hawaii.gov/czm/ocean-resources-management-plan-ormp/

8.3.2.3 Hawai‘i’s Nonpoint Source Management Plan

Hawai‘i’s Nonpoint Source Management Plan 2015-2020 presents a plan for partnering with citizens, citizen groups, State and county agencies, and Federal agency stakeholders to implement watershed-specific strategies to prevent and reduce nonpoint source throughout the State, including the Ko‘olaupoko region (HIDOH CWB 2014). MCBH has developed a strong watershed approach to nonpoint source pollution solutions (Appendix A2). Management activities in COA 7.2 and 7.3 are complementary to the objectives and implementation plan presented in the State’s plan. Website: http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/polluted-runoff-control-program/prc-hawaiis-implementation-plan/

8.3.2.4 Hawai‘i’s State Wildlife Action Plan

The *Hawai‘i’s State Wildlife Action Plan (SWAP)* presents strategies and plans of Hawai‘i DLNR and its partners to address the conservation needs of wildlife native to Hawai‘i (H.T. Harvey and Associates 2015). The 2015 plan is an update of the 2005 plan, previously called the *Hawai‘i Comprehensive Wildlife Conservation Strategy*, that was used to make significant progress in conservation of Hawai‘i’s native wildlife. The SWAP strives to continue that progress and provide direction for the future. It contains a comprehensive description of the wildlife resources of the State, describes the major threats and challenges facing native wildlife, identifies species of greatest conservation need and their habitats, and includes strategies for addressing the conservation needs of those species and their habitats.

Nu‘upia Ponds WMA and Ulupa‘u Head WMA are referenced in the SWAP as key wildlife habitats on the island of O‘ahu. The nearshore waters surrounding MCBH are also considered a key marine habitat on O‘ahu. The SWAP identifies the MCBH INRMP as an existing management plan and tool for MCBH property that addresses some of the threats listed in the Summary of Key Threats to Species and Habitats section. It recommends continuing existing management as outlined in the INRMP and names enhancing partnerships and cooperative efforts with Marine Corps as a high priority in meeting statewide conservation objectives. Website: http://dlnr.hawaii.gov/wildlife/hswap/

8.3.2.5 State of Hawai‘i Aquatic Invasive Species Plan

The *State of Hawai‘i Aquatic Invasive Species (AIS) Management Plan* was developed in response to the Federal Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, amended by the National Invasive Species Act of 1996 (Hawai‘i DAR/DLNR 2003). Its purpose is to guide a coordinated approach to implementing management efforts, by identifying problem areas and gaps, and recommending additional actions that are needed to effectively address AIS issues in Hawai‘i. The plan is structured for incremental implementation and is expected to be a work in progress with updates made as necessary. The goal, objectives, and strategies identified in this document are compatible this INRMP and the *MCBH Invasive Species Management Study* (Garrison et al. 2002), in particular with regard to recommendations relating to invasive species. The Environmental Department reviewed and contributed to the plan, which cites several MCBH reports, and includes a Case Study (6) “The Military’s Contribution: Marine Corps Base Hawai‘i Addresses Aquatic Invasive Species” documenting on-going success in controlling aquatic invasive species on MCBH property. The leadership and contribution of MCBH in controlling invasives in Hawai‘i, especially of aquatic invasives in coastal wetland environments at Mōkapu Peninsula, is acknowledged. Website: http://dlnr.hawaii.gov/ais/aboutus/

8.3.2.6 Hawai‘i Interagency Biosecurity Plan 2017-2027

The *Hawai‘i Interagency Biosecurity Plan 2017-2027* (HDOA and DLNR 2016) is a comprehensive plan that includes coordinated strategies involving several agencies and partners to increase the State’s biosecurity and protect Hawai‘i’s agriculture, environment, economy, and health from the threats and harms of invasive species. The scope of the plan addresses three biosecurity areas: pre-border (treatment of goods prior to entering the State), border (treatment upon entry), and post-border (tools and capacity for response after invasive species have become established). The plan includes action items for various agencies and stakeholders (including military), with specific details on how and when to best implement each action. Website: http://hdoa.hawaii.gov/blog/main/biosecurityplan/

8.3.2.7 Hawai‘i Invasive Species Council / O‘ahu Invasive Species Committee

The Hawai‘i Invasive Species Council (HISC) is an inter-departmental collaboration comprised of the Hawai‘i DLNR, Agriculture (HDOA), Health (HIDOH), Transportation (HDOT), Business, Economic Development and Tourism (DBEDT), and UH. HISC was established in 2003 to provide policy level direction, coordination, and planning among State departments, Federal agencies, and international and local initiatives for the control and eradication of harmful invasive species infestations throughout the State and to prevent the introduction of other invasive species that may be potentially harmful. HISC fulfills its mandate by issuing resolutions, providing plans, and strategically disbursing funds to enhance invasive species prevention, control, outreach, and research. Website: http://dlnr.hawaii.gov/hisc/

OISC is a partnership of private, governmental and non-profit organizations working to prevent new invasive species infestations on the island of O‘ahu, to eradicate incipient invasive species, and to stop established invasive species from spreading. OISC is part of a network of invasive species committees that performs these activities on five of the main Hawaiian Islands (Hawai‘i, Kaua‘i, Maui, Moloka‘i, and O‘ahu). OISC is

concerned with all non-native invasive species threatening agriculture, watersheds, native ecosystems, tourism, industry, human health and the quality of life. A *Strategic Action Plan* describes the OISC project and details the objectives and methods utilized to combat invasives on O‘ahu (OISC 2006). Natural Resources staff remain aware of OISC activities by subscribing to their list-serve, participating in OISC meetings, and coordinating related fieldwork on problems of shared concern (e.g., devilweed control at Camp Smith). OISC assists MCBH by providing information and guidance on invasive species issues, control methodology, and surveillance for incipient invasive species outbreaks, through various interagency coordinated meetings, workshops, e-mail communications, and on-site survey and control assistance. Website: http://www.oahuisc.org/

8.3.3 FEDERAL AGENCIES

Under the ESA Federal agencies are responsible for the preparation of recovery plans for endangered species and delineation of reasonable actions to recover and protect listed species. USWFS and NOAA Fisheries share responsibility for implementing the ESA. Generally, USFWS manages land and freshwater species and NOAA Fisheries manages marine and anadromous species. They are responsible for: listing, reclassifying, and delisting species; providing information and biological opinions to other Federal agencies on activities that may affect listed species; overseeing recovery activities for listed species; providing for the protection of important habitat; and providing assistance to States and others with their endangered species conservation efforts. This section summarizes the recovery plans for species that are known to occur on MCBH properties. Website: http://www.fws.gov/pacificislands/recoveryplans.html and http://www.nmfs.noaa.gov/pr/recovery/plans.htm

8.3.3.1 Recovery Plan for Hawaiian Waterbirds

The *Draft Revised Recovery Plan for Hawaiian Waterbirds: Second Draft of Second Revision* addresses four species of endangered Hawaiian waterbirds: the Hawaiian duck, Hawaiian coot, Hawaiian common moorhen, and Hawaiian stilt (USFWS 2005). It provides habitat requirements and details recovery information including goals, objectives, criteria for downlisting and delisting, and recovery actions. Proposed management actions are compatible with the MCBH INRMP (COA 7.1). MCBH’s Nu‘upia Ponds is identified as a core wetland on O‘ahu for protection and management in order to recover the waterbirds. MCBH’s INRMP is referenced as an important management plan detailing actions to enhance endangered waterbirds and their habitat. MCBH’s management efforts to support regional conservation of the stilt population are recognized in the report, including the *MCBH Support of Hawaiian Stilt Regional Recovery in the Ko‘olaupoko District, O‘ahu* study (Rauzon et al. 2002). In 2005, MCBH reviewed and commented on the update of the recovery plan.

8.3.3.2 Recovery and Management Plan for the Hawaiian Monk Seal

The *Recovery Plan for the Hawaiian Monk Seal* (*Neomonachus schauinslandi*) provides information on species status, distribution, habitat requirements, and threats, and details recovery information including objectives for downlisting and delisting and recovery goals and strategy (NMFS 2007). The *Main Hawaiian Islands Monk Seal Management Plan* further elaborates on some of the items discussed in the *Recovery Plan* including detailed recovery strategies and challenges (NMFS 2016). The Hawaiian monk seal, which sometimes occurs in the marine environment and on beaches of MCBH properties, is currently listed as endangered and is protected by Federal and State laws. Natural Resources staff and CLEOs follow conservation strategies and measures set forth by NOAA Fisheries to protect Hawaiian monk seals and assist NOAA Fisheries with associated recovery effort activities (COA 7.4 and Appendix C2 and D5). MCBH is listed in the *Main Hawaiian Islands Monk Seal Management Plan* as a partner organization for Hawaiian monk seal recovery and will continue to cooperate with NOAA Fisheries to provide seal protection zones (protective barriers and signs erected around hauled out seals), record Hawaiian monk seals sightings and

locations, share records with NOAA Fisheries, train military and DoD civilian personnel on BMPs for protection of Hawaiian monk seals, and monitor shoreline activities that may impact Hawaiian monk seals.

8.3.3.3 Recovery Plans for Turtles

There are three separate recovery plans for the turtle populations [green sea turtle hawksbill turtle (*Eretmochelys imbricatata*), and olive ridley turtle], in the U.S. Pacific. Each plan details the distribution, historical and cultural background, biological characteristics, threats, conservation accomplishments, and recovery objectives (NMFS and USFWS 1998a, 1998b, 1998c). The Central North Pacific population segment of the green sea turtle, which sometime occurs in the marine environment and on beaches of MCBH properties, is currently listed as threatened. Although very rare, endangered hawksbill turtles may be seen in the marine environment surrounding MCBH Kaneohe Bay. While not common in Hawai‘i, endangered olive ridley turtles are actively managed for and protected. Although olive ridley turtles are rarely seen in the marine environment or on beaches, there have been sightings and one confirmed nesting at MCBH (Section 6.1.3). As with other marine species, green, hawksbill, and olive ridley turtles directly benefit from active conservation and natural resource management at MCBH to address direct and indirect threats to marine resources (e.g., alien and invasive species, pollution, and habitat destruction). Natural Resources staff follow and disseminate information from the *Recommendations and Best Management Practices for the Conservation of Green Turtles* set forth by USFWS to protect green sea turtles (USFWS 2015) (Appendix C2).

8.3.3.4 Recovery Plans for Humpback Whales

The *Final Recovery Plan for the Humpback Whale* (*Megaptera novaeangliae*) provides information on distribution, habitat, natural mortality, known and potential impacts, and details recovery information including recovery actions and goals (NMFS 1991). Hundreds of humpback whales transit through MCBH waters during the migratory season. Humpback whales benefit from MCBH marine conservation actions including minimizing human disturbance, effective spill response, and planning military maneuvers to avoid migration season.

8.3.3.5 Recovery Plan for Hawaiian Hoary Bat

The *Recovery Plan for the Hawaiian Hoary Bat* provides information on habitat requirements and limiting factors, as well as recovery objectives and criteria (USFWS 1988). The Hawaiian hoary bat is currently listed as endangered both Federally and by the State of Hawai‘i. It was detected utilizing auditory collection equipment at the HIARNG Regional Training Institute, located on leased property adjoining MCTAB. MCBH plans to survey for the bat at its properties and, if detected, manage to avoid any adverse impacts to the species (COA 7.1).

8.3.3.6 Recovery Plan for the Multi-Island Plants

The Recovery Plan for the Multi-Island Plants addresses twenty-six species, one of which is found on MCBH properties: *‘ohai*. ‘*Ohai* is listed as endangered (USFWS 1999).[8] The plan provides distribution, habitat requirements, and details recovery information including objectives for downlisting and delisting, and recovery objectives and criteria. Management actions by MCBH to protect endangered plant species are found in COA 7.5.

[8] *‘Ohai*, discovered on the Fort Hase shoreline of MCBH Kaneohe Bay in 2004, occurs naturally. Only naturally occurring species are monitored regularly for declining conditions and mortality.

8.3.3.7 Shorebird Conservation Plan for Hawai'i and Pacific Islands

USFWS participates nationwide in cooperative partnerships to prepare Shorebird Conservation Plans for various regions of the United States. In Hawai'i and the Pacific, this partnership includes Hawai'i DLNR, MCBH, and other government and non-government agency personnel (e.g., Ducks Unlimited, Bishop Museum, The Nature Conservancy) – all with waterbird habitat management responsibilities. The effort to improve waterbird habitat management in Hawai'i and the Pacific is outlined in the *U.S. Pacific Islands Regional Shorebird Conservation Plan* (Engilis and Naughton 2004). The goals and activities contained in this plan are compatible and complementary with the MCBH INRMP. Natural Resources staff monitor waterbirds (COA 7.1); participate in regional initiatives to improve natural resources inventory, monitoring, and database management activities; and will update the INRMP appropriately. Website: http://www.shorebirdplan.org/wp-content/uploads/2013/01/USPI1.pdf

8.3.3.8 Pacific Island Region Marine Mammal Stranding Network

Approximately 20 cetacean (dolphin and whale) strandings and entanglements in marine debris occur each year in Hawai'i.[9] Guidelines for managing a cetacean stranding have been established by NOAA Fisheries' National Marine Mammal Stranding Network. Protocols vary by region and depend on the species and the situation. In Hawai'i and the Pacific, incidents are handled by NOAA Fisheries through the Pacific Island Region Marine Mammal Stranding Network. The marine mammal response team consists of staff and volunteers that handle marine mammal strandings. An Interservice Support Agreement provides for NOAA Fisheries' use of a facility at MCBH, where personnel from the Hawai'i Institute of Marine Biology manage day-to-day operations centered around conducting necropsies on cetaceans. The facility is not used to rehabilitate live stranded or entangled marine animals.
Website: http://www.fpir.noaa.gov/PRD/prd_marine_mammal_response.html

8.3.3.9 Brown Tree Snake Control Plan

The *Brown Tree Snake Control Plan* identifies the brown tree snake (*Boiga irregularis*) as a major threat to biodiversity of the Pacific region (The Brown Tree Snake Control Committee 1996). The brown tree snake is an arboreal, nocturnal, venomous snake that is not native to Hawai'i, nor is it known to be present at this time. A total of eight brown tree snakes have been found alive or dead in Hawai'i between 1981 and 1998. All snakes were associated with the movement of civilian and military cargo from Guam. The control plan provides information on biology, population distribution, impacts, control measures, and a description of research needs. The plan uses an integrated pest management approach in providing guidance to: reduce existing brown tree snake populations in Guam; prevent the spread of brown tree snakes to other Pacific islands and mainland areas; eradicate new populations as soon as detected; develop more effective control and/or eradication strategies; protect endangered species and other wildlife from predation; assist organizations and individuals on Guam to manage and control brown tree snake infestations; and develop adequate information on the brown tree snake's biology, dispersal dynamics and control to support Federal, State, Territorial and Commonwealth needs. Hawai'i DLNR advises that all cargo arriving from Guam, including military be inspected for the presence of brown tree snakes. DoD provides funding and support to the Emergency Snake Control Teams in Hawai'i and works with USFWS and the Department of Agriculture to reduce the risks of brown tree snakes spreading to Hawai'i. The State Department of Agriculture performs regular inspections at MCBH of cargo from certain destinations. Any brown tree snake interceptions would be recorded and kept in the MCBH natural resources database for reference. In recent

[9] The most recent stranding/entanglement to occur at MCBH was in October 2010 when a dead melon headed whale calf washed ashore at MCBH Kaneohe Bay.

years there has been only one report of a suspected brown tree snake at MCBH.[10] Website: http://www.anstaskforce.gov/Species plans/Brown Tree Snake Mgt Plan.pdf

8.3.4 OTHER INTERAGENCY PARTNERSHIPS AND ACTIVITIES

8.3.4.1 Hawai'i-Pacific Islands Cooperative Ecosystem Studies Unit

In 1998, Public Law 105-391 (Sec. 203) authorized and directed the Secretary of the Interior "to enter into cooperative agreements with colleges and universities, including but not limited to land grant schools, in partnership with other Federal and State agencies, to establish cooperative study units to conduct multi-disciplinary research…". In response and under existing cooperative agreement authorities, a network of Cooperative Ecosystems Studies Units (CESU) was developed. DoD became a Federal agency partner in the CESU network in 2000 through an amendment to the MOU.

The Hawai'i-Pacific Islands CESU, based at UH Hilo, with Federal, university, and research institution partners spanning Hawai'i and the Pacific, was formed in 2004. This coalition of governmental agencies, non-governmental organizations and universities, promotes research, education and technical assistance to support better stewardship of imperiled natural and cultural resources within the Pacific. CESU agreements allow each of the participating Federal agencies to efficiently transfer funds and duty station employees to university partners while maintaining responsibility for agency-sponsored activities within CESUs. MCBH, via HQMC, joined the Hawai'i-Pacific CESU in 2005. The CESU mechanism is a vehicle for pooling limited resources of partner agencies in working toward solution of shared problems. Website: http://hilo.hawaii.edu/hpicesu/

[10] On April 16, 2008 a possible brown tree snake sighting was reported. Natural Resources staff contacted the Hawai'i Department of Agriculture-Plant Quarantine Branch and assisted in coordinating a day and night search with members of a rapid response team as well as several volunteers. Search team members were from the Hawai'i Department of Agriculture, USFWS, Coordinating Group on Alien Pest Species, U.S. Geological Survey, National Invasive Species Council, Hawai'i DLNR, and the MCBH Environmental and Animal Control Offices. See MCBH News Release 34-08, April 18, 2008, "Possible Snake Sighting aboard Base," or Honolulu Advertiser, April 18, 2008, "Possible Snake Sighting at Marine Corps Base Hawaii". No snake was ever found.

SECTION 9
PUBLIC OUTREACH, ENGAGEMENT, AND INVOLVEMENT

9.1 PUBLIC OUTREACH AND ENGAGEMENT

Public involvement in natural resources management, outreach and engagement on ecosystem management issues, and public awareness of INRMP program requirements and activities are a well-integrated part of MCBH's integrated natural resources management program. Military personnel and their families, DoD civilians, agency partners, and the general public play important roles in MCBH's efforts to educate and involve a wide audience in natural resources management activities.

MCBH coordinates with agency personnel and community volunteers (on- and off-Base schools, UH, agencies, environmental organizations, and church groups) to effectively conduct cooperative management. Efforts include improvement of wildlife habitat, removal of invasive plants, installation of native plants, bird surveys, beach clean-ups, and field research. Due to successful outcomes with long lasting benefits and continued participation, several actions have become institutionalized as recurring events (Table 9-1, Appendix G1). For example, MCBH has a sustained all volunteer 'Weed Warrior' program at MCBH Kaneohe Bay, with events held bi-monthly to remove non-native invasive weeds from wetlands and WMAs. Volunteers come from a variety of backgrounds, such as Base military personnel and families, the Sierra Club, retirees, and universities. A rich variety of public and private organizations are represented (Tables 9-1 and 9-2).

Public outreach occurs through the MCBH website, educational DVDs and pamphlets, interpretive exhibits, and outreach events. Educational tours led by Natural Resources staff and hosted ecology camps are used to inform and interact with the public (Appendix G1 & G2).

MCBH tenants and/or family members are reached through briefs, Base events, brochures, and the internet about MCBH's natural resources and sensitivities, conservation programs, and opportunities to participate in environmental tours or volunteer projects. This outreach occurs regularly at on-Base events. Information on natural resources is included in related briefings and classroom training events, such as those provided in association with Hazardous Waste training. Examples of outreach and education include:

- **New Arrivals Orientation.** A five minute presentation to new military members arriving at MCBH outlines basic environmental information about MCBH. A booth with displays is set up in the 'break area' and is manned by the Environmental Department staff to provide supplementary information on environmental resources.
- **Environmental Awareness Class**. A voluntary class held bi-monthly for all military personnel and civilians on-Base. This class provides more detailed environmental information about the different Environmental Department program areas.
- **Natural Resources Videos**. Several natural resources oriented videos have been created, including a fifteen minute video about the Natural Resources Program in general and three five minute webisodes that detail Mud Ops training, coral reefs under MCBH jurisdiction, and the Base's waterbirds and seabirds. These videos have been developed to educate the Base population on the natural resources at MCBH, management in place to preserve and protect them, and how to train/recreate/interact with natural resources to minimize and avoid damage to them.

Signage, brochures, and videos provide information and supplement direct interaction with the public and on-Base personnel and families. In the past few years new signage detailing appropriate behavior with regard to natural resources has been created for the wedge-tailed shearwater colony, the MCCS beach

cottages, and for the day-use area licensed to the CCH on weekends (Appendix G3). Brochures, posters, and flyers are distributed covering natural resources issues including protected species, marine resources, fishing regulations, and nuisance animals (Appendix G3). MCBH realizes the value in using the internet to reach a large audience.

9.2 COOPERATIVE CONSERVATION AND MANAGEMENT

The most successful way to sustain MCBH's efforts at natural resources conservation stewardship is to commit to a continuing and—where possible—increasing the level of effort in cooperative conservation (Appendix A2). The Environmental Department partners and coordinates with a range of Federal and State agencies, as well as interdepartmentally, to carry out INRMP objectives and provide natural resources management support as well as supporting the military mission and/or partner agencies' objectives. These partnerships and coordination efforts have proven valuable for gathering data and recommendations from managers with specific expertise; providing volunteer opportunities; and maintaining compliance with current laws, rules, and regulations.

9.2.1 INTERAGENCY COOPERATIVE MANAGEMENT

An example of cooperative management that supports the military mission and has been sustained long-term is the annual Nu'upia Ponds Mud Ops AAV maneuvers to control pickleweed (*Batis maritima*) in endangered Hawaiian stilt habitat and accomplish AAV training objectives.

Examples of cooperative management that further partner agencies' objectives are: recurring bird and whale surveys; marine conservation law enforcement activities; and the recently completed marine surveys at MCBH Kaneohe Bay and MCTAB.

Interagency cooperation (both on- and off-Base) is used to carry out actions in related plans (Section 8) as well as coordinate permit and review consultations (e.g., NEPA, ESA Section 7 consultations, and permit coordination required for INRMP projects).

Table 9-1. Recurring Cooperative Management Activities

Title	COA	Description
Mud Ops	7.1 7.5 7.6	In 1970, the State Department of Fish and Game and USFWS approached MCBH about using AAVs to break up the non-native pickleweed covering the wetlands around Nu'upia Ponds to enhance habitat for endangered Hawaiian stilts. In the early 1980s, Marines from the Combat Assault Company, with advice and oversight from the Environmental Management Specialist, began using AAVs each spring just before the stilt nesting season to conduct pickleweed management efforts. Breaking up the dense pickleweed mats on the mudflats opens up the habitat for better foraging and ground-nesting opportunities for the birds. The activity also hones AAV operator skills. This annual tradition, now referred to as "Mud Ops," has positively affected use of the wetlands by Hawaiian stilt and other native and migratory waterbirds protected by Federal laws, as evidenced by recurring use. This yearly exercise supports both bird conservation and combat readiness, and raises community awareness of the protection the Marine Corps affords the Hawaiian stilt and its habitat.

Title	COA	Description
Weed Warriors	7.5 7.6	A *Weed Warriors* event to control non-native invasive plants and collect trash that finds its way into the ponds is held on the second Saturday of even numbered months. This event utilizes military service members, community volunteers, and Sierra Club members. Two Sierra Club member leaders, Daniel Anderson and Deborah Blair, have been lending their support for this bi-monthly effort for 15 years. The Sierra Club has regularly supported this event for over 25 years.
Fountain Grass and Devilweed Survey and Control	7.5 7.6	An effort to control the spread of fountain grass on MCTAB has been underway since 2002. Beginning in 2017, the highly invasive non-native devilweed that has risen to prominence in the last couple years due to it having spread widely on Army Garrison training areas and at MCBH Camp Smith, will be included in this survey. Both species are manually removed if detected. This is a joint effort involving Natural Resources staff, and OISC, Air Force, and HIARNG personnel. This activity occurs biannually, until its risk for rapid spread can be better evaluated. While fountain grass has been slow to spread, it is unclear at this time how much, if any devilweed may be on MCTAB.
Whale Counts	7.4 7.6	For over a decade open ocean humpback whale counts have been conducted at two MCBH Kaneohe Bay locations: Pyramid Rock and near the entrance to the KBRTF overlooking Monument Point. The annual event, coordinated by NOAA Fisheries and the Hawaiian Islands Humpback Whale National Marine Sanctuary, is held on the last Saturday of January, February and March at specific locations across the main Hawaiian Islands. At MCBH between 20 and 40 volunteers, mainly from the Base, conduct the counts. The Sanctuary Ocean Count Project Coordinator must obtain approval from the Coast Guard to access the navigation beacon and viewing platform atop Pyramid Rock. MCBH reviews the letter of authorization to conduct the counts every five years to ensure compliance with the terms and conditions governing access to the Base. Before conducting each of the counts, volunteers are briefed by Base Safety and Natural Resources staff.
Ecology Camps	7.6	The Environmental Department hosts the Sierra Club High School Hiker's Program Ecology Camp for participants from several local high schools (e.g., students, leaders, and resource specialists). This non-profit group promotes appreciation of Hawai'i's natural environment through hikes, service projects, and camps. MCBH has hosted the Ecology Camp in 1983, 1989, 1997, 2001, 2009 and 2014. The camp enhances community relations and, through the service project component, provides volunteers to improve wetland/wildlife habitat.
Bird Surveys	7.1 7.6	USFWS and OISC field staff have assisted Natural Resources staff with annual shearwater burrows counts since 2010 (burrow counts were initiated in 2006). DLNR coordinates with Natural Resources staff to conduct biannual waterbird surveys at the Kaneohe Bay wetlands, which includes the Nu'upia Ponds complex. The Hawai'i Audubon Society hosts an annual Christmas bird count at MCBH Kaneohe Bay. An annual event has been held aboard MCBH Kaneohe Bay since 1947.
Fossil Collection	7.0.3	Bishop Museum and the Smithsonian Institution periodically request access to the Base to collect avian bird bone fossils eroding out of the cliff face below the KBRTF. This has been occurring since the mid-1980s.[1] To simply the process for collection and curation of avian bone fossils, MCBH and Bishop Museum are exploring the creation of a memorandum of understanding (COA 7.0.3). Collection is governed by the Antiquities Act.

1

[1] Collection occurred regularly (every year or two) from the late 1980s until 2000. From 2000 to 2014 there were no collections. In 2015, Bishop Museum once again requested and was granted access. Ongoing conversations with Bishop Museum indicate that recurring collection will begin again during this INRMP implementation period (2017-2021).

Table 9-2. Cooperative Management Activities of the Past Five Years

Title	COA	Description
USGS Seabird Tagging Project	7.1	In 2014, USGS was granted a research permit by USFWS to conduct hi-resolution GPS-tracking among a sample of numerically abundant and certain vulnerable seabirds breeding throughout a number of sites in the main Hawaiian Islands. The project is being conducted to determine at-sea ranging behaviors and habitat affinities to inform planning associated with offshore marine renewable energy infrastructure and operations within offshore continental shelf waters beyond three nautical miles from shore off Hawai'i. Both adult nesting red-footed boobies from Ulupa'u Crater WMA and wedge-tailed shearwaters from Nu'upia Ponds WMA are included in the study. Natural Resources staff is assisting with Base access and GPS tagging of the birds. The project is a broad collaboration with several other Hawai'i-based researchers and resource managers, including the Navy, USFWS, and DLNR.
Red-footed Booby Relocation Study	7.1	USFWS was contracted to assist in determining the viability of utilizing social attraction methods (decoys and audio) and habitat manipulation to entice red-footed boobies to other locations on KBRTF within and on the back slopes of Ulupa'u Crater. The project goal is to identify areas for colony expansion away from the impact area to allow for greater training flexibility.
Avian Botulism	7.1	An avian botulism outbreak involving the Hawaiian duck (koloa) occurred at the Base WRF during the summers of 2014, 2015, and 2016. Except for one Hawaiian stilt, no other bird species appeared to be affected. Several dead ducks were delivered to Dr. Thierry Work, USGS veterinarian, who conducted necropsy and confirmed avian botulism. Sick birds were taken to Aloha Animal Hospital and Feather and Fur veterinary hospital for treatment. In 2015, Stephen Turnbull, DLNR Koloa Communication and Outreach Coordinator took genetic samples of many of the ducks delivered to Dr. Chang.
Activity Analysis	7.1	During analysis of potential disturbance to the wedge-tailed shearwaters, it was determined that unauthorized access by surfers from the Kailua community continues to access an unauthorized surf spot through the nesting area. Natural Resources staff worked with DLNR to utilize their design for a sign that was installed at the shearwater colony to inform people that disturbing adults, chicks, and eggs is prohibited by law.
Wetlands	7.2	USACE conducted jurisdictional boundary delineations of wetlands located near MCTAB and Pearl City Annex locations, completing the delineation of all accessible MCBH wetlands.
Coastal and Marine Surveys	7.4	Coastal and marine surveys were completed in 2017 by USFWS and a supporting interagency dive team including NOAA Fisheries and DLNR in the area seaward of MCTAB. Information derived from the surveys will enhance decision-making during military training, reporting to regulatory agencies, and evaluating environmental impacts resulting from training events and exercises.

9.2.2 COOPERATIVE PREPARATION AND UPDATES OF THE INRMP

Section 2904 of the 1997 SAIA specifically requires that installation INRMPs reflect "mutual agreement" on the "conservation, protection, and management of fish and wildlife resources" among the installation; the Secretary of Interior, acting through the Director, USFWS; and the head of each appropriate State fish and wildlife agency (Appendix A4).

MCBH regularly coordinates with and receives feedback from partner agencies on a range of activities including data collection and management; permit preparation and acquisition; and INRMP review, implementation progress evaluation, and update. MCBH's Sikes Act Partners (USFWS, NOAA Fisheries, and State DLNR) are encouraged to carefully review the management actions and identify areas where mutual partnering and cost-sharing can be most effectively implemented to reinforce mutual mandates for cooperative conservation. Documentation of partner agency review comments on the draft INRMP Update and how they were addressed in the final document is included in Appendix H2 and H3. MCBH will continue to interact with partner agencies during the plan's implementation, regular review, and update.

The public has opportunities to comment in connection with associated environmental reviews and regulatory permit requirements for site-specific INRMP projects (Table 3-2). In addition, the Environmental Department has and will engage in special public outreach efforts, based on level of public interest and other factors, when implementing pertinent projects in the integrated natural resources management program.

9.3 AWARDS AND RECOGNITION

The MCBH Natural Resources program and staff has a long track record of awards and certificates of recognition. For example, the program has received numerous Secretary of the Navy and Secretary of Defense Environmental Awards (Table 9-3). Program accomplishments are also reflected in outside publications, external media coverage, and citations on other governmental and non-governmental agency websites. Successful natural resources management is demonstrated by successful partnering with agencies and public groups to perform many of the management activities described in the INRMP. This testifies to MCBH's positive interaction with regulators and stakeholders. The ability to obtain permits to haze protected birds from runways; perform limited military maneuvers and recreational activities near sensitive wildlife habitats; dredge sensitive wetlands as part of environmental restoration projects; sustain amphibious training in sensitive MCBH waters; and obtain concurrence from historic preservation and Native Hawaiian groups also indicate good relations.

Table 9-3. Department of the Navy Environmental Awards

Award Level	Category	Award Years Won	Total Number
SECDEF	Natural Resources Conservation (Small Installation) – Program	2013, 2011, 2005, 1995, 1976	5
SECNAV	Natural Resources Conservation (Small Installation)[2] – Program	2013, 2011, 2005, 2003, 2001, 1998, 1997, 1996, 1995, 1994, 1993, 1985, 1976	13
SECNAV	Natural Resources Conservation –Individual/Team	2005, 1995	2

[2] MCBH did not submit an award package for the 'Natural Resources – Program (Small Installation)' category in 2015 and 2017.

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SECTION 10
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FINAL

MARINE CORPS BASE HAWAII INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN UPDATE (2017 – 2021)

Appendices

Marine Corps Base Hawaii
January 2017

FINAL

MARINE CORPS BASE HAWAII INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN UPDATE (2017 – 2021)

Appendices

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APPENDIX A
LAWS, REGULATIONS, AND GUIDELINES

This appendix includes information on laws, regulations, and guidelines applicable to natural resources management and INRMP implementation.

A1. INRMP Fact Sheet

A2. MCBH Planning Approaches and Guidelines

A3. *Laws, Regulations, and Other Directives (summary text) (Reference CD only)*

A4. *Sikes Act (Reference CD only)*

A5. *Natural Resource Conservation Metrics (Reference CD only)*

A6. *Tripartite Memorandum of Understanding between DoD, USFWS, and AFWA (Reference CD only)*

A7. *Migratory Bird Treaty Act (Reference CD only)*

A8. *Marine Mammal Protection Act vs State Authority (Reference CD only)*

A9. *State of Hawai'i Related Plans (Reference CD only)*

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A1. INRMP FACT SHEET

Fact sheet on Integrated Natural Resources Management Plans provided by the DoD Natural Resources Conservation Program (July 2015).

http://www.dodnaturalresources.net/Integrated-Natural-Resources-Management-Plans-July-2015.pdf

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Integrated Natural Resources Management Plans

Congress established the Sikes Act (16 U.S.C. 670a-670o) in 1960 to ensure that the U.S. Department of Defense (DoD) conserves and protects the natural resources they use. Because military lands often are protected from human access and impact, they contain some of our nation's most significant remaining large tracts of valuable natural resources. In 1997, Congress amended the Sikes Act to require DoD to develop and implement Integrated Natural Resources Management Plans (INRMPs).

Saw palmetto with longleaf pine background at Avon Park Air Force Range, FL

How INRMPs Guide Natural Resources Management on Military Lands

INRMPs are planning documents that outline how each military installation with significant natural resources will manage those resources. They integrate military mission requirements, environmental and master planning documents, cultural resources, and outdoor recreation to ensure both military operations and natural resources conservation are included and consistent with stewardship and legal requirements.

INRMPs require installations to look holistically at natural resources on a landscape or ecosystem basis. They are living documents that provide direction for daily natural resources management activities, and they provide a foundation for sustaining military readiness.

What an INRMP Includes

INRMPs are based on the principles of ecosystem management. They describe how to manage natural resources, allow for multipurpose uses of those resources, and define public access—all while ensuring no net loss in the capability of an installation to support its military testing and training mission.

INRMPs provide a comprehensive approach to natural resources management on installations.

Although variations exist among the different Military Services, a basic INRMP includes:

- A description of the installation, its history, and its current mission;
- Management goals and associated timeframes;
- projects to be implemented and estimated costs;
- A discussion of how the military mission and training requirements are supported while protecting the environment;
- Natural resources' biological needs and legal requirements;
- The role of the installation's natural resources in the context of the surrounding ecosystem; and
- Input from the U.S. Fish & Wildlife Service (USFWS), state fish and wildlife agency, and the general public.

The Sikes Act further requires, to the extent appropriate and applicable, that INRMPs include provisions for:

Bells Vireo Nest, San Pedro River, AZ

- Sustainable management of fish, plants, and wildlife;
- Enforcement of applicable natural resources laws and regulations;
- Consistency among the various activities conducted under the plan;
- Habitat enhancement, modifications; and/or restoration where necessary to support fish, plants, and/or wildlife;
- Public access to military installations for outdoor recreation and the sustainable use of natural resources by the public to the extent that the use is not inconsistent with the needs of fish, plant, and wildlife resources, and when and where safety and security allow; and
- Compatibility with, and support of, the installation's military mission.

Examples of projects that are implemented through an INRMP include natural resources assessments, monitoring programs, forestry and rangeland management, noxious and invasive weed control, native habitat restoration, threatened and endangered species management, wildlife education, and recreational hunting and fishing programs. Each of the Military Services has specific policies for developing and implementing INRMPs.

Riverine craft on a training raid, New River Intracoastal Waterway, Camp Lejeune, NC – US Marine Corps Photo

Preparing the INRMP

Trained natural resources professionals prepare the INRMP. Installation managers should actively involve individuals and organizations with a vested interest in managing the installation's natural resources early in the planning process. Stakeholders may include any or all of the following:

- military operations/ training activities managers
- environmental managers
- master planning staff
- federal and state agencies
- agricultural lessees
- recreational groups
- environmental and conservation groups
- cultural resources managers
- installation pest management professionals
- neighboring land owners

Military training on the prairie, Fort Riley, KS

Tracking INRMP Implementation

Each Military Service tracks INRMP progress for its installations, and reports findings to the Office of the Secretary of Defense for each of seven focus areas:

- INRMP Implementation
- Listed Species and Critical Habitat
- Sikes Act Cooperation
- Recreational Use and Access
- Natural Resources Management
- Natural Resources Program Support of the Installation Mission
- Team Adequacy between DoD, the USFWS, and the state fish and wildlife agency

The Sikes Act requires the Secretary of Defense to report annually to Congress the status of each INRMP, and the amounts expended by each military installation to implement its INRMP. The Secretary of the Interior also reports the amounts expended by the USFWS and state fish and game agencies on INRMP-related activities each year.

INRMP Updates

All installations must keep their INRMPs current. INRMPs undergo an annual internal review, and are updated or revised as necessary. Installations invite the USFWS and the appropriate state agency to participate in the annual review process. In addition to DoD's annual review policy, the Sikes Act requires that USFWS and state formally review INRMPs for operation and effect at least every five years.

The INRMP planning process integrates all traditional elements of natural resources management. The process also considers military mission requirements, installation master planning, environmental planning, and outdoor recreation. To address installation requirements and regional issues, INRMPs involve appropriate stakeholders, thereby providing for more efficient and effective management of natural resources on a landscape-scale basis, all while ensuring that military readiness is sustained.

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July 2015

A2. MCBH PLANNING APPROACHES AND GUIDELINES

This text describes the foundations of the planning process used for natural resource management at MCBH.

A2.1 PLANNING PROCESS USED

Integrated natural resources management planning for Department of Defense (DoD) facilities has as its foundation "ecosystem management principles" as described in DoD Instruction 4715.03, Natural Resources Conservation Program of March 18, 2011[1] and Marine Corps Order (MCO) P5090.2A Ch 1-3 of August 26, 2013. The planning process used also draws on administrative management principles described in the Code of Environmental Management Principles (CEMP) for Federal Agencies (61 FR 54062) developed by the U.S. Environmental Protection Agency (USEPA) (1997), as directed by Part 4 of Executive Order 13148, Greening of the Government Through Leadership in Environmental Management.[2] It is important to review the evolution of this approach culminating in the requirement for this Integrated Natural Resource Management Plan (INRMP).

A2.2 CODE OF ENVIRONMENTAL MANAGEMENT PRINCIPLES (CEMP)

Even before the Sikes Act Improvement Act – which congressionally mandates INRMPs – there was a related CEMP requirement promulgated by USEPA that contained "precursor" elements. By Executive Order (EO) 12856 (1993), USEPA became the lead Federal agency to develop and enforce compliance with principles and performance objectives that provide a common basis for Federal agencies to move toward responsible environmental management. Among other things, EO 12856 required USEPA to establish an "environmental challenge" program, in cooperation with Federal agencies, including DoD. It required Federal agencies to agree to a code of environmental principles emphasizing pollution prevention, sustainable development, and state-of-the-art environmental management programs. To address this challenge, the CEMP was developed, which contains several component parts. One of those components, "Enabling Systems," included "Measures of Merit" to support overall organizational objectives. In the Conservation area, Headquarters Marine Corps (HQMC) adopted a Measure of Merit that INRMPs would be the primary vehicle through which the Marines would promulgate ecosystem management principles. EO 12856 was revoked with the publication of EO 13148, Greening the Government through Leadership in Environmental Management (2000).

A2.3 ECOSYSTEM APPROACH TO INTEGRATED NATURAL RESOURCE MANAGEMENT

In 1995 the DoD was one of fourteen Federal land management agencies to sign an Interagency Memorandum of Understanding (MOU) to Foster the Ecosystem Approach.[3] The goal of Ecosystem Management as stated in the MOU is:

[1] Initially published as DoD Instruction 4715.3 of May 3, 1996.

[2] Executive Order 13148 was rescinded and replaced by Executive Order 13423, Strengthening Federal Environmental, Energy and Transportation Management, signed January 24, 2007, and Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, signed October 5, 2009. Executive Order 13423 and Executive Order 13514 were subsequently rescinded and replaced by Executive Order 13693, Planning for Federal Sustainability in the Next Decade, signed March 19, 2015. The Memorandum for Executive Departments and Agencies: Incorporating Ecosystem Services into Federal Decision Making, published October 7, 2015, is another recent document that supports this approach.

[3] Memorandum of Understanding to Foster the Ecosystem Approach signed on December 15, 1995 by the President's Council of Environmental Quality and 14 Federal land management agencies. Distributed within DoD in

> …to restore and sustain the health, productivity, and biological diversity of ecosystems and their overall quality of life through a natural resource management approach that is fully integrated with social and economic goals.

The MOU further defined an ecosystem approach as:

> …a method for sustaining or restoring ecological systems and their functions and values. It is goal driven, and it is based on a collaboratively developed vision of desired future conditions that integrates ecological, economic, and social factors. It is applied within a geographic framework defined primarily by ecological boundaries.

Ecosystem Management emphasizes humans as part of the ecosystem, basing resource management decisions not only on "best science" but on associated cultural values, improved communication with the general public, and forming partnerships with government, non-governmental agencies, and other stakeholders.

DoD Instruction 4715.3 of May 3, 1996 defined the 'Goal of Ecosystem Management' and included ten "Ecosystem Management Principles and Guidelines" to be followed by all U.S.-based military installations with significant natural resources.[4]

A. GOAL OF ECOSYSTEM MANAGEMENT

To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic and marine ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations.

B. PRINCIPLES AND GUIDELINES

1. **Maintain and Improve the Sustainability and Native Biodiversity of Ecosystems**. Ecosystem management involves conducting installation programs and activities in a manner that identifies, maintains, and restores the "composition, structure, and function of natural communities that comprise ecosystems," to ensure their sustainability and conservation of biodiversity at landscape and other relevant ecological scales to the maximum extent that mission needs allow.

2. **Administer with Consideration of Ecological Units and Timeframes**. Ecosystem management requires consideration of the effects of installation programs and actions at spatial and temporal ecological scales that are relevant to natural processes. A larger geographic view and more appropriate ecological time frames assist in the analysis of cumulative effects on ecosystems that may not be apparent with smaller and shorter scales. Regional ecosystem management efforts are generally more appropriate than either national or installation-specific efforts. Consideration of sustainability under long-term environmental threats, such as climate change, is also important.

3. **Support Sustainable Human Activities**. People and their social, economic, and national security needs are an integral part of ecological systems, and management of ecosystems depends on sensitivity to those issues. Consistent with mission requirements, actions should

an attachment to Memorandum of the Undersecretary of Defense, Environmental Security (ES)/EQ-CO, Letter of January 23, 1996, prepared by Office of the Undersecretary of Defense, ES. Pentagon, Washington, D.C.

[4] DoD Instruction 4715.3 has been updated to DoD Instruction 4715.03, Natural Resources Conservation Program, published March 18, 2011. Updates include new and updated policy for integrated management of natural resources and implementation of Natural Resources Conservation metrics.

support multiple use (e.g., outdoor recreation, hunting, fishing, forest timber products, and agricultural outleasing) and sustainable development by meeting the needs of the present without compromising the ability of future generations to meet their own needs.

4. **Develop a Vision of Ecosystem Health**. All interested parties (Federal, State, tribal, and local governments, nongovernmental organizations, private organizations, and the public) should collaborate in developing a shared vision of what constitutes desirable future ecosystem conditions for the region of concern. Existing social and economic conditions should be factored into the vision, as well as methods by which all parties may contribute to the achievement of desirable ecosystem goals.

5. **Develop Priorities and Reconcile Conflicts**. Successful approaches should include mechanisms for establishing priorities among the objectives and for conflict resolution during both the selection of the ecosystem management objectives and the methods for meeting those objectives. Identifying "local installation objectives" and "urban development trends" are especially important to determine compatibility with ecosystem objectives. Regional workshops should be convened periodically to ensure that efforts are focused and coordinated.

6. **Develop Coordinated Approaches to Work Toward Ecosystem Health**. Ecosystems rarely coincide with ownership and political boundaries so cooperation across ownerships is an important component of ecosystem management. To develop the collaborative approach necessary for successful ecosystem management, installations should:

    a. Involve the military operational community early in the planning process. Work with military trainers and others to find ways to accomplish the military mission in a manner consistent with ecosystem management.

    b. Develop a detailed ecosystem management implementation strategy for installation lands and other programs based on the vision developed in subsection B.4., above, and those principles and guidelines;

    c. Meet regularly with regional stakeholders (e.g., State, tribal, and local governments; nongovernmental entities; private landowners; and the public) to discuss issues and to work towards common goals.

    d. Incorporate ecosystem management goals into strategic, financial, and program planning and design budgets to meet the goals and objectives of the ecosystem management implementation strategy.

    e. Seek to prevent undesirable duplication of effort, minimize inconsistencies, and create efficiencies in programs affecting ecosystems.

7. **Rely on the Best Science and Data Available**. Ecosystem management is based on scientific understanding of ecosystem composition, structure, and function. It requires more and better research and data collection, as well as better coordination and use of existing data and technologies. Information should be accessible, consistent, and commensurable. Standards should be established for the collection, taxonomy, distribution, exchange, update, and format of ecological, socioeconomic, cartographic, and managerial data.

8. **Use Benchmarks to Monitor and Evaluate Outcomes**. Accountability measurements are vital to effective ecosystem management. Implementation strategies should include specific and measurable objectives and criteria with which to evaluate activities in the ecosystem. Efficiencies gained through cooperation and streamlining should be included in those objectives.

9. **Use Adaptive Management**. Ecosystems are recognized as open, changing, and complex systems. Management practices should be flexible to accommodate the evolution of scientific

understanding of ecosystems. Based on periodic reviews of implementation, adjustments to the standards and guidelines applicable to management activities affecting the ecosystem should be made.

10. **Implement Through Installation Plans and Programs**. An ecosystem's desirable range of future conditions should be achieved through linkages with other stakeholders. "Specific DoD activities" should be identified, as appropriate, in installation INRMPs and ICRMPs and in other planning and budgeting documents.

Marine Corps compliance with an ecosystem approach to integrated natural resource management was further reinforced in MCO P5090.2A, Environmental Compliance and Protection Manual. As summarized in Paragraph 11105.13 of MCO P5090.2A, Ecosystem Management is:

> A goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural processes; is cognizant of natural processes' time scales; recognizes social and economic viability within functioning ecosystems; is adaptable to complex, changing requirements; and is realized through effective partnerships among private, local, state, tribal, and Federal interests. Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole.

For emphasis, Ecosystem Management differs from conventional natural resources management in at least three important ways.

1. It stresses collaborative learning and a participatory approach that involves Base resource managers, the internal and external stakeholder communities, and other subject-specific expertise, as appropriate. To be fully collaborative includes recognizing differences in held values pertaining to natural resources and their uses (e.g., Marines may look at a coral reef as an environmental impediment to assault of a beach during amphibious landing maneuvers while a fisherman may look at the same reef as a source of subsistence; a scuba diver as a source of recreation; and a marine biologist as a source of valued biological diversity).

2. It involves multiple disciplines, addressing multiple resources, and is systems oriented. It treats all resources (e.g., soil, wetlands, watersheds, fish and wildlife) as inter-related components of a single system.

3. It views human systems – the economy, community, society, and culture – as part of the ecosystem, rather than seeing human systems as an external factor impacting the environment.

A2.4 INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN (INRMP)

As defined in MCO P5090.2A, Paragraph 11105.25[5], an INRMP is:

> A planning document using ecosystem management principles directing the management of conservation of installation natural resources.

Preparing and implementing such a plan addresses the overarching Marine Corps Natural Resources Management Goals as stated in Paragraph 11200.3 of MCO P5090.2A:

a. Preserve access to air, land, and sea spaces to meet military readiness requirements;
b. Comply with applicable natural resources protection requirements (e.g., laws, E.O.s, and regulations);
c. Provide public access to installation lands, where practicable, provided such access does not conflict with military readiness and does not harm sensitive installation natural resources;
d. Participate in regional ecosystem management partnerships provided such participation does not conflict with military readiness or provisions of a SOFA [Status of U.S. Armed Forces in Japan Agreement] and does not harm installation natural resources; and
e. Participate in wetland mitigation banks and threatened and endangered species conservation banks.[6]

A2.5 WATERSHED APPROACH

Federal regulations and DoD and Marine Corps directives mandate that MCBH take an "ecosystem perspective" while engaging in land and natural resource management actions. This means looking "beyond base borders" to entire ecosystems of which MCBH is a part and working with all stakeholders concerned about shared natural resources in that region. In Hawai'i, a "watershed" is one of the functional units of ecosystem-level concern most useful for land use and resource managers. A watershed is "an area where rain and other water drains to a common location such as a river, lake, or wetland. This collection of water may occur naturally (as with rain running down a hillside) or with the influence of drainage infrastructure such as ditches and storm sewers" (USEPA 1997). Watershed assessment, planning, and actions have become an essential component of integrated natural resources management. The "watershed approach" to resource planning and management is recognized as highly advantageous as a means to accelerate Federal progress towards achieving Clean Water Act compliance. A watershed approach includes a set of methodologies to assess and restore the condition of a watershed. As described in the Unified Federal Policy (UFP) for a Watershed Approach to Federal Land and Resource Management, Notice of Final Policy, (October 18, 2000, 65 FR 62566), it is "a framework to guide watershed management that: (1) uses watershed assessments to determine existing and reference conditions; (2) incorporates assessment results into resource management planning; and (3) fosters collaboration with all landowners in the watershed."

[5] Previously MCO 5090.2A (Paragraph 11105.24) defined an INRMP as an integrated ecosystem management plan showing the interrelationships of individual components of natural resources management (fish and wildlife, forestry, land management, and public access) to mission requirements and other land use activities affecting an installation's natural resources.

[6] While MCBH understands and supports the use of mitigation and conservation banking, these practices have not historically been used in Hawai'i.

The watershed approach is inherently integrative, has clearly defined procedural components, allows for identification of distinct land and water resource management units, and is complementary with ecosystem management principles. It is viewed as an effective and efficient means of addressing multiple compliance requirements bearing on environmental and natural resources components of watersheds: water quality, inland water bodies (streams, lakes, reservoirs, estuaries, and wetlands), riparian habitat, water resources, and others (COA 7.3).

A foundation of the watershed approach is a watershed assessment, which in its most comprehensive sense is a continuous process of information gathering, analysis, stakeholder interaction, action, and response evaluation. As defined in the UFP for a Watershed Approach to Federal Land and Resource Management, a watershed assessment is “an analysis and interpretation of the physical and landscape characteristics of a watershed using scientific principles to describe watershed conditions as they affect water quality and aquatic resources.” Watershed condition is “the state of the watershed based on physical and biogeochemical characteristics and processes (e.g., hydrologic, geomorphic, landscape, topographic, vegetative cover, and aquatic habitat, water flow characteristics and processes (e.g., chemical, physical, and biological) as it affects water quality and water resources.” The UFP states that Federal agencies “will develop a science-based approach to watershed assessment for Federal lands. Watershed assessment information will become part of the basis for identifying management opportunities and priorities and for developing alternatives to protect or restore watersheds” in so far as existing “missions, funding, and fiscal and budgetary authorities permit” (see II. Agency Objectives section of UFP).

A2.6 COOPERATIVE CONSERVATION

EO 13352 Facilitation of Cooperative Conservation (2004) launched a significant national initiative in this regard (Appendix A3). In 2008 the Government Accountability Office (GAO) conducted a study to determine if collaborative resource management is an effective enough means of resolving natural resource conflicts and problems to warrant the use of time and resources it requires (GAO 2008). The GAO determined that the key challenges Federal agencies face have similarities and recommended that agencies develop long term plans that support collaborative efforts.

One response to the GAO recommendations was the development of a MOU, signed January 2009, between the U.S. Departments of Agriculture, Commerce, Defense and the Interior; the USEPA; and the Council on Environmental Quality. The MOU established the Partnership for Cooperative Conservation and provides a framework for Federal agencies to facilitate cooperative conservation initiatives among agencies and across public and private sectors to sustain and conserve natural resources. The MOU calls for the agencies involved to identify issues, develop solutions, and share best practices in collaborative natural resources and environmental management across organizational and jurisdictional boundaries.

A2.7 IMPLEMENTATION LEVEL OF EFFORT

The 2001 INRMP/EA defined three alternative sets of management actions and levels of effort that can be undertaken to implement INRMP management actions: Operational Stewardship (continuing current level of action effort), Compliance-focused Stewardship (reduced level and type of effort), or Optimal Stewardship (increased level and type of effort).

> **Compliance-focused Stewardship**: a programmatic set of management actions comprising an alternative under which MCBH will reduce the scale, type, and intensity of its established resource management program actions in the COA, although integration of military mission priorities with an ecosystem management approach will continue as a central element of compliance (see Sections 5 and 7, 2001 INRMP/EA).
>
> **Operational Stewardship**: a programmatic set of management actions comprising an alternative under which MCBH will continue its existing level of effort in the COA (see Sections 5 and 7, 2001 INRMP/EA).
>
> **Optimum Stewardship**: a programmatic set of management actions comprising an alternative under which MCBH will increase the type, intensity and scale of its established natural resource management program actions in the COA, providing they continue to integrate with military mission priorities (see Sections 5 and 7, 2001 INRMP/EA).

Considering these alternative sets during the INRMP development and update process helped to define the minimum/maximum range of management efforts possible within the INRMP implementation framework, while still adhering to relevant laws, regulations, and directives. To satisfy National Environmental Policy Act (NEPA) requirements when the original INRMP/EA was developed, potential environmental impacts were analyzed and discussed for the three alternative sets of management actions considered (Sections 5 and 8, and Appendix C of the 2001 INRMP/EA). Each alternative comprised a set of programmatic actions that varied in intensity and duration over the time frame of the INRMP.

Since 2001, MCBH has demonstrated a sustained commitment to the Operational Stewardship level of management effort in implementing the integrated natural resources management program. Since this updated INRMP continues this existing level of program implementation, no revision to the NEPA analysis is required or contained in this document.

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APPENDIX B
FIGURES

This appendix contains maps and figures in support of the INRMP. The MCBH GIS data repositories were the primary government provided information to support development of these figures. Additional information was obtained from public data repositories (e.g., Federal, State) and contractor-developed datasets.

Regional

1. MCBH Properties, Island of O‘ahu

MCBH Kaneohe Bay

2. MCBH Kaneohe Bay Site Map
3. MCBH Kaneohe Bay Range Training Complex
4. MCBH Kaneohe Bay Soils
5. MCBH Kaneohe Bay, Bird Surveys
    a. Nu‘upia Ponds Vicinity: Shearwater Nesting Burrows with Chicks
    b. Nu‘upia Ponds Vicinity: Hawaiian Stilt Nesting and Foraging Locations
    c. Hale Koa and Sag Harbor: Hawaiian Stilt Nesting and Foraging Locations
6. MCBH Kaneohe Bay – Wetlands
    a. MCBH Kaneohe Bay Wetlands – Overview
    b. MCBH Kaneohe Bay Wetlands – Nu‘upia Ponds Vicinity
    c. MCBH Kaneohe Bay Wetlands – Salvage Yard
    d. MCBH Kaneohe Bay Wetlands – Percolation Ditch
    e. MCBH Kaneohe Bay Wetlands – Motor Pool
    f. MCBH Kaneohe Bay Wetlands – Hale Koa & Sag Harbor
    g. MCBH Kaneohe Bay Wetlands – Klipper Golf Course Ponds
7. MCBH Kaneohe Bay Off Limit Areas
    a. Former Trap and Skeet Range (UXO0003)
    b. Former Moving Target Range (UXO0002)
8. MCBH Kaneohe Bay Flood Hazard Areas
9. MCBH Kaneohe Bay Marine Resources Survey
10. MCBH Kaneohe Bay Monk Seal Haul-Out Locations
11. MCBH Kaneohe Bay, Projected Sea Level Rise
12. MCBH Kaneohe Bay, Vegetation Species of Conservation Concern
    a. Nu‘upia Ponds Area
    b. Pyramid Rock Area
13. MCBH Kaneohe Bay – Ulupa‘u Crater
    a. Ulupa‘u Crater: Erosion Sensitivity
    b. Ulupa‘u Crater: Recent Fire Occurrence
    c. Ulupa‘u Crater: Water Cannons
14. MCBH Kaneohe Bay – Fishing and Water Sports

Marine Corps Training Area Bellows

15. MCTAB Site Map
16. MCTAB Soils
17. MCTAB Wetlands
18. MCTAB Flood Hazard Areas
19. MCTAB Floodway Restoration
20. MCTAB Marine Resources Survey Area
21. MCTAB Vegetation
22. MCTAB Invasive Species Vegetation
    a. Koa Haole Cover
    b. Guinea Grass Cover
    c. Christmasberry Cover
    d. Kiawe Cover
    e. California Grass Cover
    f. High Fire Danger
    g. Fountain Grass Locations (2001-2005)
    h. Fountain Grass Locations (2006-2016)
    i. Broomsedge
23. MCTAB Recreational Areas

Waikane Valley Impact Area

24. Waikane Valley Impact Area and Vicinity
25. Waikane Valley Impact Area Soils
26. Waikane Valley Impact Area Unexploded Ordnance Removal Activities

Camp Smith

27. Camp Smith and Vicinity
28. Camp Smith Soils
29. Camp Smith Vegetation
30. Camp Smith Invasive Species

Pu‘uloa Range Training Facility

31. Pu‘uloa RTF and Vicinity
32. Pu‘uloa RTF Soils
33. Pu‘uloa RTF Flood Hazard Areas
34. Pu‘uloa RTF Shoreline Erosion Project Area

Pearl City Annex

35. Pearl City Annex, Manana Housing Area, and Vicinity
36. Pearl City Annex Wetlands

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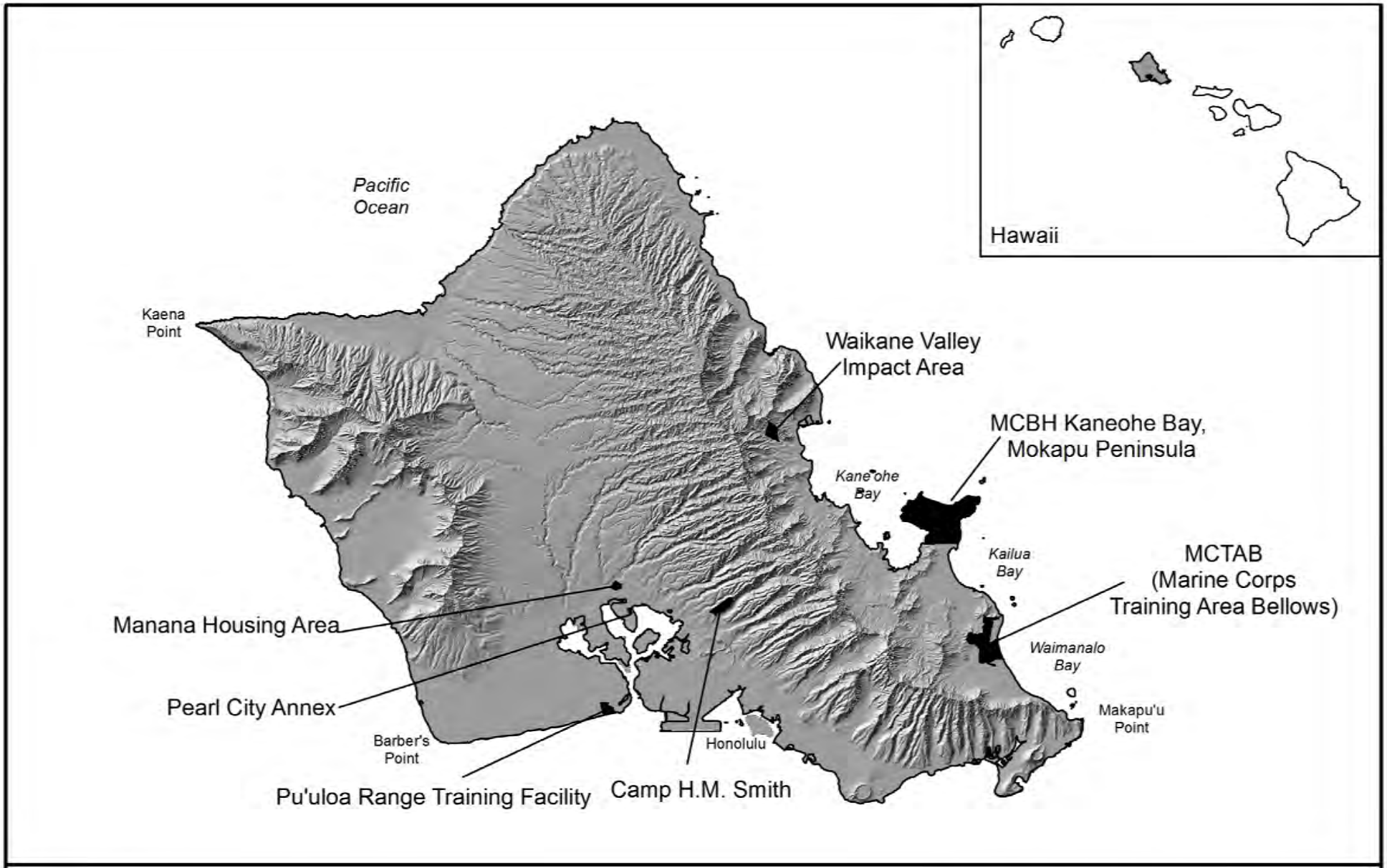


Figure 1
MCBH Properties, Island of Oahu

Source: MCBH GIS Data Repository; State of Hawaii Data Repository

Final MCBH INRMP Update (2017-2021)
January 2017

Figure 2
MCBH Kaneohe Bay Site Map

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

500 yd Security Buffer Zone

Wildlife Management Area

Source: MCBH GIS Data Repository
Aerial Photo from ESRI

N

Miles
0 0.15 0.3 0.6 0.9

FIGURE 3: MCBH KANEOHE BAY RANGE TRAINING COMPLEX

This map depicts training ranges in Ulupa‘u Crater.

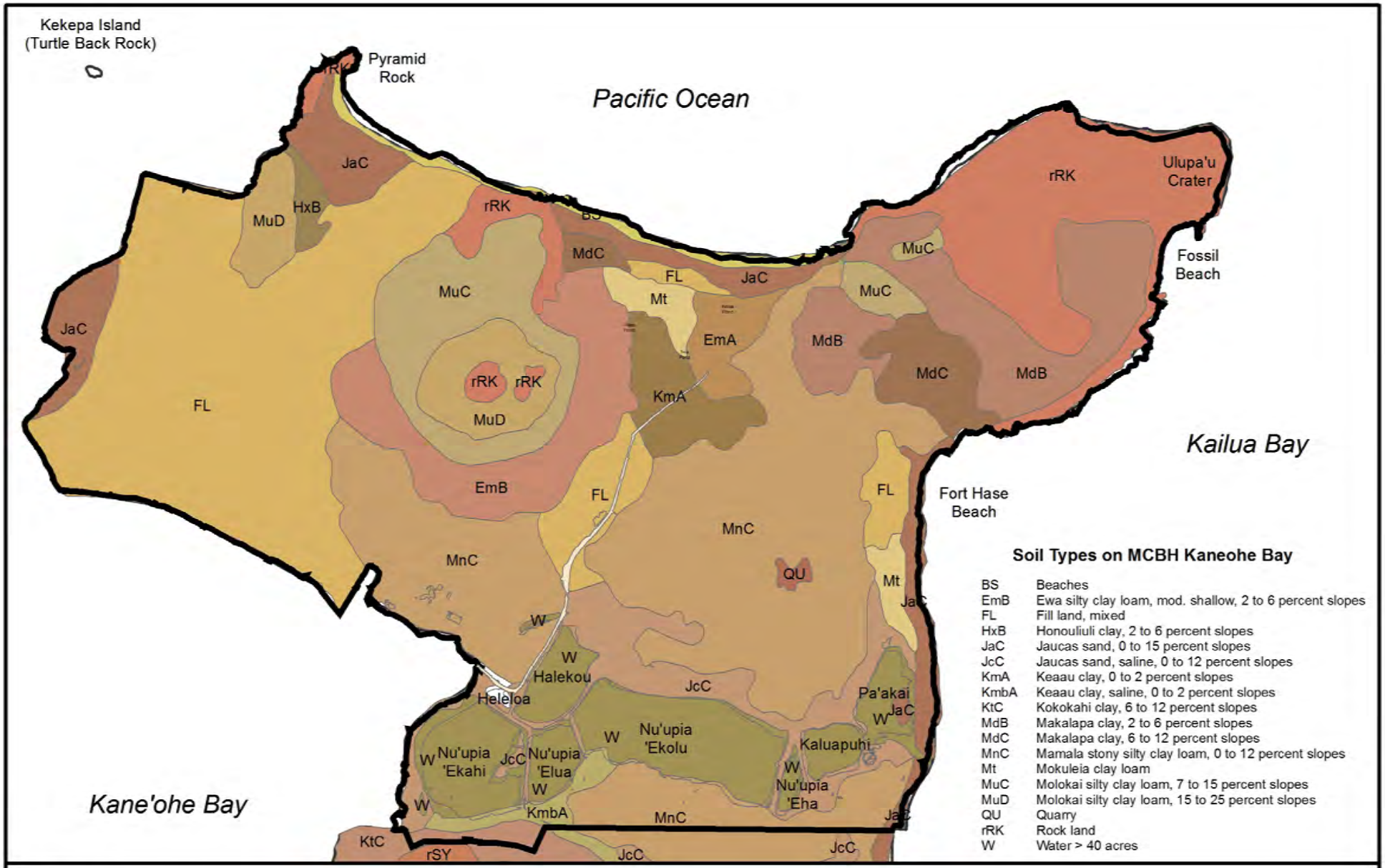


Figure 4
MCBH Kaneohe Bay Soils

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository (Soil types from
NRCS (SCS) Soil Survey of O`ahu (Foote et al. 1972))

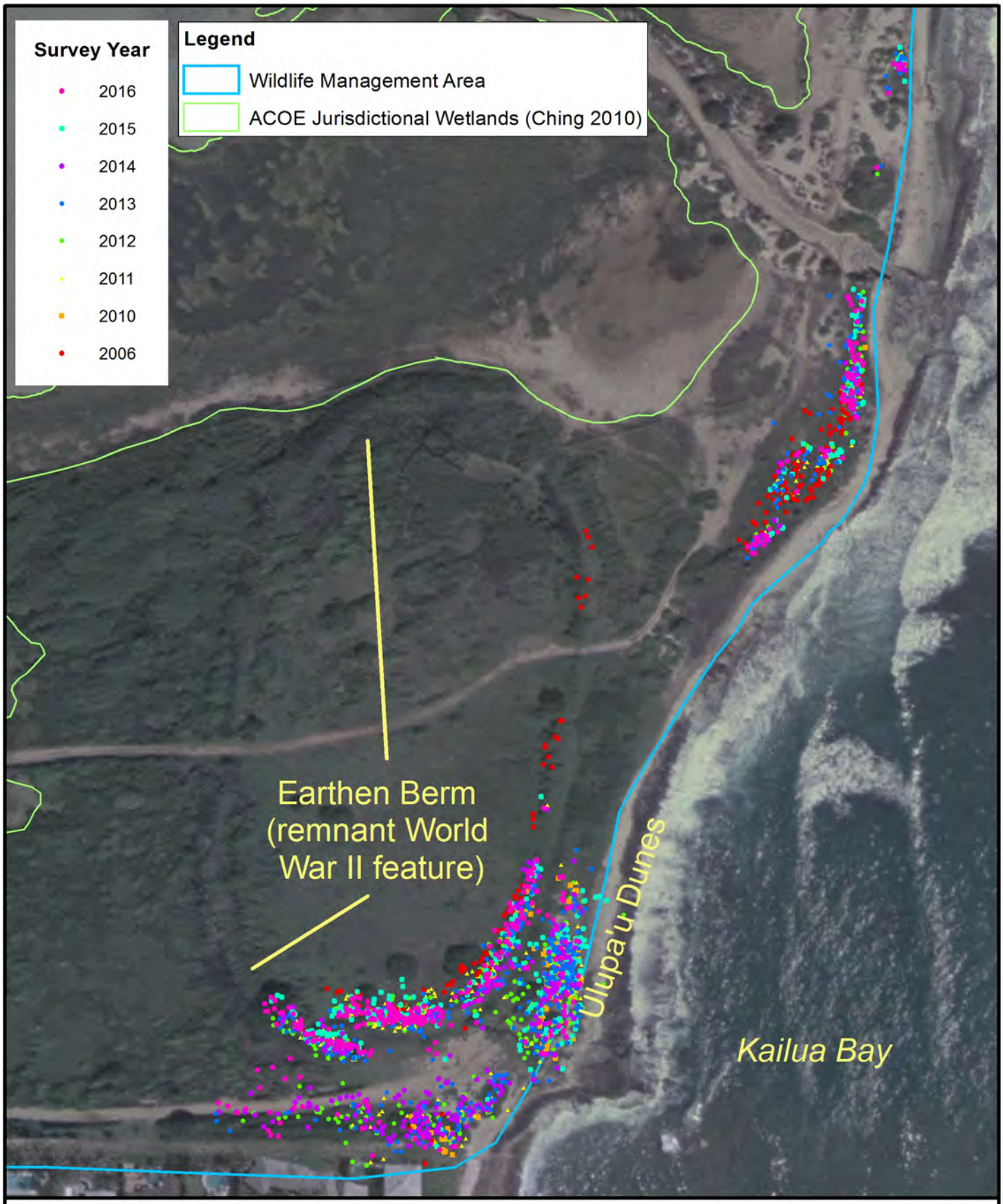


Figure 5a. MCBH Kaneohe Bay Bird Surveys
Nu'upia Ponds Vicinity
Shearwater Nesting Burrows with Chicks

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI.
Nesting data retained in Natural Resources Dept files.

N

0 0.01 0.02 0.04 Miles

Figure 5b. MCBH Kaneohe Bay Bird Surveys
Nu'upia Ponds Vicinity
Hawaiian Stilt Nesting and Foraging Locations

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

Wildlife Management Area

ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository;
Aerial photo from ESRI
Stilt nesting and foraging from Volinski 2007 and Natural Resources Staff observations

N

0 0.05 0.1 0.2 Miles

Figure 5c. MCBH Kaneohe Bay Bird Surveys
Hale Koa and Sag Harbor
Hawaiian Stilt Nesting and Foraging Locations
Final MCBH INRMP Update (2017-2021)
January 2017

Legend

ACOE Jurisdictional Wetlands (Ching 2010)

nesting/foraging

Source: MCBH GIS Data Repository;
Aerial photo from ESRI
Stilt nesting and foraging from Volinski 2007
and Natural Resources Staff observations

N

Miles
0 0.015 0.03 0.06

Figure 6a
MCBH Kaneohe Bay Wetlands - Overview

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Wildlife Management Area
- ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository
Aerial photo from ESRI

N

0 0.125 0.25 0.5 0.75 Miles

Figure 6b. MCBH Kaneohe Bay Wetlands
Nu'upia Ponds Vicinity

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Wildlife Management Area
- ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

N

0 0.05 0.1 0.2 0.3 Miles

Figure 6c. MCBH Kaneohe Bay Wetlands Salvage Yard

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

PCB Contamination (No-go for AAVs - MudOps)

ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository; Aerial photo from ESRI

N

0 0.02 0.04 0.08 Miles

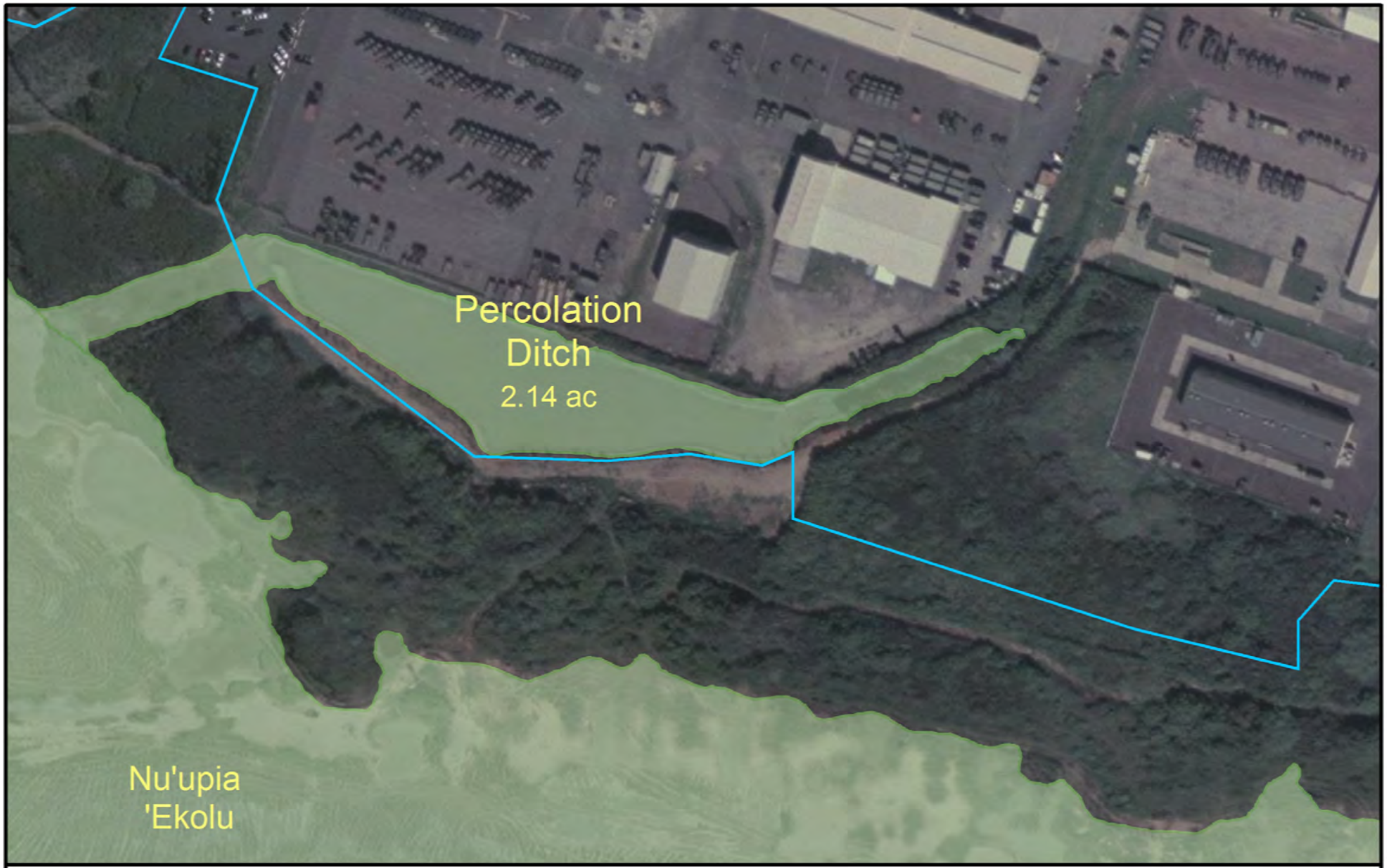


Figure 6d. MCBH Kaneohe Bay Wetlands Percolation Ditch

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Wildlife Management Area
- ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository; Aerial photo from ESRI

N

0 0.01 0.02 0.04 Miles

Figure 6e. MCBH Kaneohe Bay Wetlands Motor Pool

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository; Aerial photo from ESRI

N

0 0.01 0.02 0.04 Miles

Figure 6f. MCBH Kaneohe Bay Wetlands
Hale Koa & Sag Harbor

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

N

Miles
0 0.02 0.04 0.08

Figure 6g. MCBH Kaneohe Bay Wetlands
Klipper Golf Course Ponds

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

ACOE Jurisdictional Wetlands (Ching 2010)

Note: Klipper Golf Course Ponds are located on the Kaneohe Klipper Golf Course

Source: MCBH GIS Data Repository; Aerial photo from ESRI

N

0 0.01 0.02 0.04 Miles

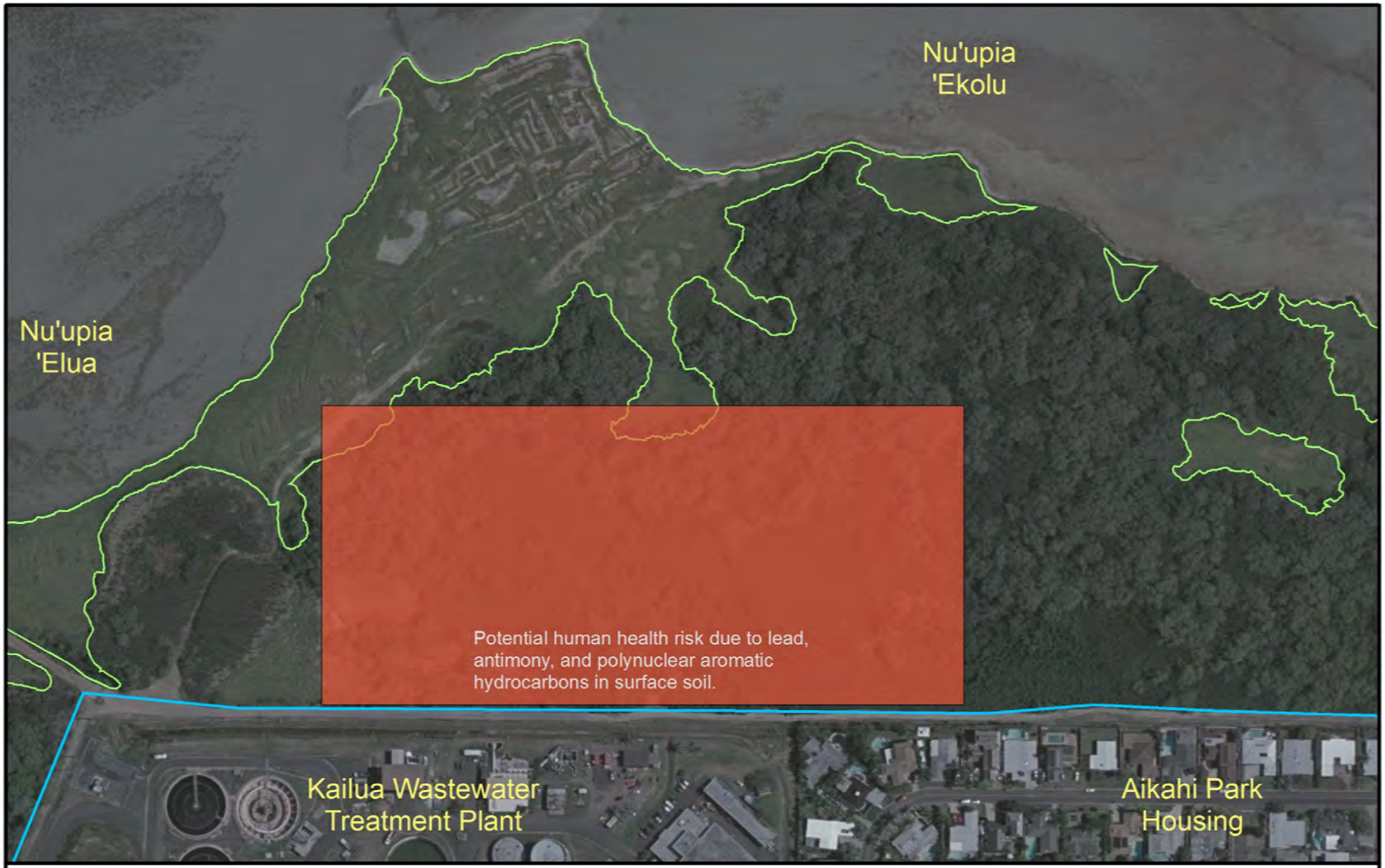


Figure 7a. MCBH Kaneohe Bay Off Limit Areas Former Trap and Skeet Range (UXO0003)

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Wildlife Management Area
- ACOE Jurisdictional Wetlands (Ching 2010)
- Portion of MRS UXO 0003 Site (approx bnds)

Source: MCBH GIS Data Repository; Aerial photo from ESRI.

N

0 0.015 0.03 0.06 Miles

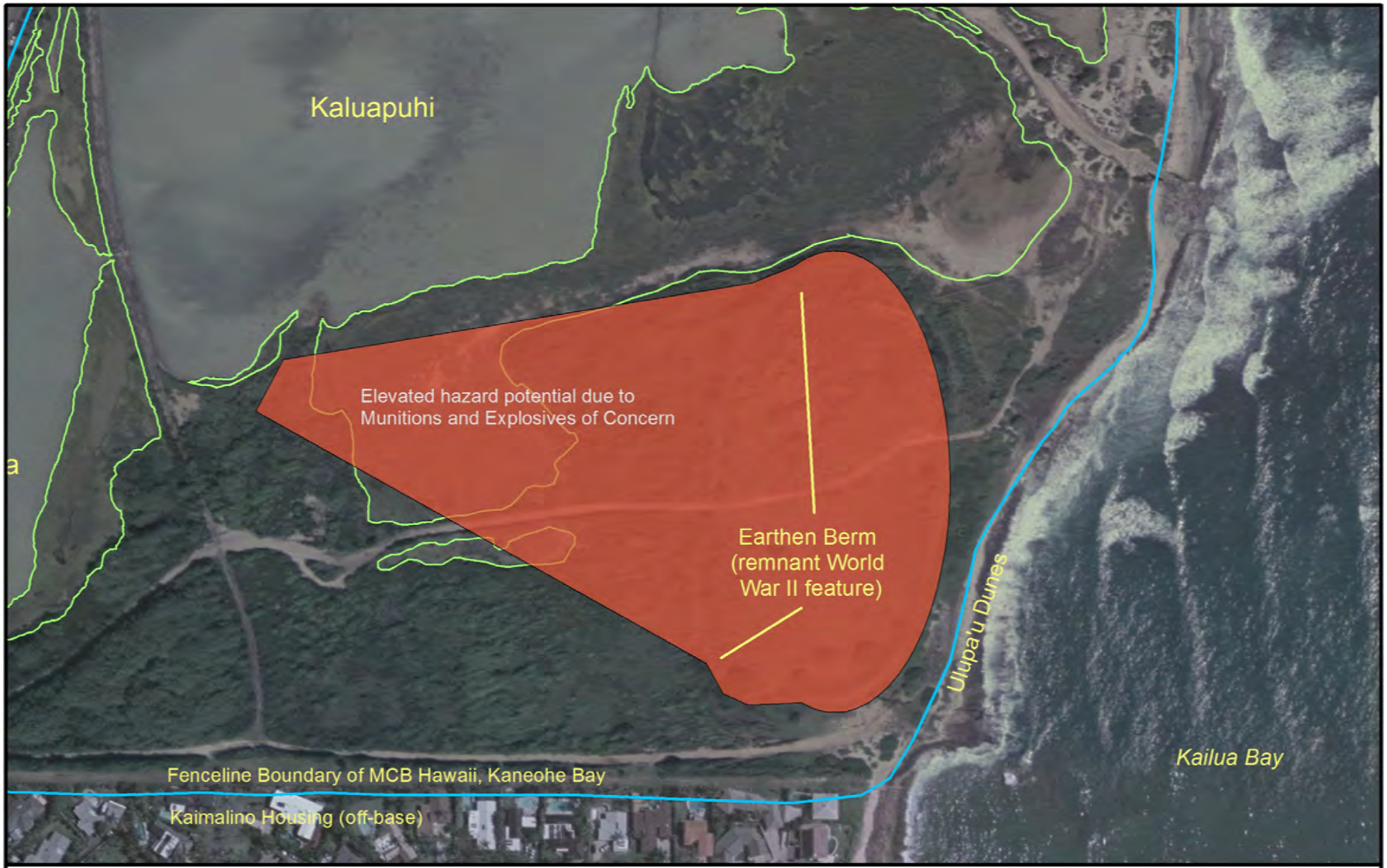


Figure 7b. MCBH Kaneohe Bay Off Limit Areas
Former Moving Target Range (UXO0002)

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- MRS UXO 0002 Site (approx bnds)
- Wildlife Management Area
- ACOE Jurisdictional Wetlands (Ching 2010)

Source: MCBH GIS Data Repository;
Aerial photo from ESRI.

N

0 0.015 0.03 0.06 Miles

Figure 8
MCBH Kaneohe Bay Flood Zones

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI
Flood Hazard Areas from C/C Honolulu (2011)
and Mokapu Central Drainage Channel Study, MCBH (HPE 2003)

FIGURE 9: MCBH KANEOHE BAY MARINE RESOURCES SURVEYS

The following figure and associated descriptive information about the observations (e.g., habitat, species) in survey areas are highlights of the results of the USFWS-led marine resources surveys in the MCBH Kaneohe Bay 500-yard security buffer zone (USFWS 2008, 2013). The map of the survey areas was used for both qualitative and quantitative surveys. Management recommendations to promote conservation of marine resources can be found in the final reports (USFWS 2008, 2013). See further discussion in COA 7.4.

HABITAT DESCRIPTIONS (USFWS 2008)

Station 1 Habitat: Carbonate and basalt pavement with sediment filled sand channels and depressions was the primary habitat with a change in rugosity to a basalt dominated boulder field.

Station 2 Habitat: This site was a moderate relief carbonate pavement over basalt with occasional sand channels and overhangs. *Porites compressa* and *Montipora capitata* were observed and macroalgae assemblage was diverse with 34 taxa recorded during the survey.

Station 3 Habitat: This station had high-relief spur-and-groove morphology with overhangs and archways large enough for a diver to swim through. The spurs were mostly composed of carbonate while the grooves were sediment-covered basalt. Coral, crustose coralline algae and filamentous turf algae with grazing scars were the common benthic organisms.

Station 4 Habitat: Located at the base of a windward cliff, this site is dominated by a mix of boulders covered with small encrusting coral colonies (*Porites* and *Montipora*) and a variety of zoanthids (*Palythoa* and *Zoanthus*). A diverse assemblage of urchins, mollusks, and sponges were recorded.

Station 5 Habitat: Complex coral community features caves, overhangs, and crevices provide suitable habitat for a diverse assemblage of reef fish, mollusks, and algae. Significant bioerosion is attributed to large numbers of the boring urchin, *Echinometra matthaei*.

Station 6 Habitat: Sand-scoured carbonate pavement and basalt with sand filled channels and depressions; ledges; scattered coral heads of *Pocillopora damicornis* and collapsed lava tubes dominate substrate types of this station. Ghost nets and ordnance (various sizes) were observed

Station 7 Habitat: The primary substrate type was low relief carbonate pavement over basalt with occasional sand channels and overhangs. Macroalgae formed three distinct canopies: 1) the tallest macrophytes were meadow-forming adult forms of the brown alga *Dictyopteris australis*; 2) a mixture of the green alga *Microdictyon setchellianum* and juvenile *D. australis* as a turf and sediment-covered filamentous turf algae in between the *D. australis* adults; 3) crustose coralline algae underneath the *M. setchellianum*. The green turtle *Chelonia mydas* was observed at the surface. Since the alga *Microdictyon setchellianum* is consumed by green turtles in Hawaii, this area may provide a grazing habitat for turtles.

Station 8 Habitat: High energy, low relief coral community featuring *Pocillopora*, *Porites*, and *Montipora* coral species. Strong waves have eroded the carbonate reef forming arches, crevices, ridges and grooves that provide habitat for a wide variety of reef fish and mollusk species. Algae diversity was low. Observed a young Hawaiian monk seal (*Neomonachus schauinslandi*), with acoustical tracking tag, foraging for food at the spur and groove structure.

Station 9 Habitat: This dredged area had an intact reef flat, a steep graded slope with coral and macroalgae cover and a broad soft sediment plain that leveled off. Coral cover abruptly ended along the dredged slope. *Halophila decipiens* formed an extensive meadow in the shallow soft sediments. The green turtle *Chelonia mydas* was seen resting in the area. As both seagrass species are frequently consumed by green turtles in Hawaii this area could be considered a potential grazing habitat for the green turtle. The endemic seagrass *Halophila hawaiiana* formed dense patches, on soft sediment.

Station 10 Habitat: Low energy environment largely soft sediment bottom, with isolated *Porites* coral pinnacles appearing in abundance throughout the station. The pinnacles support a diverse assemblage of macroinvertebrates. However, the pinnacles have been invaded by alien algae (*Acanthophora* and *Gracilaria*) and the keyhole sponge (*Mycale*).

Station 11 Habitat: Two invasive macroalgae species occurred as unattached accumulations (tumbleweed-like morphology) within the soft bottom, dredged habitat (marina). The red alga *Gracilaria salicornia* formed the base of the macroalgal accumulations and it supported an epiphyte, the red alga *Acanthophora spicifera*.

DETAILED OBSERVATIONS (USFWS AND USGS 2013)

Survey Areas 1-3 Eastern Facing Communities

Survey Areas 1-3 are eastern facing communities that are exposed to tradewinds, large waves, and swell. The increased wave activity could account for the encrusting morphology of corals and the turf morphology of algae that occur in these habitats. Both taxa often dominate the benthic substrate. Native and diverse algal meadows and few encrusting colonies of common Hawaiian corals (*Montipora* spp., *P. lobata*) dominate the habitat in Survey Area 1. A very small patch of branching corals occur on large basalt boulders located in the deeper reef. Flat carbonate pavement colonized by turf algae and encrusting corals are found along the shallow transects in Survey Area 2. However, the habitat transitioned from a co-dominated community in the nearshore to a coral dominated community in deeper water.

Survey Areas 4-8 Northern Facing Communities

Survey Areas 4-8 have northern exposures to tradewinds and this area experiences large oceanic waves and swell. The benthic colonizers throughout these stations are native algae and corals. The species identities and proportions of these taxa change among stations with the varying substrate types. Survey Area 4 consists of large platform boulders that have broken away from the seaward cliffs. *Palythoa caesia* was a common colonizer of these rocks and occurs in dense patches. Coral diversity is high in Survey Area 4 and an octocoral, zoanthids, and scleractinian representatives were encountered. Crustose and turf algae were also common. Reef fish aggregate within the smooth boulder substrate which was colonized by crustose and turf algae. Survey Area 5 consists of a spur and groove reef. Cropped reef algae with short statures and colonies of corals with encrusting or mound morphology tend to dominate the benthos. However, encrusting corals (*P. lobata*, *Montipora* spp.) tended to occupy a larger percentage of the hard substrate towards western boundary. As a result of the intense wave action in Survey Area 8, the substrate in the outer reef is highly sculpted creating few channels and numerous overhangs and ledges. Turf algae and *P. meandrina* are the dominant benthic colonizers on the hard substrate spurs. Green sea turtles frequent this reef, resting in the ledges and overhangs. The reef flat located nearshore in Survey Area 8 is protected from large waves and swell. Large coral colonies with microatoll morphologies can be found here along with a boring urchin (*E. mathaei*) zone covered in turf algae. The brown alga *Turbinaria ornata*, the green alga *H. discoidea*, and the invasive *A. spicifera* often inhabit this survey area. Juvenile and adult reef fishes and non-coral macroinvertebrates were common in all stations 4-8.

Survey Areas 9-11 Western Facing Communities

Survey Areas 9-11 are located on the western side of the peninsula where it is protected from wave action. These areas have been highly modified by dredging activities and as a result the soft sediment occurs throughout much of these stations. The sediment is devoid of epi-benthic cover but numerous burrows from infauna are present. Rays are known to frequent the bay and feed on alpheid shrimps but none were seen. Seagrasses (*H. decipiens*, *H. hawaiiana*) grow in much of the soft sediment located in Survey Area 9. The two species of seagrass were observed at station 9 but these species occupy different areas and do not co-mingle. These grass stands tend to be dense with long axes (5-cm). In contrast in areas 9-10 *Halophila decipiens* is sparsely distributed in shallow waters.

Corals occupy areas that were not previously dredged. *Montipora capitata* and *P. compressa* are common members of the patch and shallow reefs found in Survey Areas 9-11. Two colonies of diseased corals were found in Survey Area 10. *M. armata*, a red colored sponge has invaded the coral reefs, occupying the space between coral fingers. *Gracilaria salicornia* and *A. spicifera* are also invaders in the shallow regions of the reef flats, patch reefs, and fringing reefs. In some areas these algae form dense mats that blanket the substrate. This is of concern as these species are thought to out-compete many native corals and algae. Numerous green sea turtles were observed to feed and frequent in coral and seagrass habitats in Survey Area 9. Debris was also concentrated in the boat channel and near the beaches in this survey area.

U.S. Fish & Wildlife Service
Pacific Islands Office
Honolulu, Hawaii
MCBH - Kaneohe Bay: Inventory Study Areas
1
2
3
4
5
6
7
8
9
10
11
Study Areas
1-11
N
W
E
S
0 250 500 Meters
0 0.25 0.5 Miles
Produced in the Division of Ecological Service Honolulu, HI
Map Date: April 07
UTM Zone 4, NAD83
1:31,000

1

Figure 10 MCBH Kaneohe Bay Monk Seal Haul-Out Locations

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

500 yd Security Buffer Zone

Wildlife Management Area

Source: MCBH GIS Data Repository
Aerial Photo from ESRI

N

0 0.1 0.2 0.4 0.6 Miles

FIGURE 11: MCBH KANEOHE BAY PROJECTED SEA LEVEL RISE

This map depicts the general area of Mōkapu Peninsula and Kailua Bay. The red tone areas indicate lands vulnerable to sea level rise impacts, at high tide, when mean sea level rises 3 ft (91 cm) above present. According to Dr. Charles Fletcher (University of Hawai'i), the latest research suggests we are facing ~1 ft (32 cm) of sea level rise by 2050 and a range of 2.5-6.2 ft (0.75-1.9 m) by the end of the century. See further discussion in COA 7.4.

Source: Dr. C. Fletcher, map used with permission

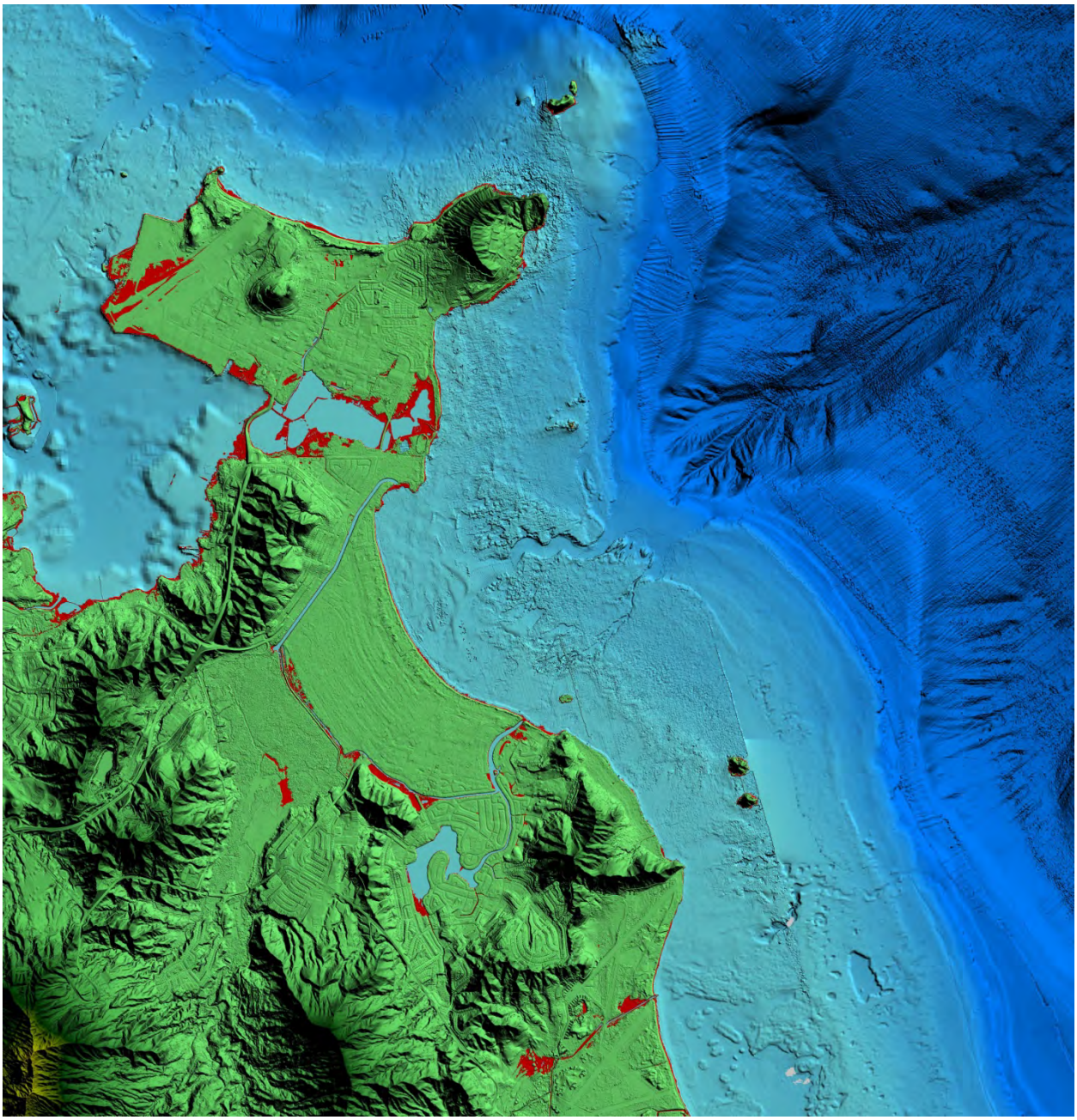


Figure 12a MCBH Kaneohe Bay
Vegetation Species of Conservation Concern
Nu'upia Ponds Vicinity

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI.

Figure 12b MCBH Kaneohe Bay
Vegetation Species of Conservation Concern
Pyramid Rock Vicinity
Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Maiapilo (Capparis sandwichiana)
- Nama (Nama sandwicensis)

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

N

0 0.03 0.06 0.12 Miles

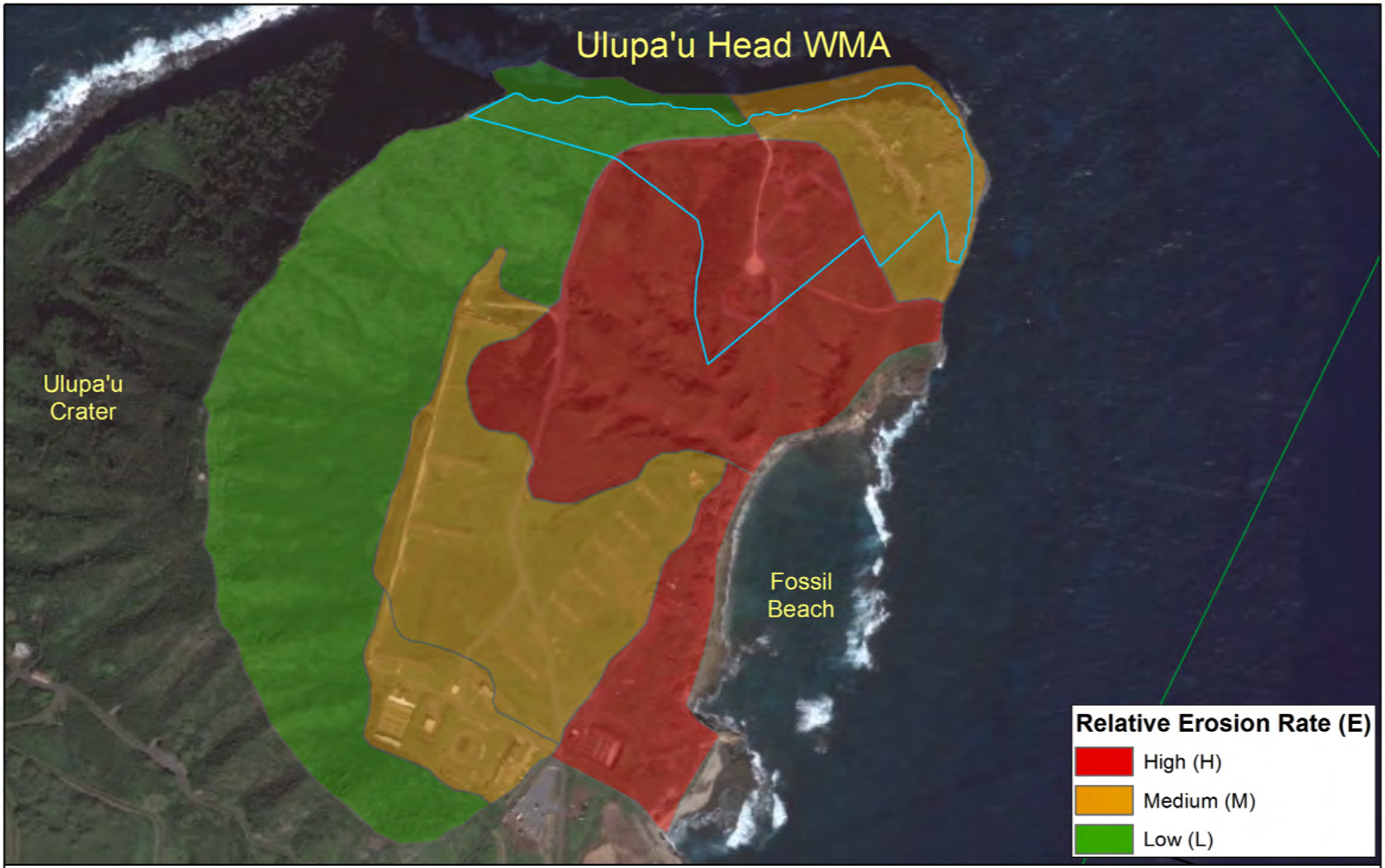


Figure 13a
Ulupa'u Crater: Erosion Sensitivity

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

500 yd Security Buffer Zone

Wildlife Management Area

Source: MCBH GIS Data Repository
Aerial Photo from ESRI

N

0 0.05 0.1 0.2 Miles

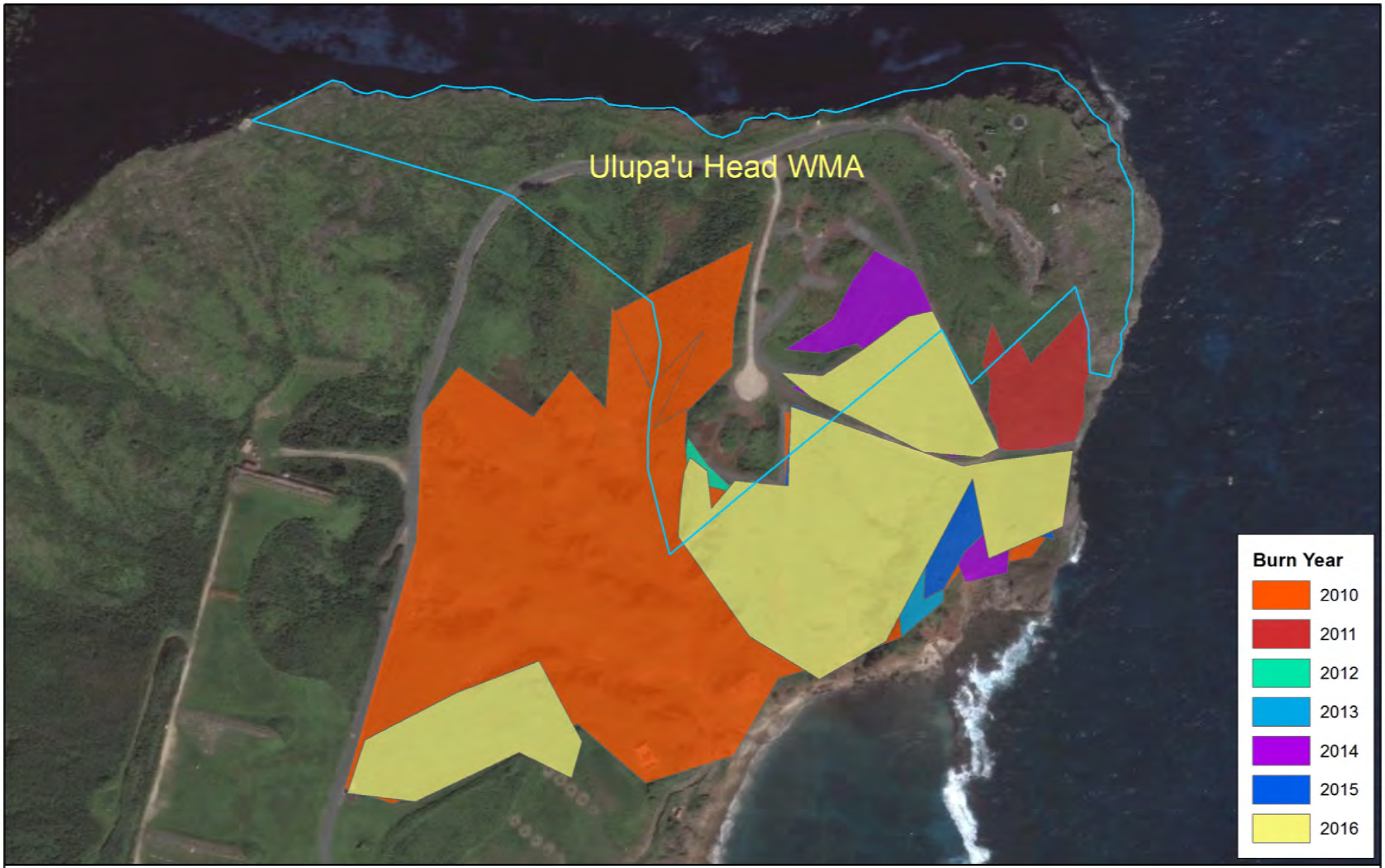


Figure 13b
Ulupa'u Crater: Wildland Fires

Source: MCBH GIS Data Repository
Aerial Photo from ESRI

Final MCBH INRMP Update (2017-2021)
January 2017

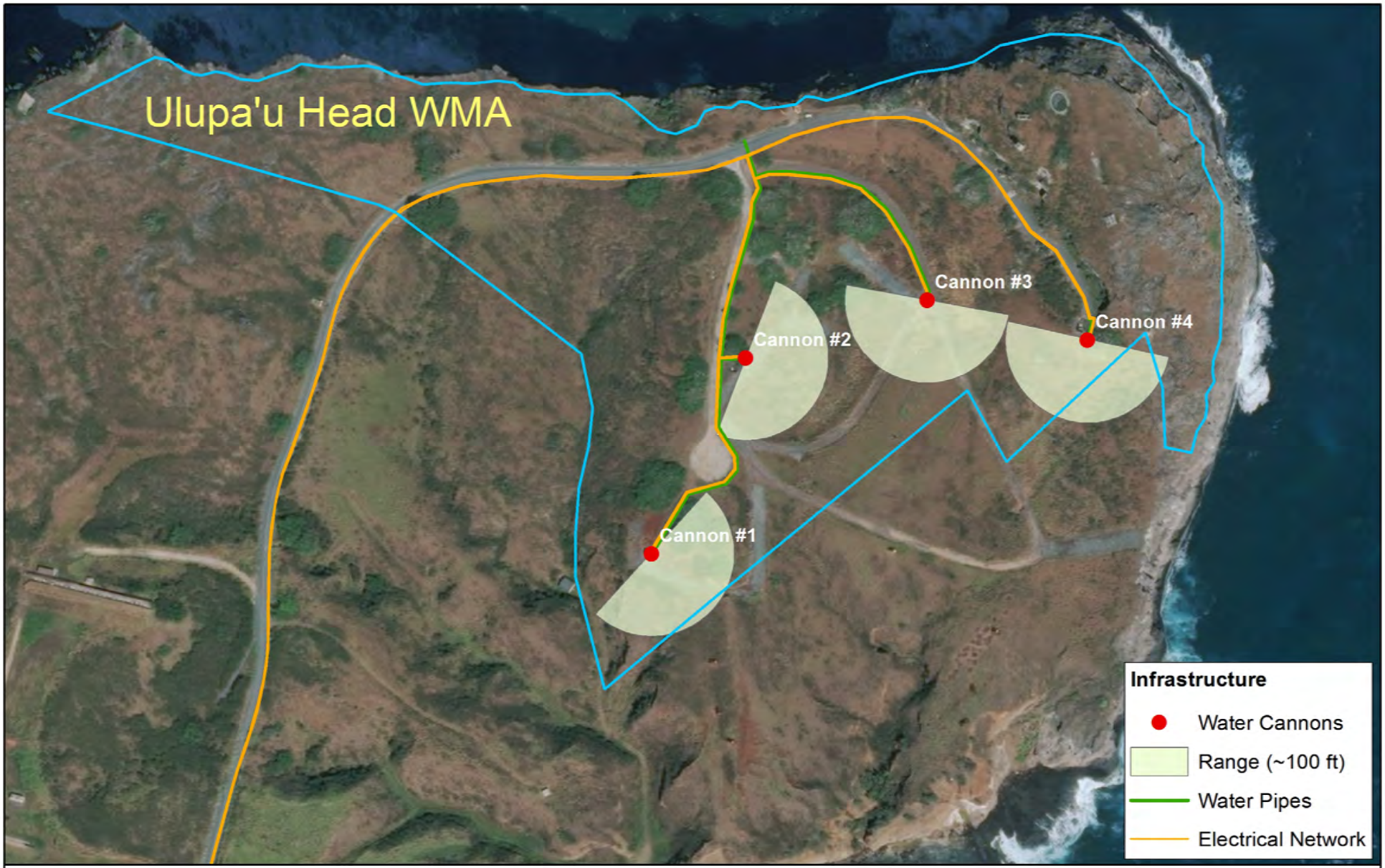


Figure 13c
Ulupa'u Crater: Water Cannons

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

Wildlife Management Area

Source: MCBH GIS Data Repository
Aerial Photo from ESRI

N

0 75 150 300 Feet

FIGURE 14: MCBH KANEOHE BAY FISHING AND WATER SPORTS

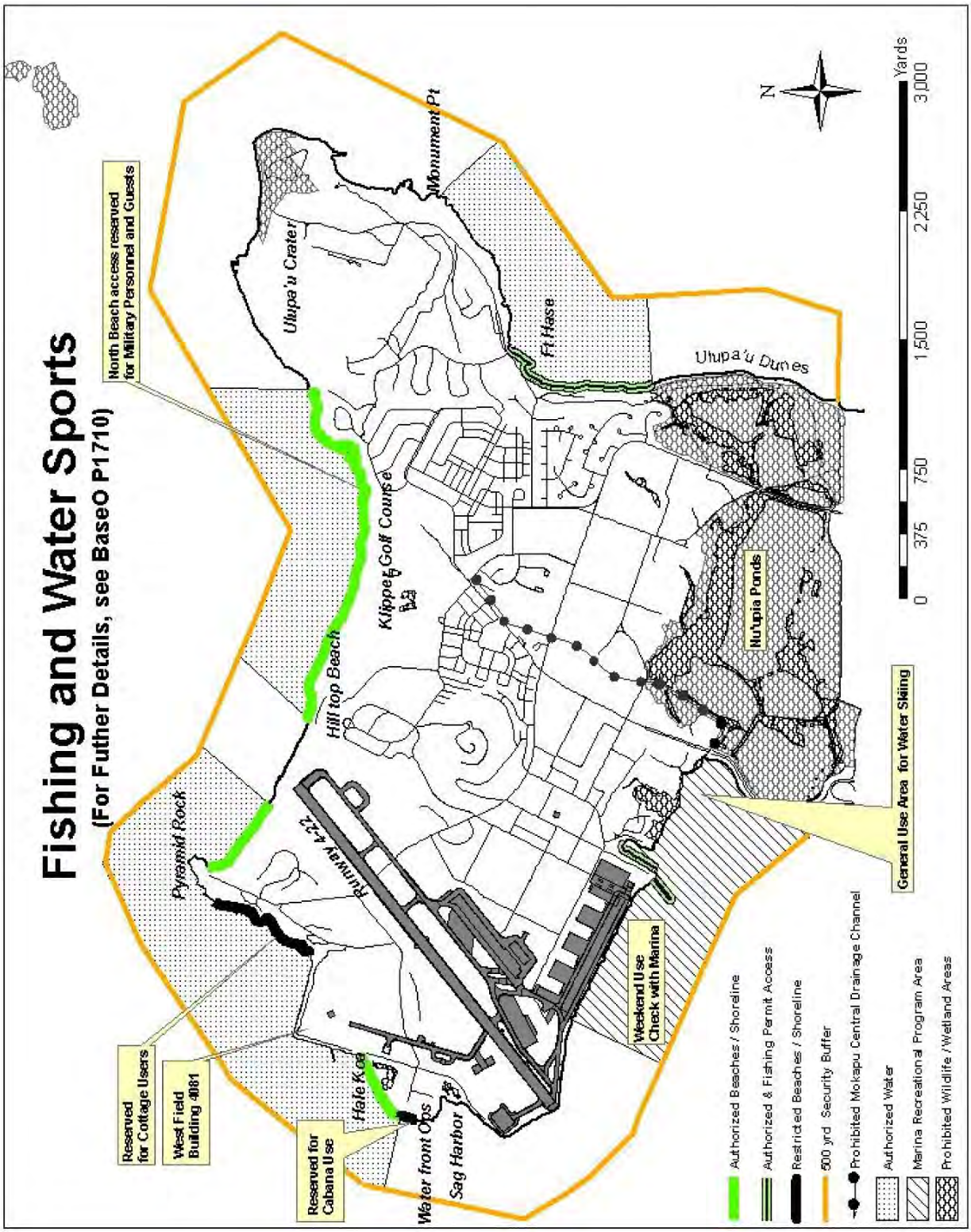


Figure 15
MCTAB Site Map

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Installation Area
- Wetlands

Source: MCBH GIS Data Repository; State of Hawaii Data Repository

N

0 0.2 0.4 0.8 Miles

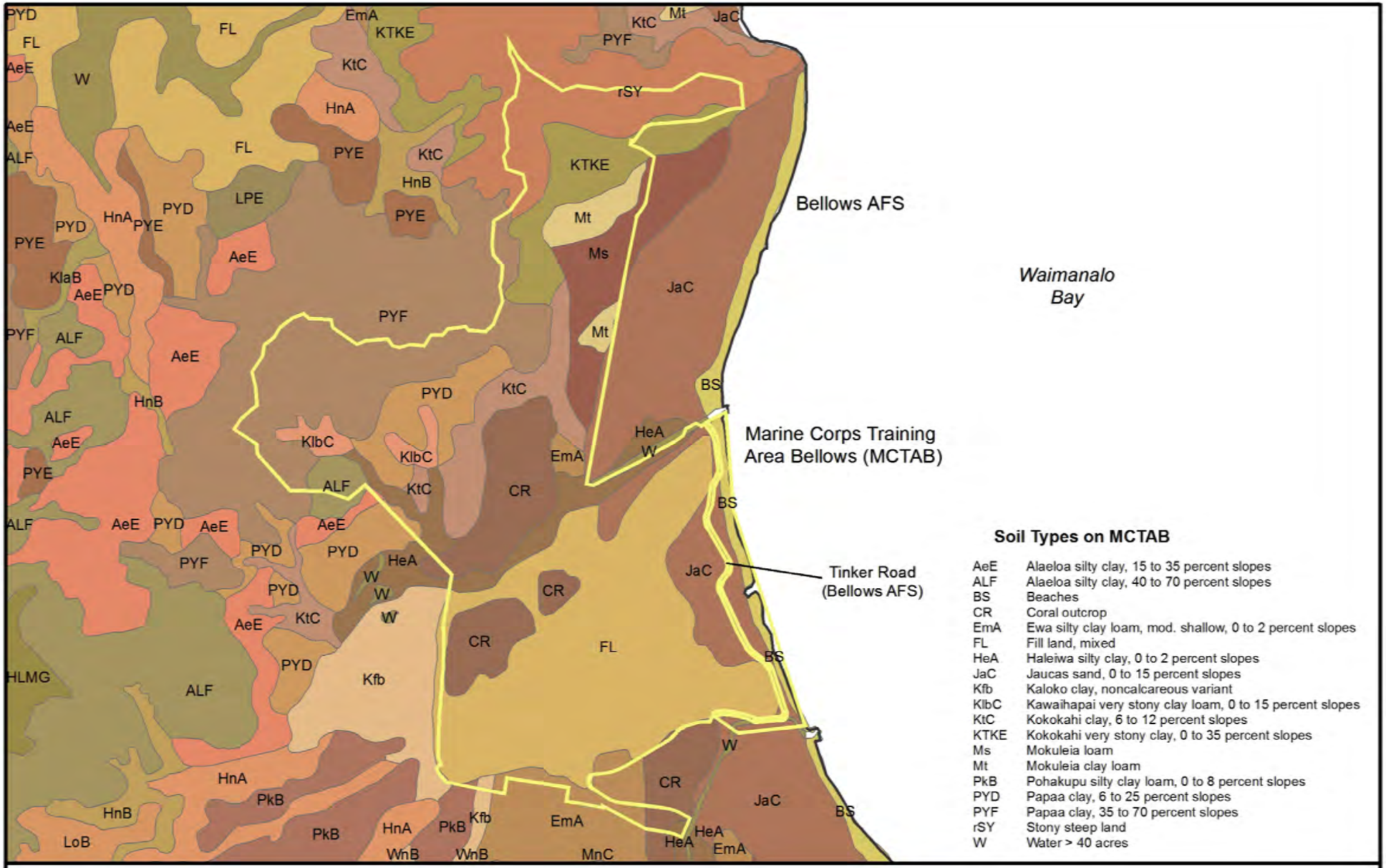


Figure 16
MCTAB Soils

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository (Soil types from NRCS (SCS) Soil Survey of O`ahu (Foote et al. 1972))

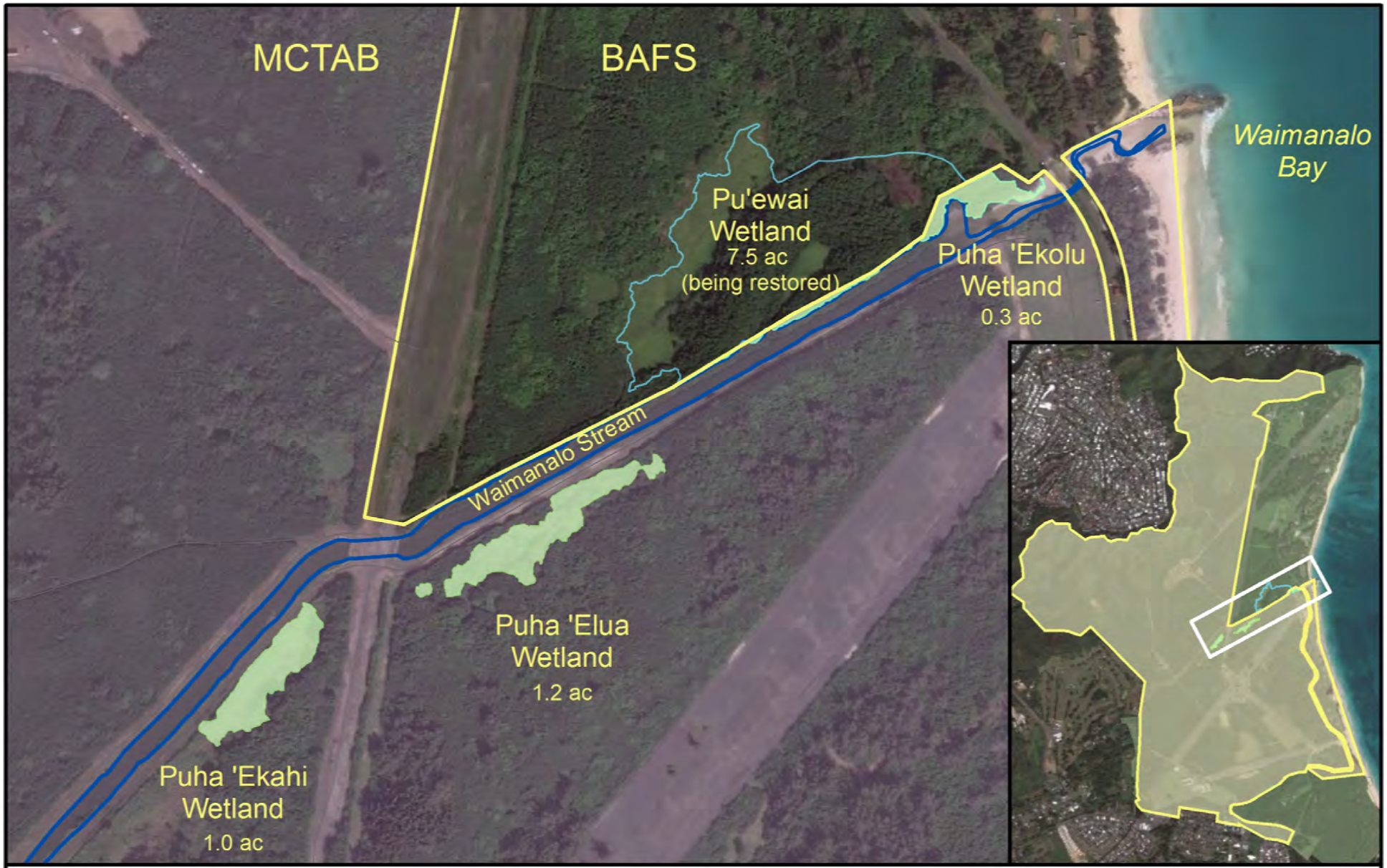


Figure 17
MCTAB Wetlands

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

= ACOE Jurisdictional Wetlands MCTAB (Ching 2002, 2010)

= ACOE Jurisdictional Wetlands BAFS (Ching 2002)

Source: MCBH GIS Data Repository; Aerial photo from ESRI

N

0 0.03 0.06 0.12 Miles

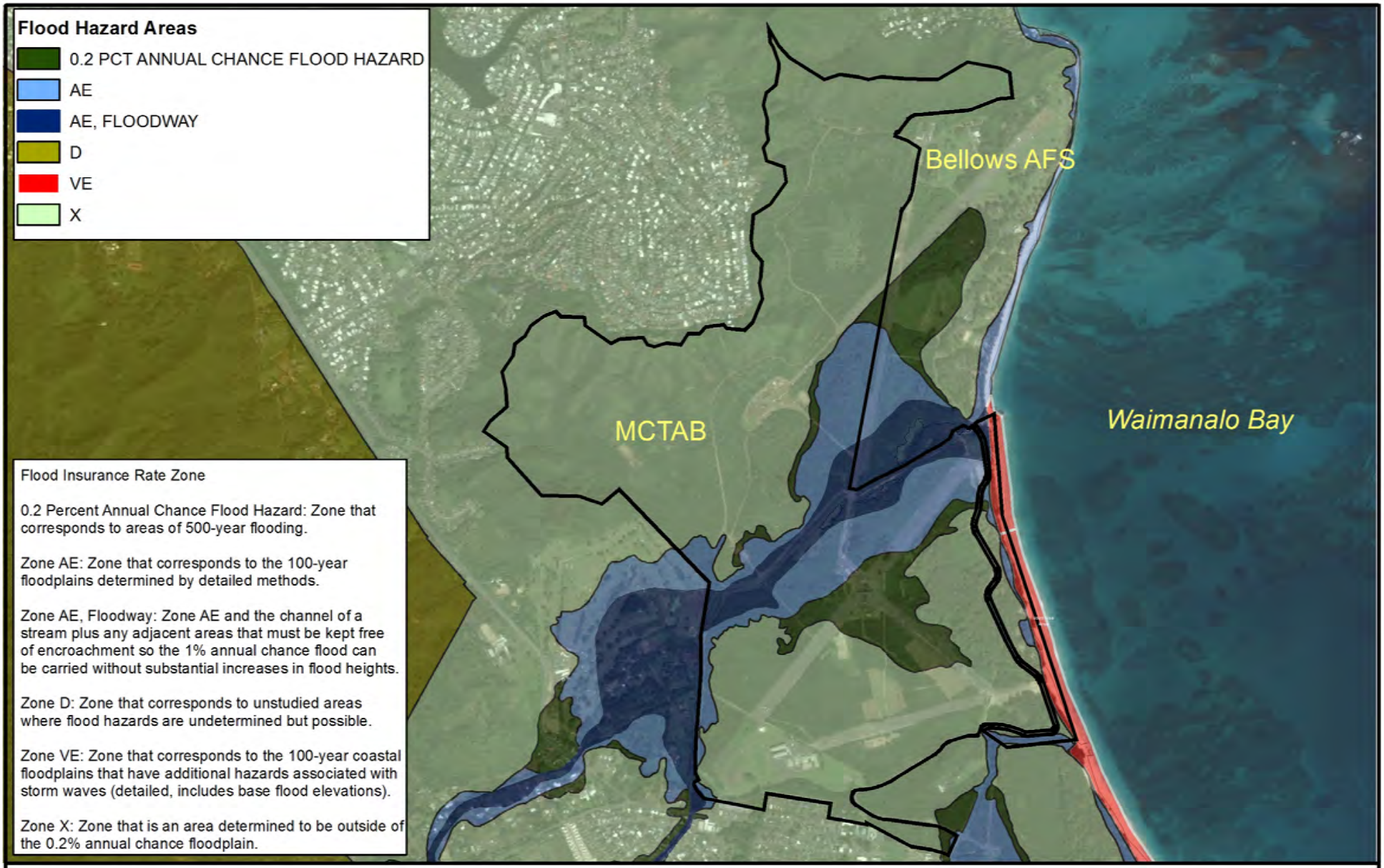


Figure 18
MCTAB Flood Hazard Areas

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository (2011 data)

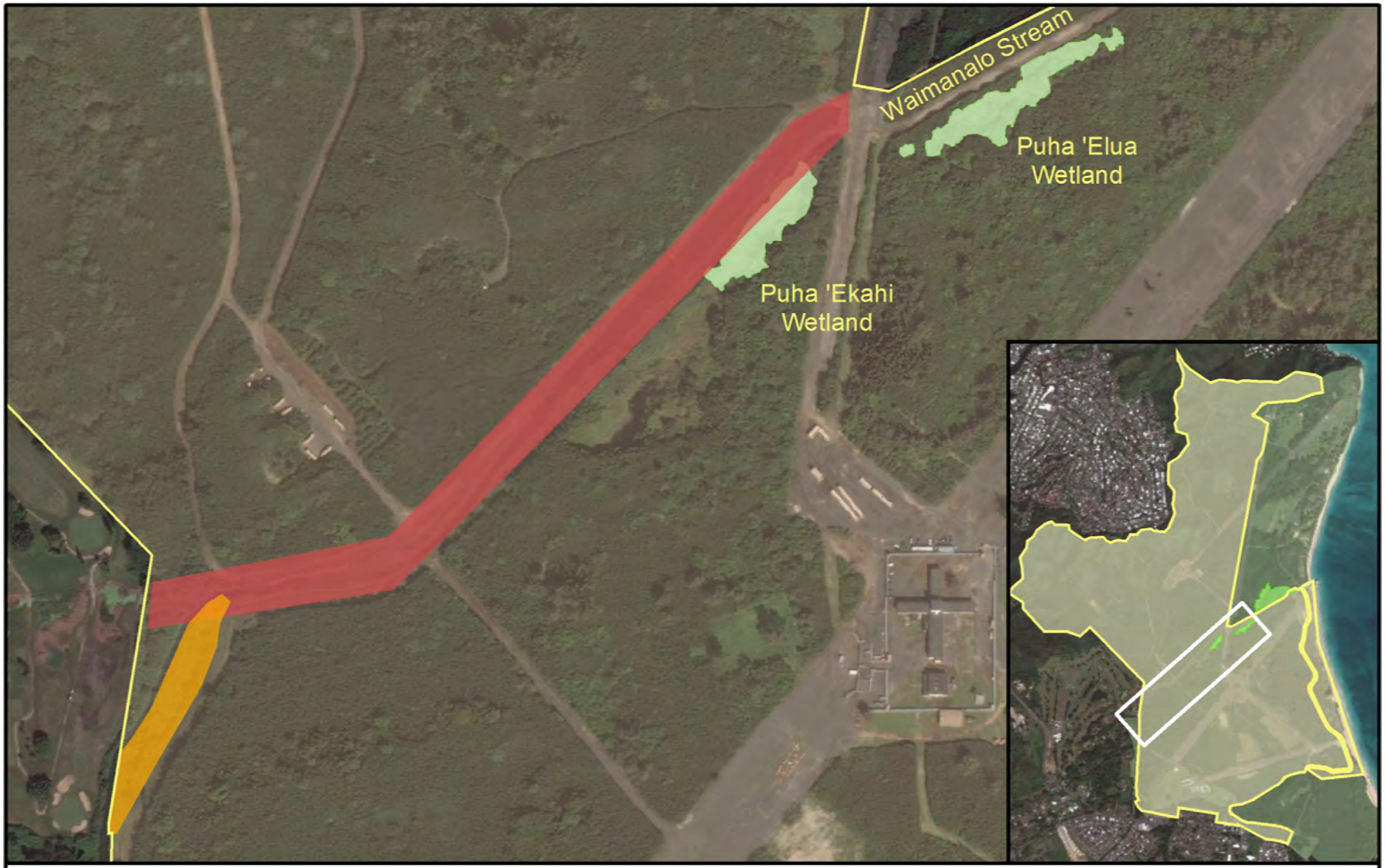


Figure 19
MCTAB Floodway Restoration

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Floodway Restoration
- Maintenance Dredging

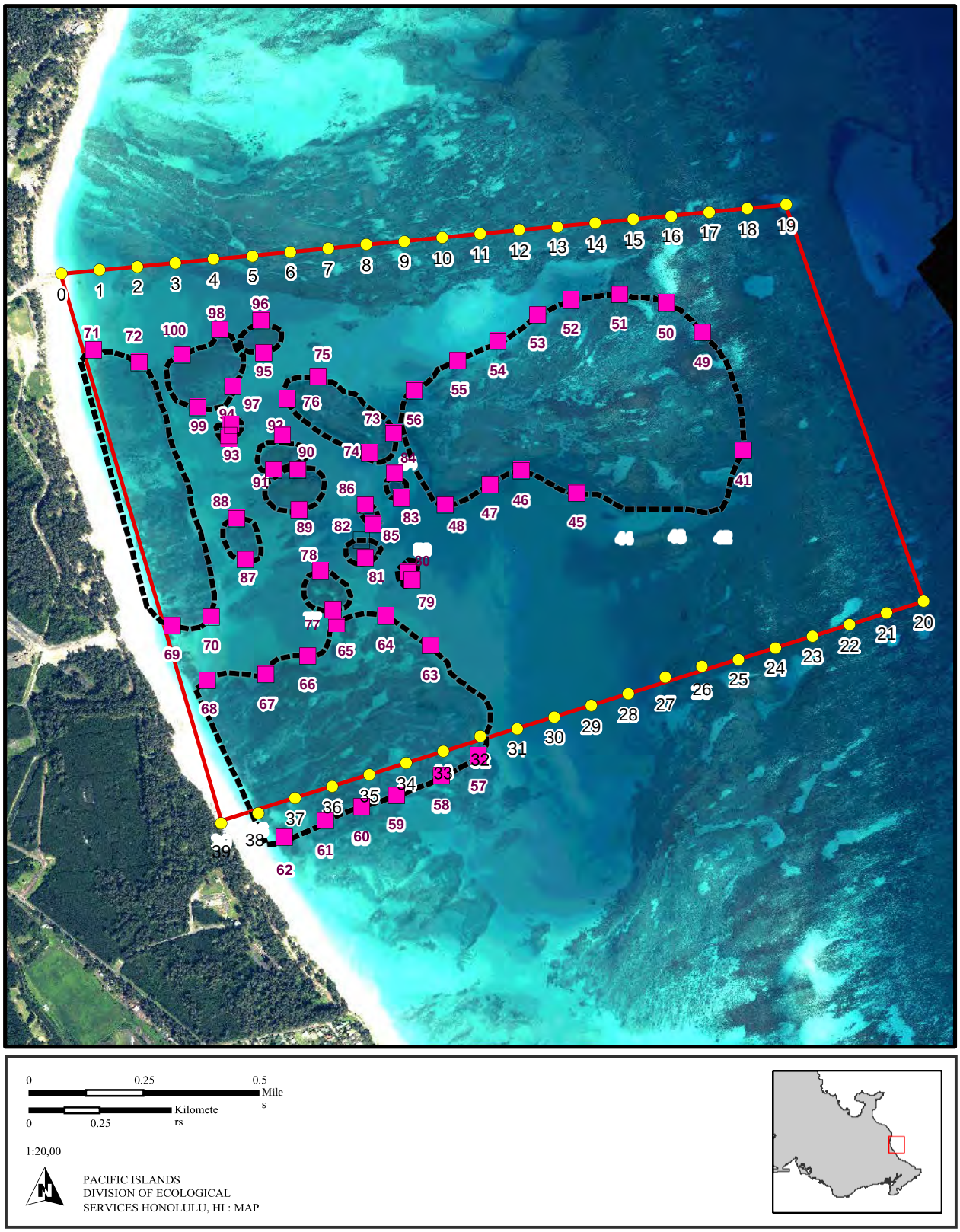
Source: MCBH GIS Data Repository; Aerial photo from ESRI

N

0 0.0325 0.065 0.13 Miles

FIGURE 20: MCTAB MARINE RESOURCES SURVEY AREA

This map depicts the survey area for the *MCTAB Marine Resources Survey* (USFWS in prep). See further discussion in COA 7.4.



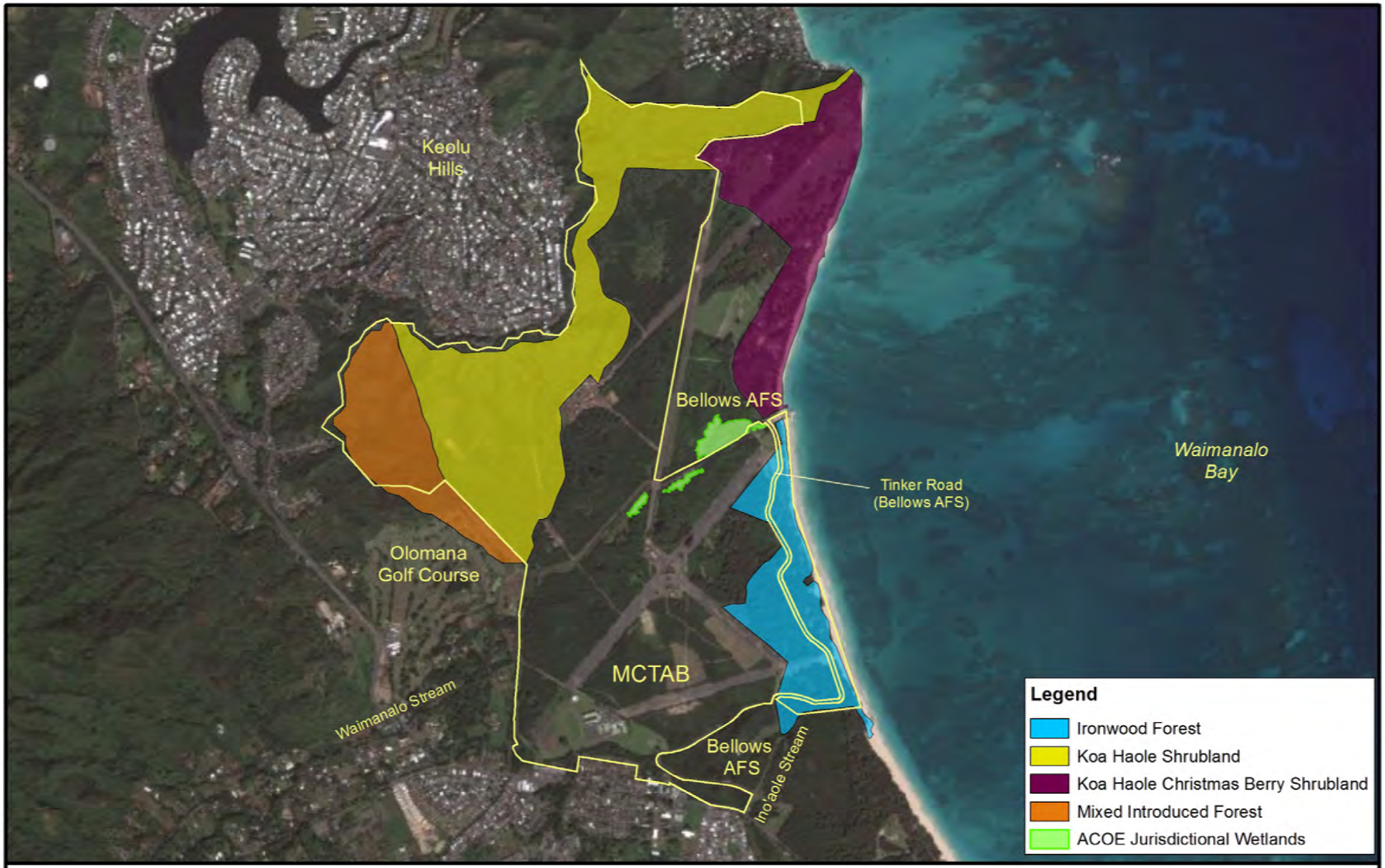


Figure 21
MCTAB Vegetation

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository;
Botanical Survey Bellows Air Force Station (Char 1995)
Aerial photo from ESRI
Note: Vegetation boundaries approximate

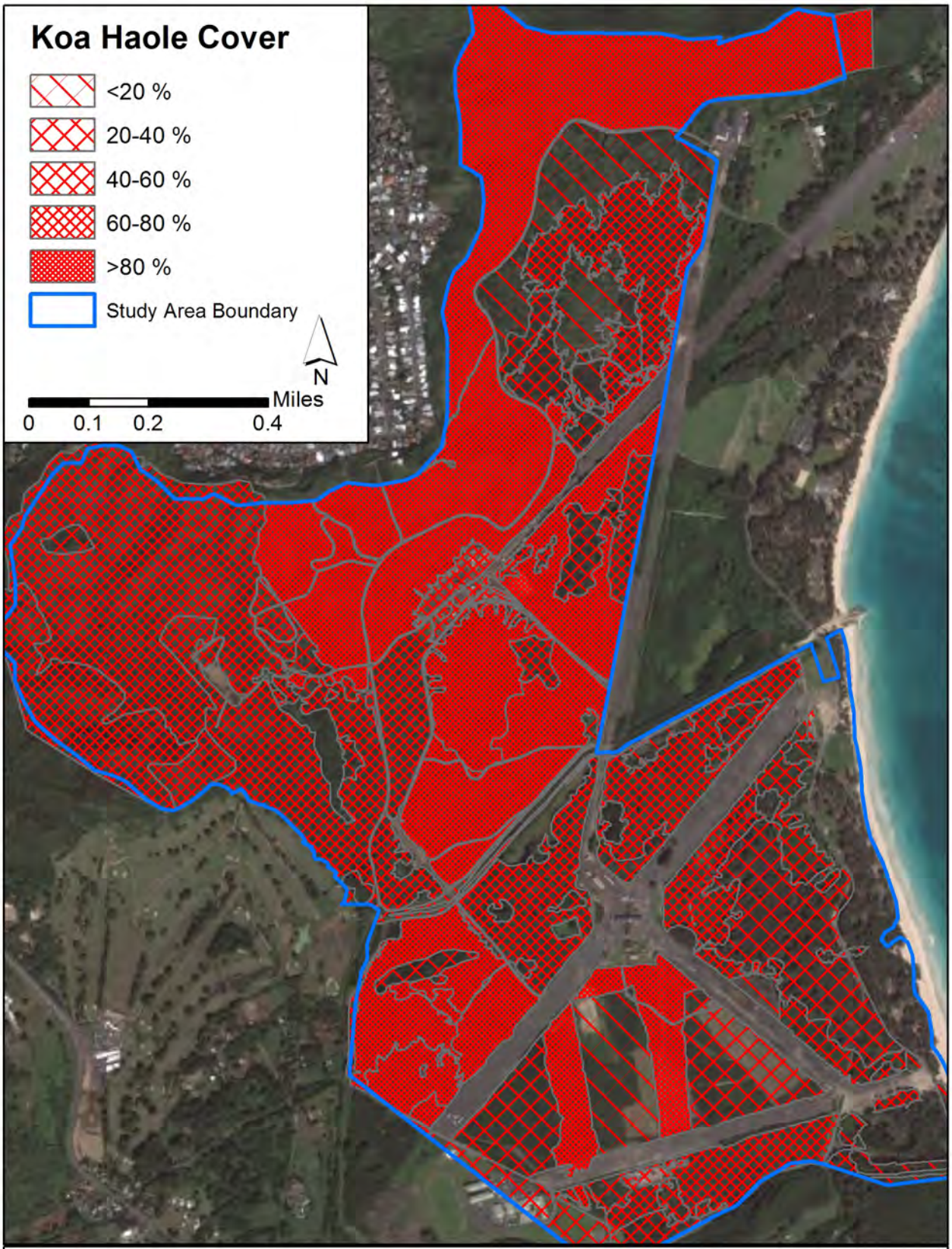


Figure 22a
MCTAB Invasive Vegetation: Koa Haole Cover

Final MCBH INRMP Update (2017-2021)
January 2017

Source: Figure 2, GIS Mapping and Control of Invasive Species/Erosion/ Brushfire Control on MCBH Training Lands (GII 2004)

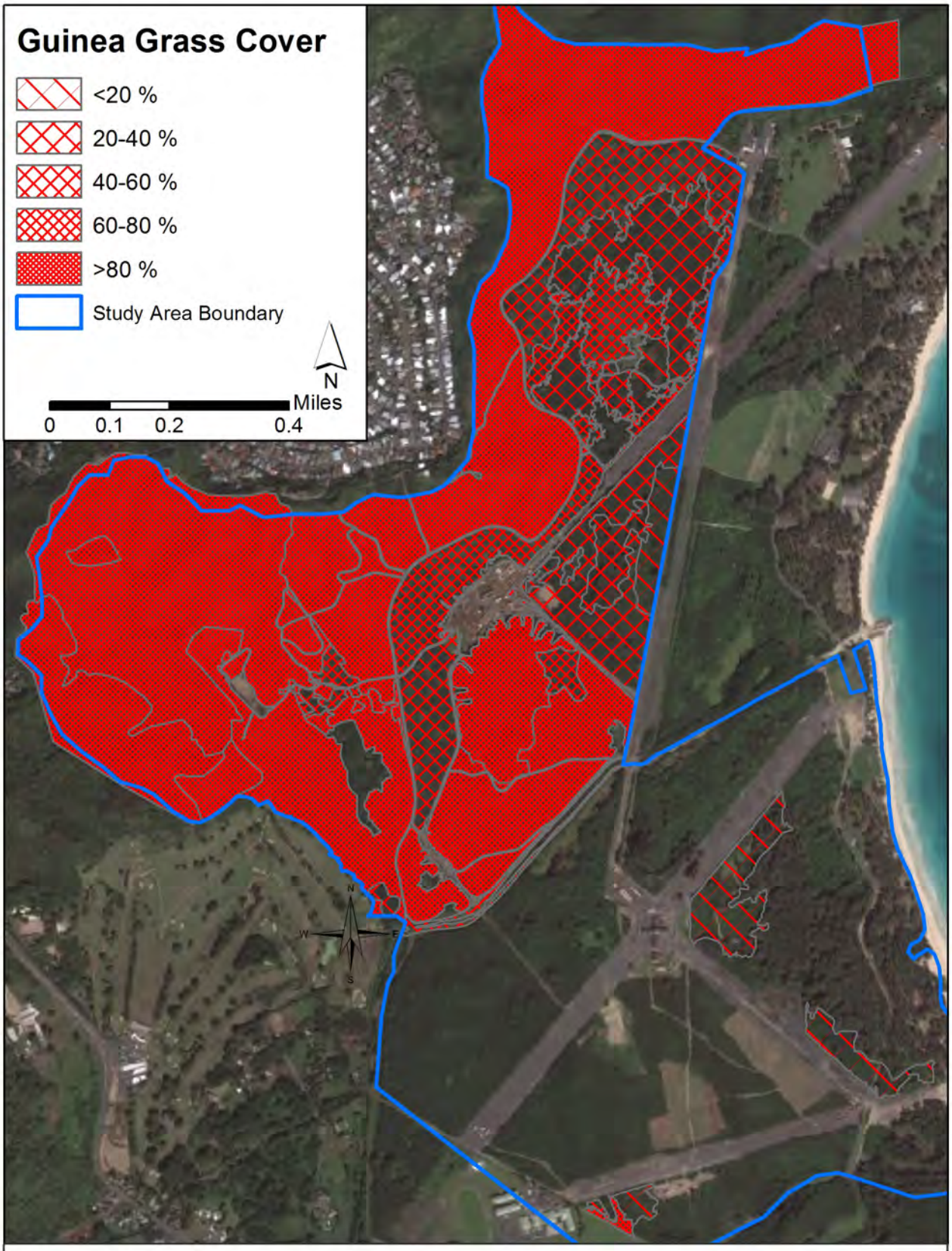


Figure 22b
MCTAB Invasive Vegetation: Guinea Grass Cover

Final MCBH INRMP Update (2017-2021)
January 2017

Source: Figure 3, GIS Mapping and Control of Invasive Species/Erosion/ Brushfire Control on MCBH Training Lands (GII 2004)

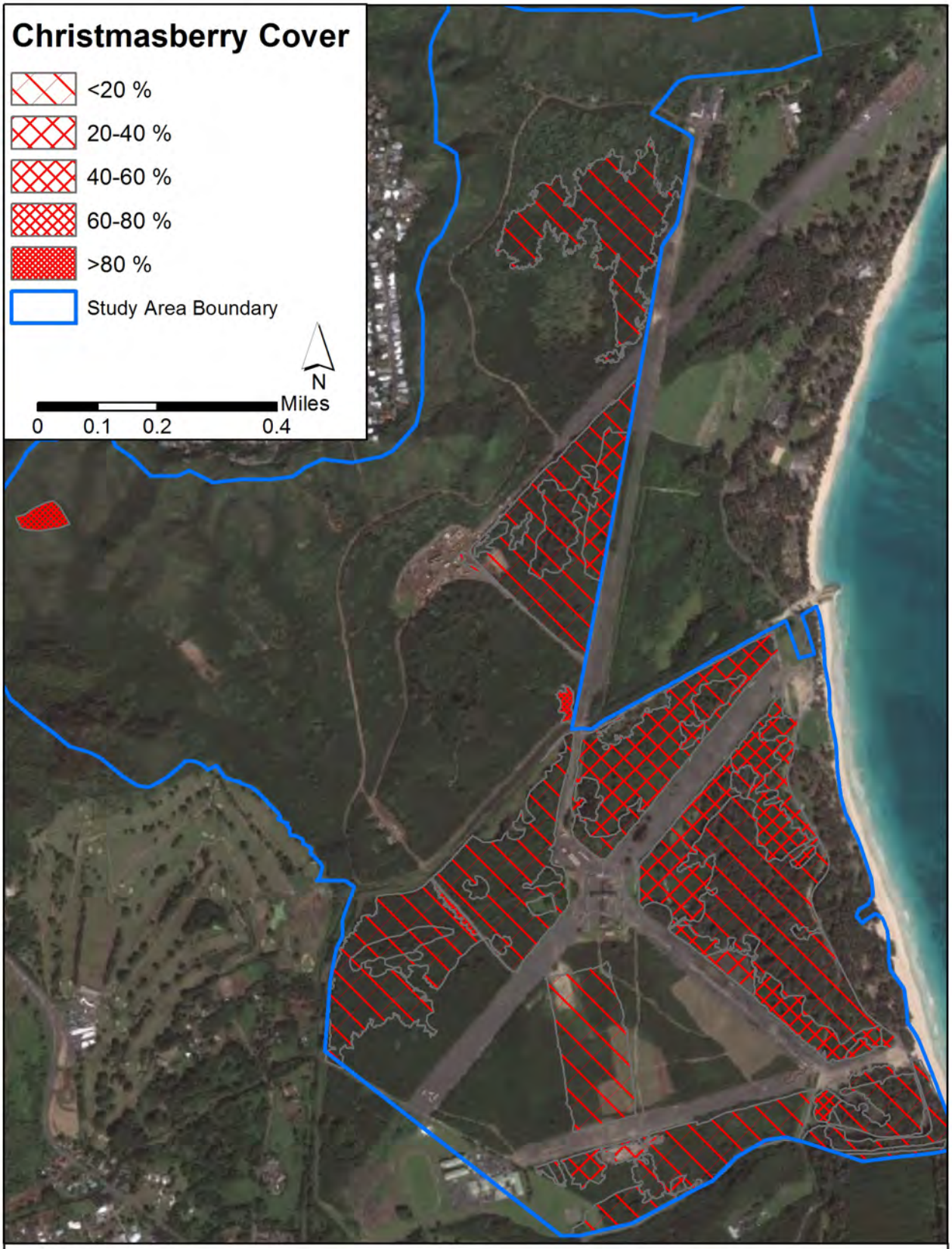


Figure 22c
MCTAB Invasive Vegetation: Christmasberry Cover

Final MCBH INRMP Update (2017-2021)
January 2017

Source: Figure 4, GIS Mapping and Control of Invasive Species/Erosion/ Brushfire Control on MCBH Training Lands (GII 2004)

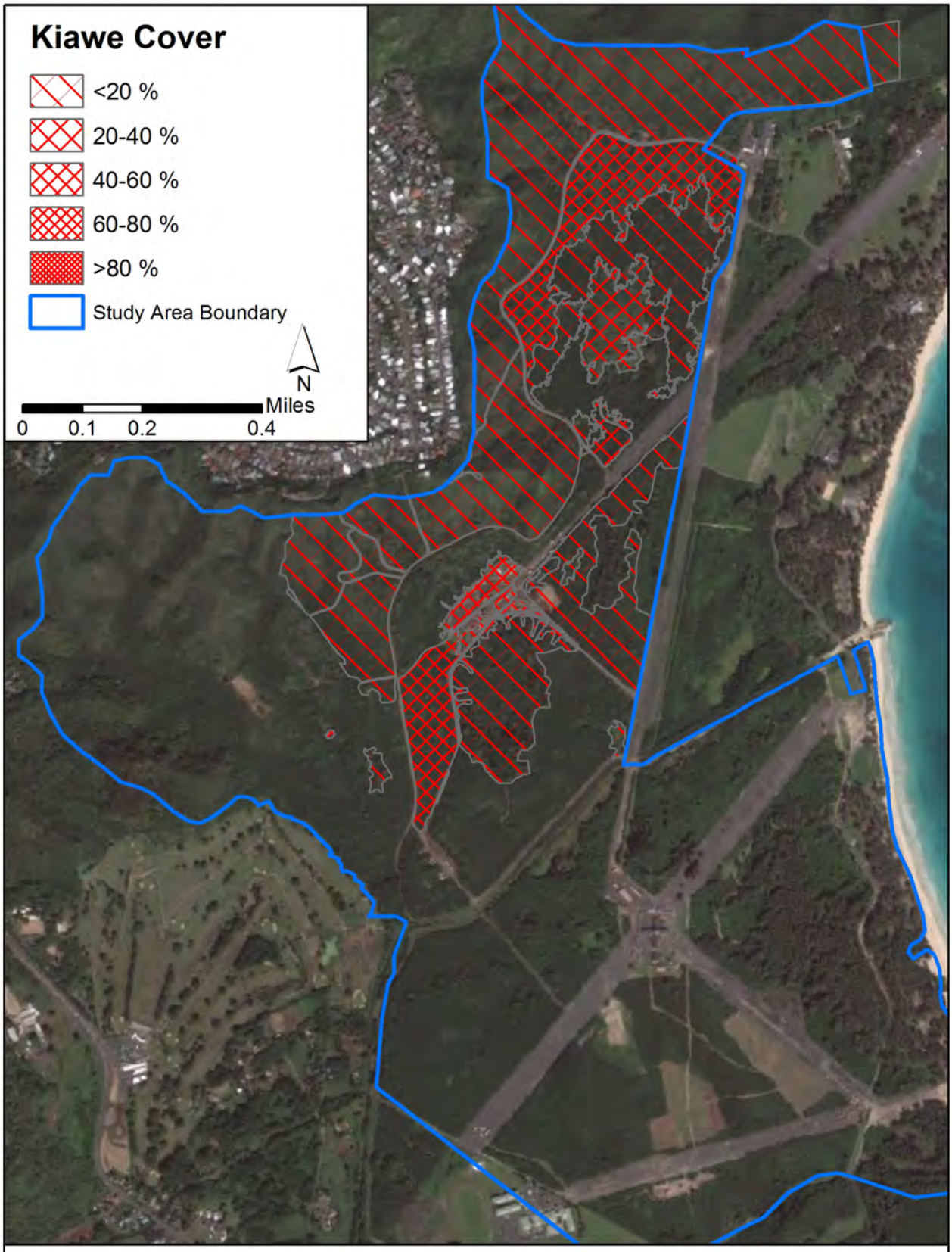


Figure 22d
MCTAB Invasive Vegetation: Kiawe Cover

Final MCBH INRMP Update (2017-2021)
January 2017

Source: Figure 5, GIS Mapping and Control of Invasive Species/Erosion/ Brushfire Control on MCBH Training Lands (GII 2004)

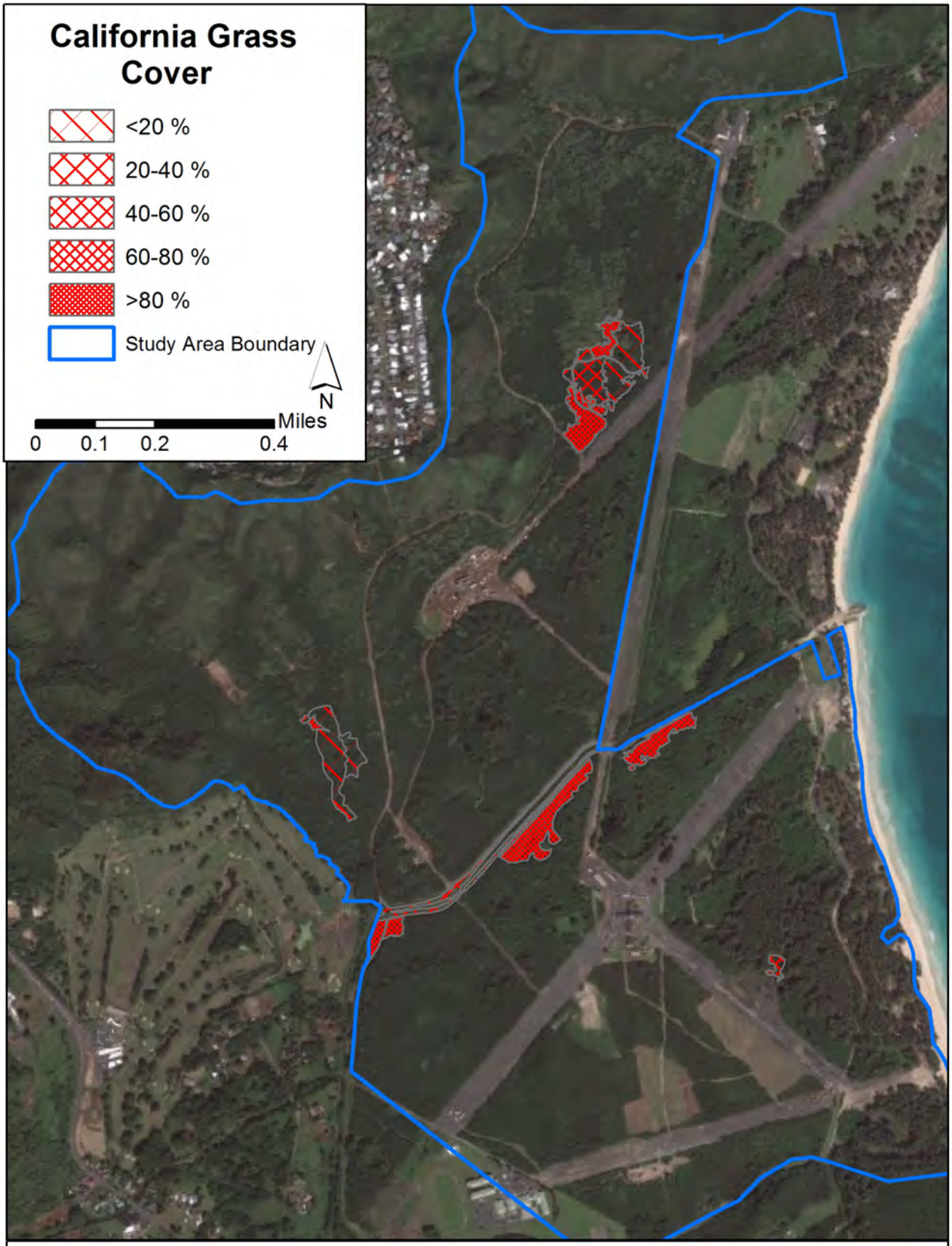


Figure 22e
MCTAB Invasive Vegetation: California Grass Cover

Final MCBH INRMP Update (2017-2021)
January 2017

Source: Figure 6, GIS Mapping and Control of Invasive Species/Erosion/ Brushfire Control on MCBH Training Lands (GII 2004)

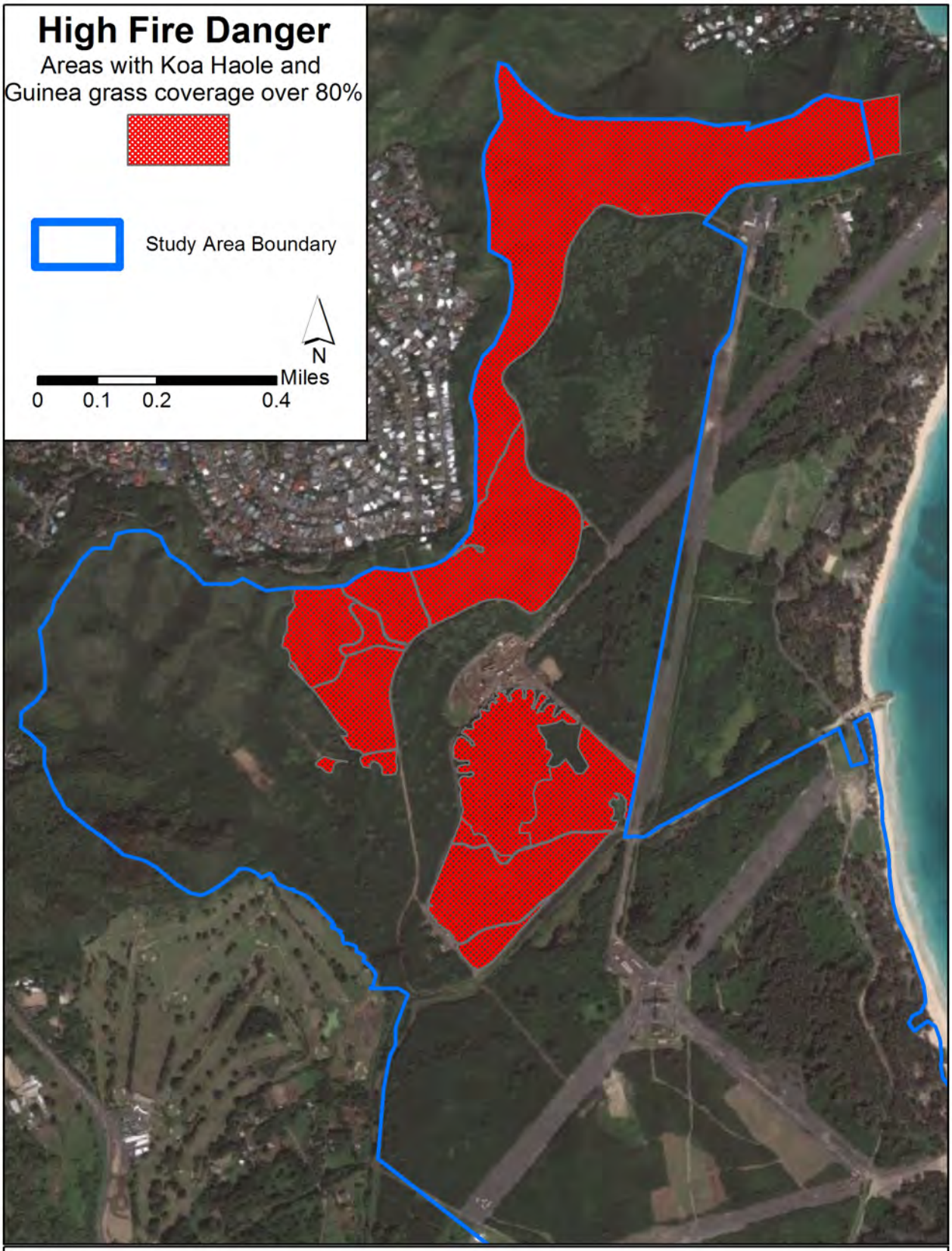


Figure 22f
MCTAB Invasive Vegetation: High Fire Danger

Final MCBH INRMP Update (2017-2021)
January 2017

Source: Figure 7, GIS Mapping and Control of Invasive Species/Erosion/ Brushfire Control on MCBH Training Lands (GII 2004)

FIGURE 22G: MCTAB FOUNTAIN GRASS LOCATIONS (2001-2005)

(Figure 9 from SWCA 2007)

Figure 22h
MCTAB Fountain Grass Locations (2006-2015)

Source: MCBH GIS Data Responsitory

Final MCBH INRMP Update (2017-2021)
January 2017

Miles
0 0.075 0.15 0.3
N

Figure 22i
MCTAB Broomsedge Location

Source: MCBH GIS Data Responsitory

Final MCBH INRMP Update (2017-2021)
January 2017

0 0.05 0.1 0.2 Miles

N

Figure 23
MCTAB Recreational Areas

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

N

0 0.04 0.08 0.16
Miles

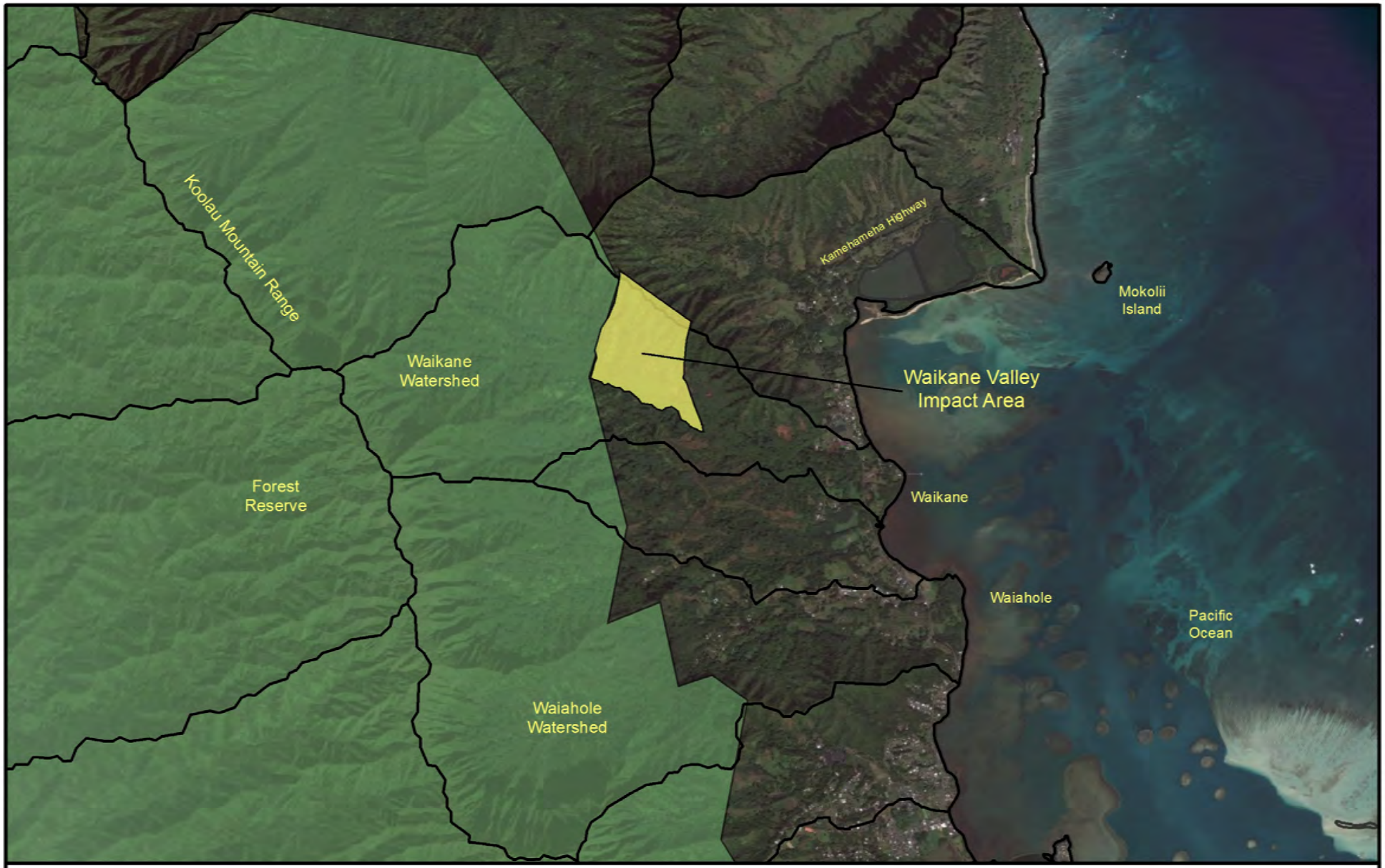


Figure 24
Waikane Valley Impact Area and Vicinity

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

- Watersheds
- O'ahu 'Elepaio Critical Habitat
- Installation Boundary

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository
Aerial photo from ESRI

N

0 0.3 0.6 1.2 Miles

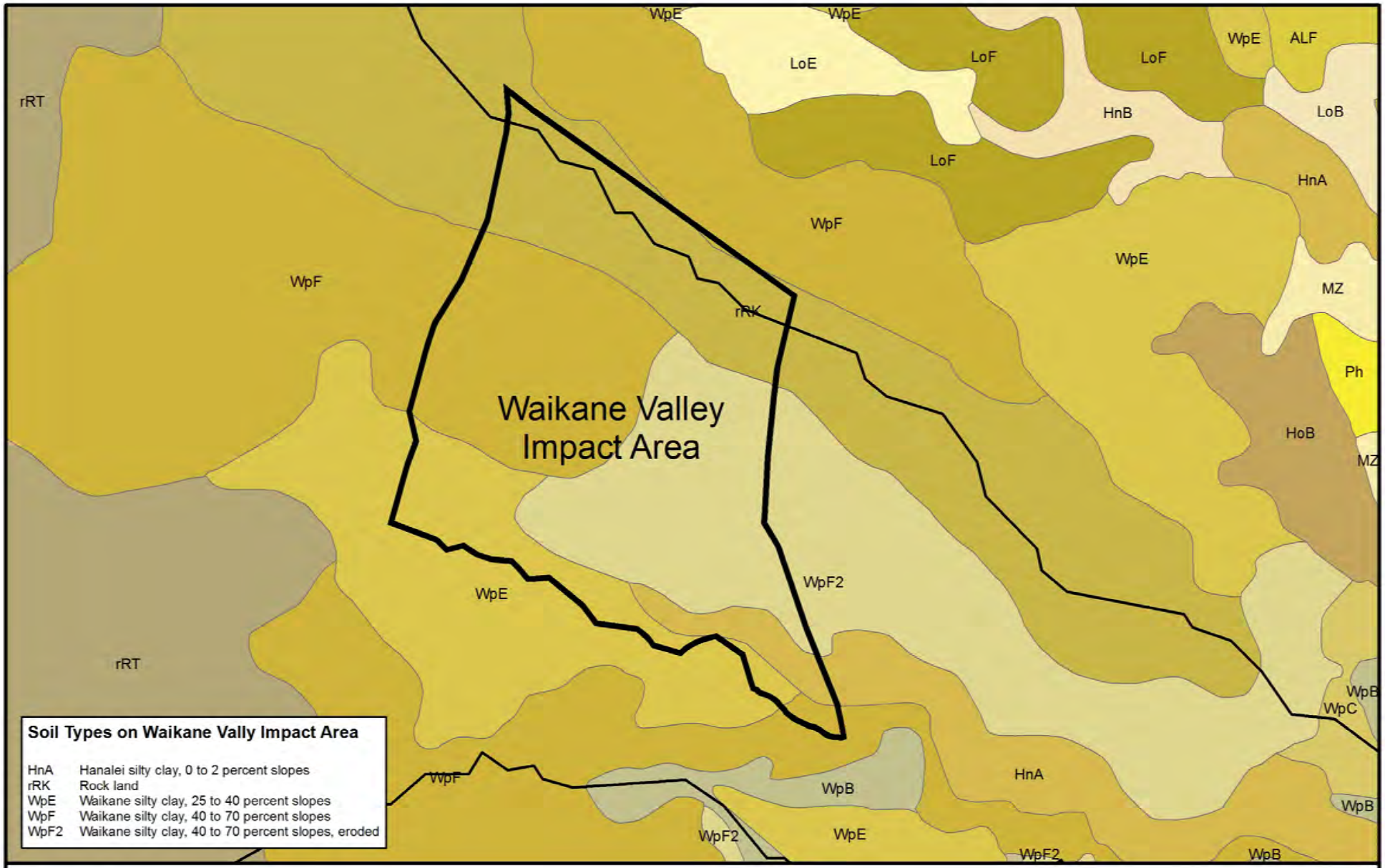


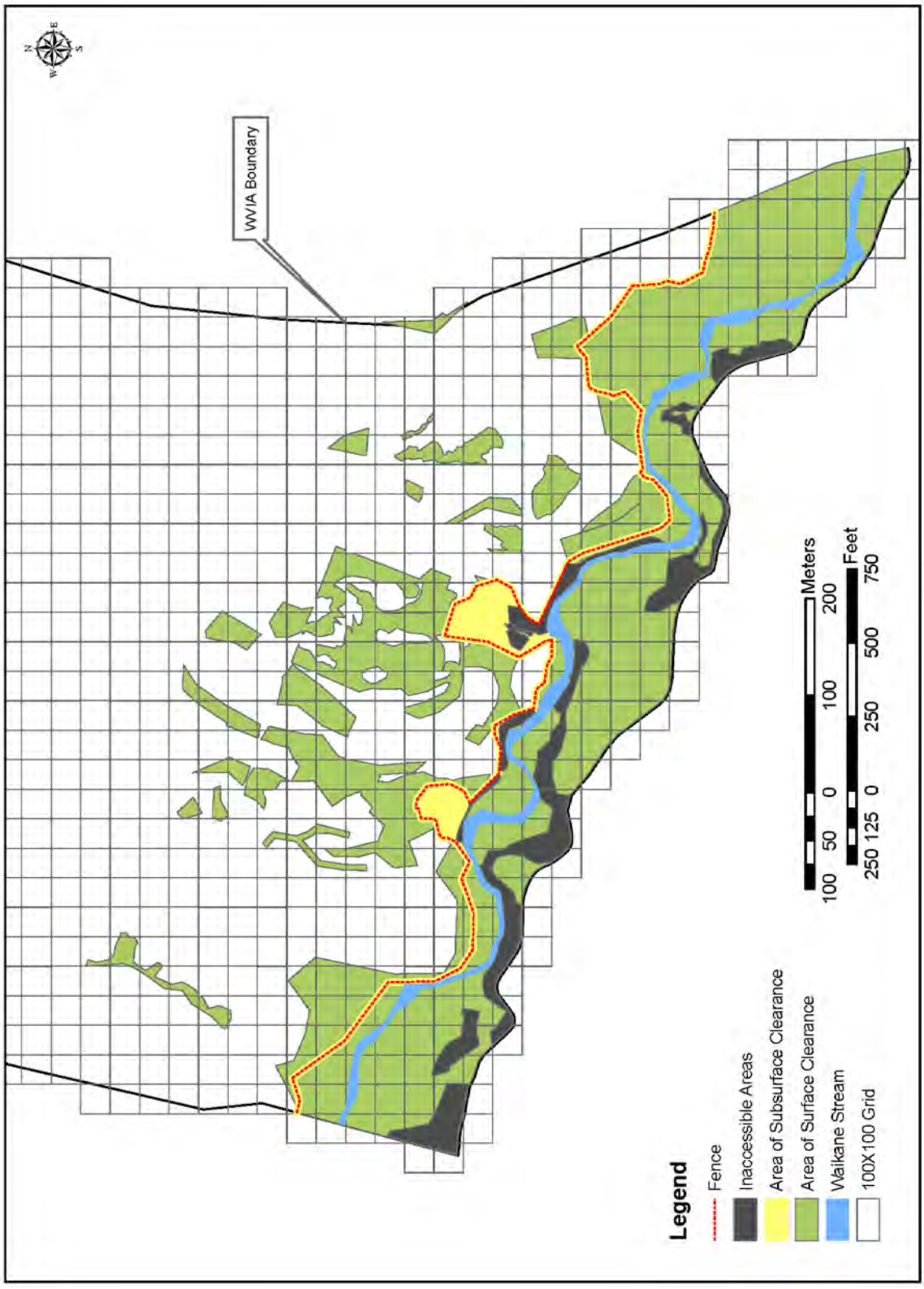
Figure 25
Waikane Valley Impact Area Soils

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository (Soil types from
NRCS (SCS) Soil Survey of O`ahu (Foote et al. 1972))

FIGURE 26: WAIKANE VALLEY IMPACT AREA UNEXPLODED ORDNANCE REMOVAL ACTIVITIES

This map depicts areas of unexploded ordnance removal activity in Waikane Valley Impact Area (DoN 2015). See further discussion in COA 7.3.



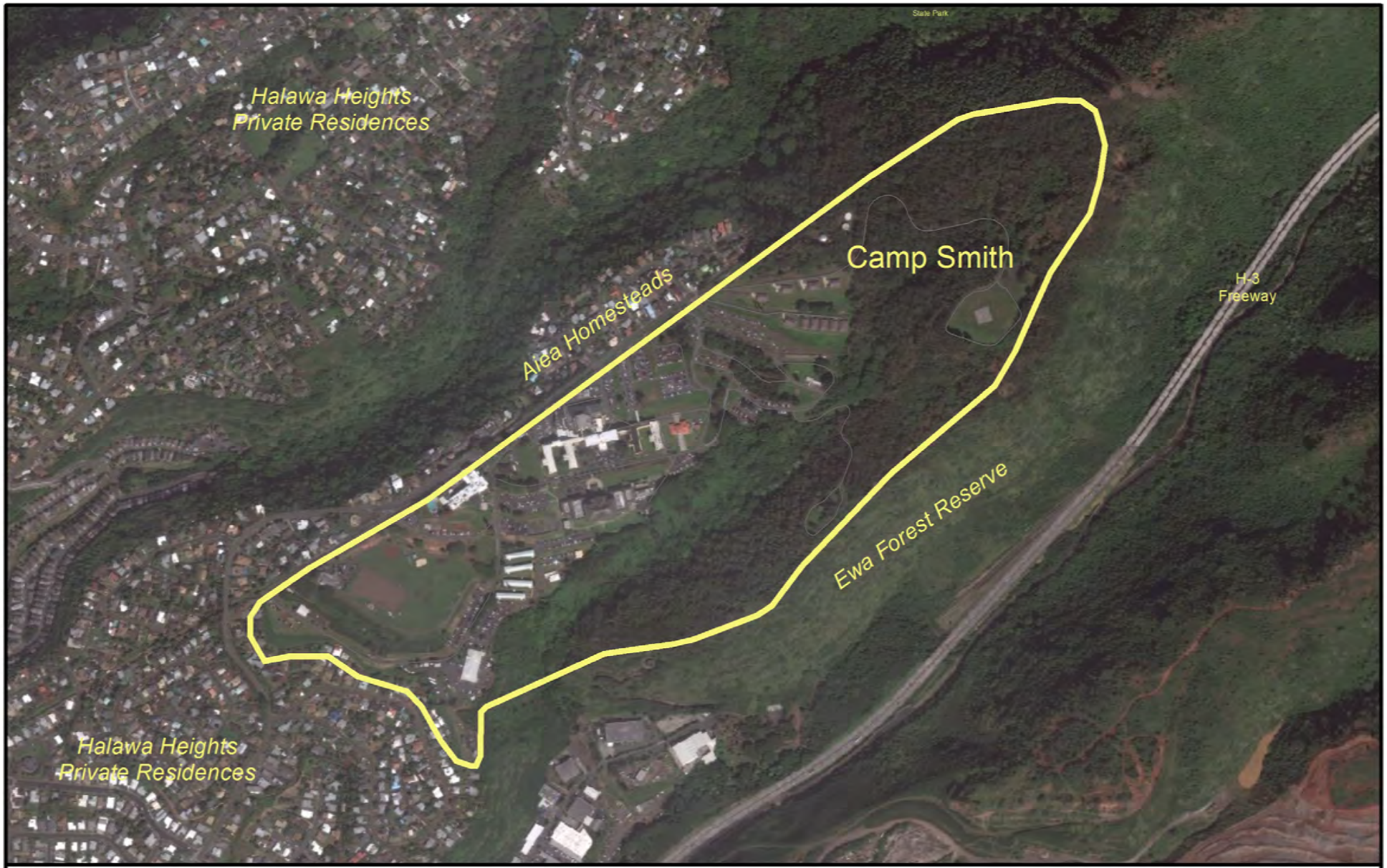


Figure 27
Camp Smith and Vicinity

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

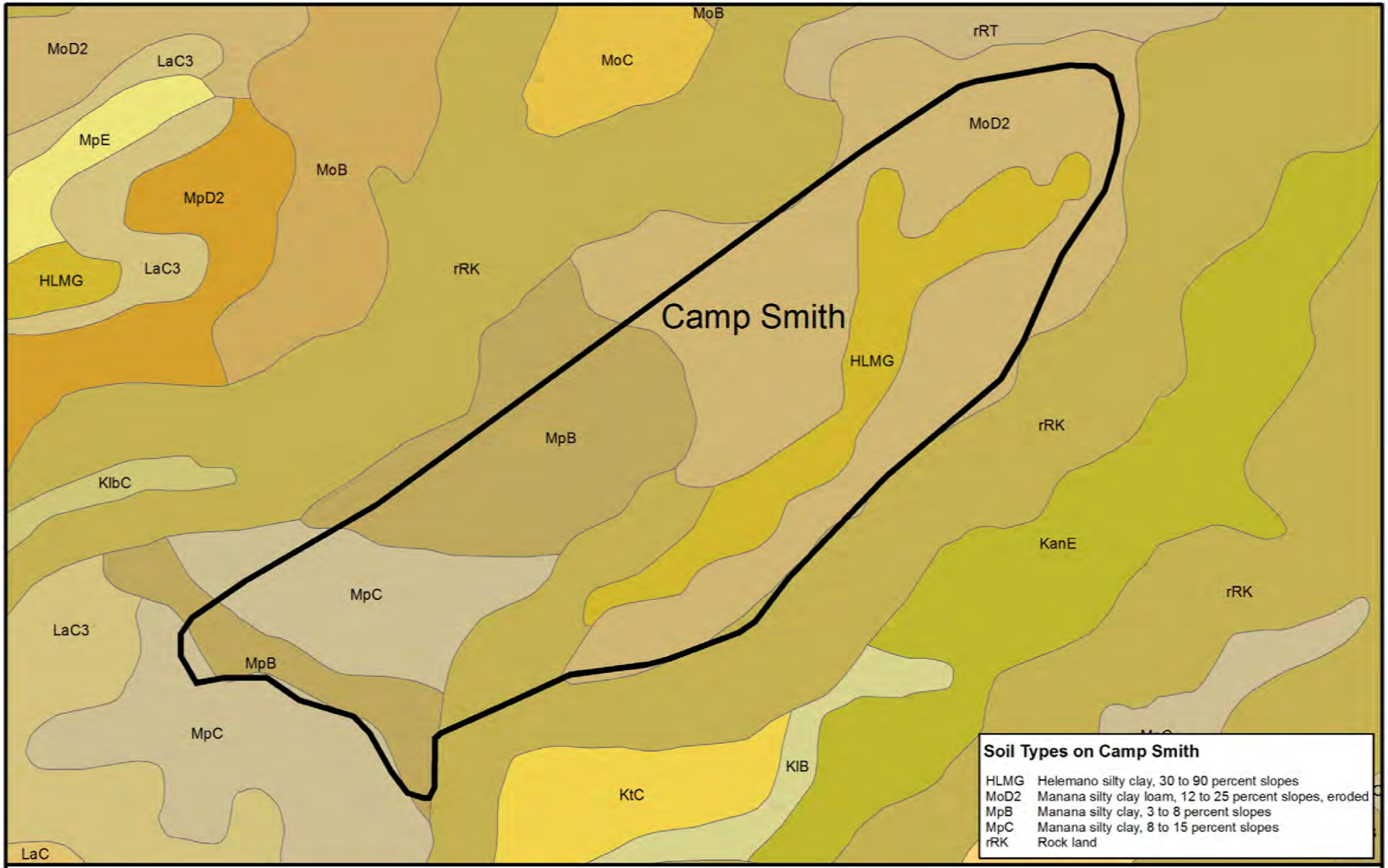


Figure 28
Camp Smith Soils

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository (Soil types from NRCS (SCS) Soil Survey of O`ahu (Foote et al. 1972))

Figure 29
Camp Smith Vegetation

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

Forested Area (boundaries apprx)

Source: MCBH GIS Data Repository;
Aerial photo from ESRI;
Vegetation from MCBH Master Plan
(Wilson Okamoto & Associates, Inc. 1999)

N

Miles
0 0.05 0.1 0.2

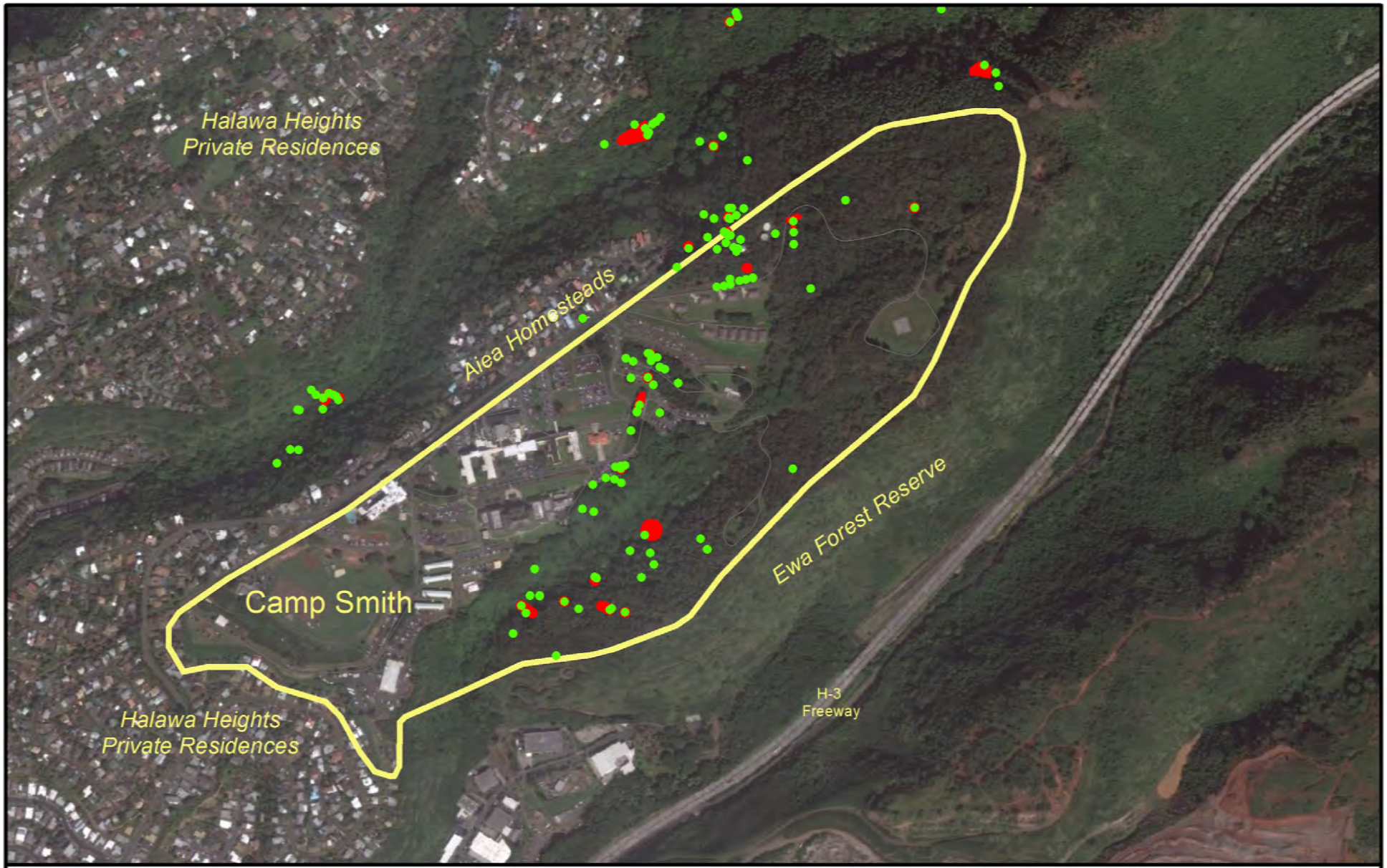


Figure 30
Camp Smith Invasive Species

Final MCBH INRMP Update (2017-2021)
January 2017

Legend

Devil Weed Hotspots

Devil Weed Treatment Points

Source: MCBH GIS Data Repository;
OISC (June 2016)
Aerial photo from ESRI

N

0 0.05 0.1 0.2 Miles

Figure 31
Pu'uloa RTF and Vicinity

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

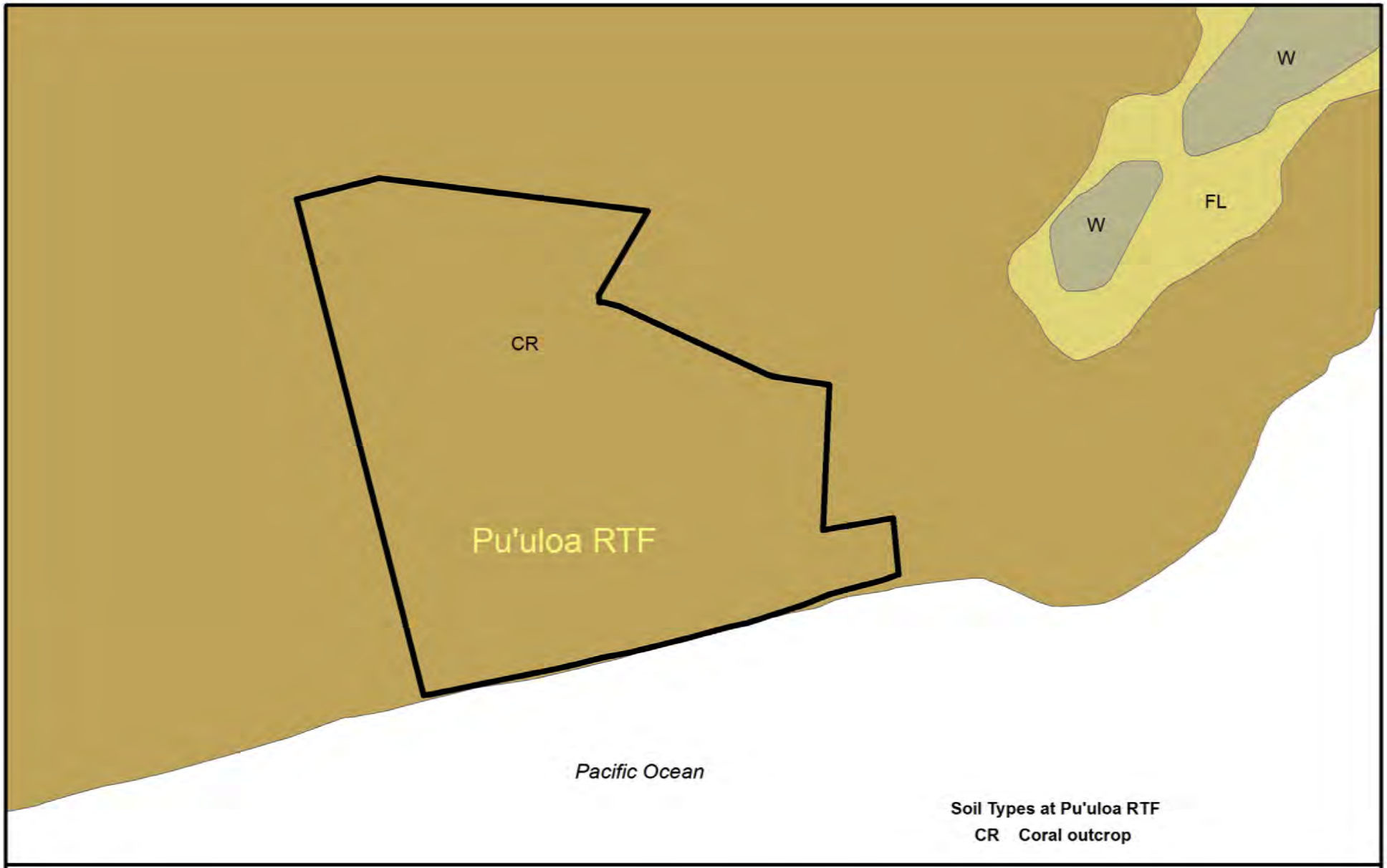


Figure 32
Pu'uloa RTF Soils

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository (Soil types from
NRCS (SCS) Soil Survey of O`ahu (Foote et al. 1972))

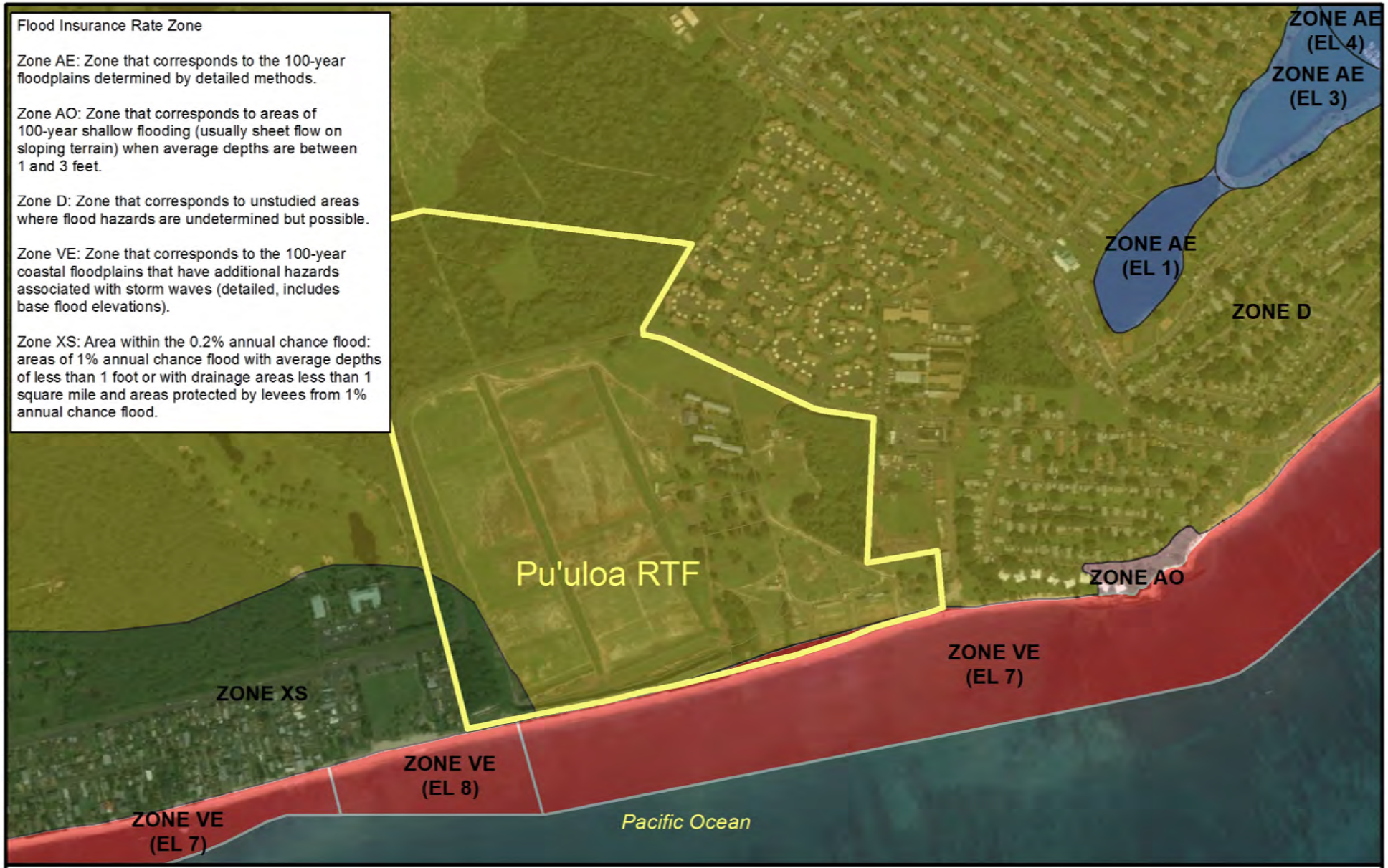


Figure 33
Pu'uloa RTF Flood Hazard Areas

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
State of Hawaii Data Repository (2011 data);
Aerial photo from ESRI

FIGURE 34: PU‘ULOA RTF SHORELINE EROSION PROJECT AREA

This map depicts the project area from the *Pu‘uloa Shoreline Erosion Study* (SSFM International, Inc., Sea Engineering, Inc., and Brownlie & Lee 2015). See further discussion in COA 7.4.

Scale: 1 inch = 60 feet

LEGEND

Project Area

Range Identification

Figure 35
Pearl City Annex, Manana Housing Area, and Vicinity

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

Figure 36
Pearl City Annex Wetlands

Final MCBH INRMP Update (2017-2021)
January 2017

Source: MCBH GIS Data Repository;
Aerial photo from ESRI

N

0 0.015 0.03 0.06 Miles

APPENDIX C
FLORA AND FAUNA OF MCBH

This appendix includes information on the flora and fauna of MCBH.

C1. *Species Inventory (Reference CD only)*

C2. Protected Species Highlights

C3. Species of Control Concern Management

C4. ESA and MBTA Bird Species Protection Measures

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C2. PROTECTED SPECIES HIGHLIGHTS

A number of species are found on land or in waters around MCBH jurisdiction that are protected or regulated under Federal or State laws (e.g., Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), Migratory Bird Treaty Act (MBTA), and Hawai'i Revised Statute Chapter 195D, Conservation of Aquatic Life, Wildlife and Land Plants).[1] Other species that are considered "at risk" (i.e., species of concern or species of greatest conservation need), are afforded protection by the Natural Resources Management Program at MCBH.

Annual review of the INRMP requires that MCBH report on all measures taken for the protection of listed species and critical habitat. Each of the threatened and endangered species in Table C2-1 is included in the annual metrics review process and is assessed separately in six different categories: location mapped on installation GIS, goals and monitoring requirements in place to assess conservation effectiveness, funding of listed species projects, adequate data on habitat conditions, adequate data on population presence and numbers, and extent that INRMP projects and programs benefit the species. Ten of these species have been formally documented as occurring on the installation by multiple agencies and/or individuals. In addition, even though MCBH hosts dozens of MBTA-protected bird species, this appendix details only those that are also protected under the ESA (e.g., Hawaiian stilt, Hawaiian coot, Hawaiian duck, and Hawaiian moorhen), or are specifically managed for due to a high geographic concentration of them found on MCBH properties (e.g., red-footed boobies, wedge-tailed shearwaters). 'Species of Concern' is a term used by Federal agencies to describe species for which there is concern about their status and might be in need of concentrated conservation actions. 'Species of Greatest Conservation Need' is a term used by State of Hawai'i agencies that encompasses all species on the Federal 'Species of Concern' list plus additional species State agencies have concerns about regarding status and threats. Neither status carries any procedural or substantive protections under the ESA. Listed species and critical habitat changes will be addressed in yearly reviews and future INRMP updates.

Conservation and Management sheets have been developed to provide basic background information on protected species and those of conservation concern that occur at MCBH. These species are actively targeted as part of MCBH's current conservation efforts. The sheets include information on common name, Hawaiian name, scientific name, legal status, appearance, native range, habitat (where it grows or resides in Hawai'i), methods of reproduction and dispersal, ecological threats, current locations on Base, general conservation strategies, and MCBH conservation measures. They contain photos of the species to help in identification.

Additional detail on management actions aimed at protection of these species is contained in the COA (Section 7). Many of the INRMP management actions are designed to benefit multiple species, as mandated by the ecosystem-based management approach to INRMP implementation required by Marine Corps Order (MCO P5090.2A, Section 11200). For example, enhancement of wetland habitat can provide benefits for several species of endangered and migratory waterbirds, while improving water quality and reducing flood risk to adjacent human communities.

[1] Under Hawai'i Revised Statute Chapter 195D, any species determined to be a Federally endangered or threatened species pursuant to the ESA is deemed to have, at minimum, the same status for the State. The regulatory status listed for all species in Table C2-1 reflects the most protected status, in this case the Federal standing.

1 **Table C2-1. MCBH Protected Species and Species of Conservation Concern**

Scientific Name	Common Name	Hawaiian Name	Regulatory Status[2]	Origin	Pg
Marine Species					
Megaptera novaeangliae	Humpback whale	*Kahola*	State Endangered, MMPA[3]	Global	C2-3
Neomonachus schauinslandi	Hawaiian monk seal	*ʻIlio-holo-i-ka-uaua*	Endangered, MMPA	Endemic	C2-5
Chelonia mydas	Green sea turtle	*Honu*	Threatened	Indigenous	C2-9
Eretmochelys imbricata	Hawksbill sea turtle	*ʻEa*	Endangered	Indigenous	C2-9
Lepidochelys olivacea	Olive ridley sea turtle	--	Endangered	Circumtropical	C2-9
Lingula reevii[4]	----	----	Species of Concern	Indigenous	
Montipora dilitata	Irregular rice coral	----	Species of Concern, Protected under HAR Chapter 13-95	Endemic	C2-17
Montipora flabellata	Blue rice coral	----	Protected under HAR Chapter 13-95	Endemic	C2-17
Montipora patula	Sandpaper rice coral	----	Protected under HAR Chapter 13-95	Endemic	C2-17
Waterbirds					
Anas wyvilliana	Hawaiian duck	*Koloa maoli*	Endangered, MBTA	Endemic	C2-19
Fulica alai	Hawaiian coot	*ʻAlae keʻokeʻo*	Endangered, MBTA	Endemic	C2-21
Gallinoula chloropus sandvicensis	Hawaiian common moorhen	*ʻAlae ʻula*	Endangered, MBTA	Endemic	C2-23
Shorebirds and Seabirds					
Himantopus mexicanus knudseni	Hawaiian stilt	*Aeʻo*	Endangered, MBTA	Endemic	C2-25
Ardenna pacifica	Wedge-tailed shearwater	*ʻUaʻu kani*	Birds of Conservation Concern, MBTA	Indigenous	C2-27
Sula sula rubripes	Red-footed booby	*ʻA*	MBTA	Indigenous	C2-30
Other Terrestrial Species					
Asio flammeus sandwichensis	Hawaiian short-eared owl	*Pueo*	State Endangered, MBTA	Endemic	C2-33
Branta sandvicensis	Hawaiian goose	*Nēnē*	Endangered, MBTA	Endemic	C2-35
Hylaeus anthracinus	Yellow-faced bee	*Nalo meli maoli*	Endangered	Endemic	C2-37
Lasirus cinereus semotus[5]	Hawaiian hoary bat	*ʻOpeʻapeʻa*	Endangered	Endemic	C2-39
Plants					
Capparis sandwichiana	Native caper	*Maiapilo*	Species of Greatest Conservation Need (HI)	Endemic	C2-41
Nama sanwichensis	Nama	*Hinahina kahakai*	Species of Greatest Conservation Need (HI)	Endemic	C2-43
Sesbania tomentosa	Oʻahu riverhemp	*ʻOhai*	Endangered	Endemic	C2-45

[2] All species in the table are included on the Hawaiʻi State list of Species of Greatest Conservation Need. Some species are also protected under international treaties (e.g., Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)).

[3] NOAA Fisheries revised the ESA listing status of the humpback whale, effective October 11, 2016 (Section 5).

[4] *Lingula reevii* is a brachiopod that occurs in shallow, sandy reef flats in Kāneʻohe Bay. It has been recorded adjacent to but not within MCBH's 500-yard security buffer zone. Further information on this species may be found at http://www.nmfs.noaa.gov/pr/pdfs/species/inarticulatedbrachiopod_detailed.pdf

[5] MCBH has not yet documented the presence of the Hawaiian hoary bat on its properties, but 11 bat vocals have been recorded on the HIARNG RTI, leased MCBH property at MCTAB. MCBH will be conducting surveys to confirm or deny its presence during this INRMP implementation period (COA 7.1).

Whales

COMMON NAME: Humpback Whale
HAWAIIAN NAME: *Kohola*
SCIENTIFIC NAME: *Megaptera novaeangliae*
LEGAL STATUS: Protected under the MMPA, State Endangered Species law, CITES, and the International Whaling Commission moratorium against whaling.

APPEARANCE: Adult humpback whales range from 40 to 50 feet in length and weigh 25 to 40 tons. Heads are broad and rounded and bodies are round, narrowing towards the tail. There is a dorsal fin on their back and ventral grooves that run from the lower jaw back to the belly area. The top of the head and lower jaw have bumpy knobs. They are black on the upper side and mottled black and white on the underside, with flippers that range from all white to all black. Flippers are long (between 1/4 and 1/3 of the length of the body), and the tail is up to 18 feet wide, serrated, and pointed at the tips.

HABITAT: Humpback whales are found in all of the world's oceans. Most spend summer in temperate and polar waters to feed and winter in tropical waters for mating and calving. The Central North Pacific Stock winters in Hawai'i and migrates to the British Columbia/Alaska area in summer.

DIET: Humpback whales are baleen whales and feed on krill, small crustaceans, and fish.

REPRODUCTION: Humpback whales reach sexual maturity between 6 and 10 years of age. Females will bear one calf every 2 to 3 years after a 12 month gestation period. Calves nurse for approximately one year.

POPULATION TRENDS: For the latest information on population trends, consult NOAA Fisheries' Marine Mammal Stock Assessment Reports posted at http://www.nmfs.noaa.gov/pr/sars/

ECOLOGICAL THREATS: Whales may be negatively impacted or killed by hooking or entanglement in fishing gear, ship strikes, habitat impacts (reduced water quality and available forage resources), harassment by boats (such as whale watching vessels), and harvest. Acoustic impacts on whales include immediate effects (such as injury and behavioral modification) from exposure to noise from seismic profilers and sonars used in oceanographic research and military operations, as well as construction activities such as pile driving. They also include exposure to rising ambient noise levels, the effects of which are currently not well understood.

Whales

NOAA FISHERIES CONSERVATION STRATEGIES: Conservation strategies include the creation of whale sanctuaries, preserving the moratorium against whaling, mitigation of ship strikes, and responding to whales in distress. Federal regulations prohibit approaching whales within 100 yards in the water and within 1000 feet when operating an aircraft.

Water vessels should follow NOAA Fisheries' *Guidelines for Whale Protection and Human Safety* while boating in Hawai'i. Guidelines include maintaining the appropriate distance (100 yds), passing around whales from behind, stopping the vessel and taking it out of gear if a whale is within the 100 yd buffer of the vessel, notifying other vessels that may not be aware of a whale in their path, and reporting any collisions with whales to NOAA Fisheries. NOAA Fisheries has a handbook that details the laws and regulations for federally protected marine resources including whales: http://hawaiihumpbackwhale.noaa.gov/documents/pdfs_ocean_users/hawaiioceanusersguide.pdf

Humpback whales are protected under the MMPA. It was determined in 2016 that the Central North Pacific (Hawaiian archipelago and Johnston Atoll) distinct population segment did not warrant listing under the Endangered Species Act. Any action that is likely to cause harm or to harass them requires a Letter of Authorization or an Incidental Harassment Authorization from NOAA Fisheries. http://www.nmfs.noaa.gov/pr/permits/incidental/

MCBH CONSERVATION MEASURES: Conservation measures that benefit whales include:

- **Habitat protection and enhancement**. MCBH opportunistically removes marine debris from the water and routinely from land areas within its jurisdiction. Actions are taken to reduce nonpoint source pollution from the land into the sea such as erosion control measures, which reduce damage to off-shore habitat.
- **Restrictions within the 500 yard marine buffer zone at MCBH Kaneohe Bay**. Includes prohibiting entry of commercial fishing and whale watching vessels.
- **Enforcement**. The 500 yard buffer zone is regularly patrolled for violations to regulations. Marines and civilians are made aware of the regulation to stay 100 yds away from whales in the ocean, which includes not placing a boat or kayak in the path of an approaching whale.
- **Interagency cooperation**. MCBH supports NOAA Hawaiian Islands Humpback Whale National Marine Sanctuary annual island-wide humpback whale count by providing conditional access passes to specific vantage points on Mōkapu Peninsula for NOAA-sponsored volunteers during designated count weekends.
- **Education and outreach**. Development and distribution of informational material including videos, fact sheets, pamphlets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

REFERENCES

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National Marine Fisheries Service (NMFS). 1991. Final Recovery Plan for the Humpback Whale (*Megaptera novaeangliae*). Prepared by the Humpback Whale Recovery Team for NMFS, Silver Spring, MD. 105 pp. November. http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_humpback.pdf

For more information: MCBH Integrated Natural Resources Management Plan Update. 2016. Sections 7.0, 7.4, 8, 9, Appendix C & D.

PHOTOS

1. NOAA. http://www.noaanews.noaa.gov/stories2008/20080331_sanctuaryoceancount.html

Hawaiian Monk Seal

COMMON NAME: Hawaiian Monk Seal
HAWAIIAN NAME: *'Ilio-holo-i-ka-uaua (The Dog that Runs in Rough Seas)*
SCIENTIFIC NAME: *Neomonachus schauinslandi*
LEGAL STATUS: Endangered (Federal and State). Protected under the MMPA. Endangered (IUCN Red List).

APPEARANCE: Monk seals are named for the folds of skin on their head that look like a monk's hood and because of their mostly solitary nature. Female monk seals are slightly larger than males. Females can be up to 7.5 feet long and 450 lbs while males can be up to 7 feet long and 375 lbs. Adults have silvery-grey colored backs with lighter creamy coloration on their underside. Additional light patches and red and green tinged coloration from attached algae are common. The back of the animals may become darker with age, especially in males. Monk seal life expectancy is 25-30 years.

NATIVE RANGE: Monk seals are endemic to the Hawaiian Islands. The majority of the population lives in the Northwestern Hawaiian Islands Papahanaumokuakea Marine National Monument - the largest contiguous fully protected conservation area in the U.S. Monk seals are also found on the MHI; pupping has been recorded on all islands except Lanai where haul-outs, but not pupping, have been recorded.

POPULATION TRENDS: The Hawaiian monk seal is one of the rarest marine mammals in the world, in part because it was hunted to the brink of extinction in the late 19th century. Over the last 50 years, the Hawaiian monk seal population has declined by more than 60%. The monk seal population is currently declining at 4% annually and is estimated at fewer than 1,200 individuals. Survival rates of monk seal pups have dropped from 80-90% in the 1970s to lower than 15% today. As the older breeding females begin to pass away, there are fewer younger animals maturing, which could lead to a catastrophic collapse of the entire population. While the larger NWHI population is shrinking, the MHI population is growing, and is estimated at approximately 200 animals as of 2015. The population in the MHI is estimated to be growing at a rate of approximately 6.5% per year. Accordingly, in recent years, monk seal sightings on MCBH properties have been increasing. For latest information on population trends, see NOAA Fisheries' Marine Mammal Stock Assessment Reports by Species at http://www.nmfs.noaa.gov/pr/ or http://www.nmfs.noaa.gov/pr/pdfs/sars/po2010sehm-hi.pdf.

HABITAT: Monk seals spend two-thirds of their time at sea in waters surrounding atolls, islands, and areas farther offshore on reefs and submerged banks. Monk seals also use deepwater coral beds as foraging habitat. Monk seals are often seen resting on beaches during the day. Monk seals breed and haul-out on sand, corals, and volcanic rock. Sandy, protected beaches surrounded by shallow waters are preferred when pupping.

DIET: Monk seals are primarily benthic (bottom) foragers, and eat a variety of prey including fish, cephalopods (octopus and squids) and crustaceans (crabs, lobster, shrimp). Their diet varies by location, sex, and age. Adults are generally nocturnal hunters while juveniles forage more during the day on species that hide in the sand or under rocks. Monk seals generally forage offshore in waters

60-300 feet deep but can also venture deeper than 1,000 feet, to feed on eels and other benthic organisms.

REPRODUCTION: Females generally mature at age 5-6. It is unknown when males mature. Monk seals are promiscuous and mate underwater. In areas with male-dominated sex ratios, group mobbing of estrus (in "heat") females is known to occur, sometimes causing serious injury or even death to the female. The gestation period is 10-11 months. Birthing rates vary with a range of 30-70% of adult females birthing in a given year. Birthing occurs year round with most births occurring in late March and early April.

Pups are about 3 feet long and 35 lbs at birth. Newborns are black and then molt near the end of their nursing period. Nursing occurs for about 39 days, during which time the mother fasts and remains on land. During this process the female may lose hundreds of pounds. The process of rearing a pup is very challenging, and most females are not able to reproduce every year. After the pup is weaned, the mother abandons her pup and returns to sea. In rare circumstances, lactating females have been observed fostering others' offspring.

ECOLOGICAL THREATS: Reasons for the decline of the monk seal include:

- Entanglement in marine debris
- Ingestion of fisheries debris or toxic substances,
- Human disturbance including intentional kills
- Competition for food and a decrease in food availability for some subpopulations (e.g., French Frigate Shoals)
- Shark predation
- Aggressive male behavior towards females
- Pup mortality
- Inherently slow reproductive rates and an aging population
- Low genetic diversity
- Harmful algal blooms
- Toxoplasmosis from beaches or storm water runoff containing infected cat feces
- Habitat loss due to erosion of haul-out and pupping beaches throughout its range
- Global climate change (if sea level continues to rise many of the remaining beaches will disappear).

HUMAN-SEAL INTERACTION: The increase in monk seals in the MHI requires enhanced attention to threats related to species utilization of populated areas. The most serious human related threats in the MHI, as identified in the *Main Hawaiian Island Monk Seal Management Plan* (NFMS 2016), include infectious diseases, human-seal interactions, habitat threats, and human dimensions (management capacity, communication and community engagement, and public knowledge and attitudes). Some examples of threats related to human-seal interactions in the MHI are: embedded hooks from recreational fishing, seals becoming entangled in gill nets and disturbance and harassment of seals on beaches.

Hawaiian Monk Seal

NOAA FISHERIES CONSERVATION STRATEGIES: NOAA Fisheries' overarching monk seal recovery strategies are to: (1) enhance survival of female seals, especially juveniles, born in the NWHI; (2) ensure natural population growth and reduce human-seal interactions in the MHI; (3) prevent and mitigate disease and build seal health care capacity; and (4) administer a recovery program for maximum effectiveness, integration and partnerships. Designated critical habitat was revised in 2015 for the NWHI and the MHI. For O'ahu, designated critical habitat includes all of the nearshore waters out to 200 meters, except where excluded for national security reasons, or deemed ineligible due to protection measures afforded in Base INRMPs. Terrestrial areas from the shoreline to 5 meters inland were also designated for some areas of O'ahu.

MCBH CONSERVATION MEASURES: The majority of monk seal haul-outs at MCBH occur at Kaneohe Bay along the Mōkapu Peninsula beaches. Monk seals also haul-out on the Pu'uloa RTF shoreline, although infrequently, and haul-outs at MCTAB may occur but have not been documented. Sightings at MCBH have increased in recent years with 90 sightings occurring between 2012 and 2016. NOAA Fisheries determined, as discussed in the final rule, that the conservation measures carried out by MCBH provide a benefit to the monk seal and its habitat therefore its coastal lands were precluded from critical habitat designation.

MCBH engages in a variety of conservation measures to support the continued health and viability of this species. Specific management actions detailed in the MCBH INRMP are assessed annually as part of the INRMP performance evaluation in cooperation with USFWS, NOAA Fisheries, and Hawai'i DLNR, and revised if necessary due to new information. The following management activities have been implemented and procedures established to protect Hawaiian monk seals to the greatest extent. Management activities, aimed at maintaining ecosystem health, benefit the species indirectly, such as implementing measures to minimize erosion and polluted run-off and invasive species removal.

Conservation measures that benefit monk seals include:

- **Monitoring for presence to help direct management activities**. Natural Resources staff record occurrences and consult with NOAA Fisheries as needed.
- **Seal protection zones.** All monk seal sightings should be reported to the military police at (808) 257-2123 or to NOAA Fisheries' Monk Seal Hotline at (808) 220-7802. If a monk seal hauls-out in an area people frequent, trained, designated staff will erect barriers around the animal and monitor the site. Signs indicating these are protected species, that people and pets are required to remain at least 100 feet away and contact information are placed near the barriers.
- **Removal of marine debris.** MCBH conducts efforts to remove derelict fishing gear and other marine debris from MCBH jurisdictional waters.
- **Restrictions to protect marine species.** MCBH has several regulations in place that provide protection for monk seals. MCBH Kaneohe Bay has a 500 yard seaward buffer zone within which MCBH claims control to all access and resources. Regulations restrict fishing, surfing, and other near shore activities. Pets must be leashed at all times and are only allowed on beaches during specific times. Enforcement is supported by two

full-time federally-commissioned Conservation Law Enforcement Officers on the Environmental Department staff and occasionally by the Military Police Department.

- **Pet regulations.** Per BO P5233.2, pets must be under control of their owners at all times (indoors, fenced area, or leash). This protects seals from negative encounters with dogs on the beach. In addition, feeding of wild animals aboard MCBH is unauthorized. Cat colonies and feeding stations are prohibited; this helps protect seals from the risk of toxoplasmosis.
- **Interagency cooperation.** MCBH collaborates with NOAA Fisheries regarding data sharing on monk seal sightings. If a sick, injured, stranded, entangled or dead monk seal appears in MCBH waters or on beaches it is reported, protected, and if necessary transferred to appropriate authorities at NOAA Fisheries for rehabilitation and/or necropsy.
- **Educational outreach.** MCBH posts warning signs at frequent monk seal haul-out sites and around hauled-out seals. Briefings given to military personnel on Base include information on monk seal reporting and avoidance procedures. Information on monk seal reporting procedures is posted on the MCBH website and included in Appendix C3.
- **Protocols to be followed during military maneuvers and large scale recreational events.** Beaches and nearshore waters in the vicinity of the event are surveyed one hour prior to the event and throughout the duration of the event. If monk seals are present prior to the event, it may be delayed, rerouted, or cancelled. If monk seals appear during an event people are asked to move away from the area and regular protection zone protocols are followed.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6, 7.4, Appendix C & D.

PHOTOS

1. Hawaiian monk seal at MCBH. MCBH. 2010.
2. Hawaiian monk seal on O'ahu. SRGII. 2011.
3. Hawaiian monk seal signage used at MCBH. Dr. Diane Drigot. 2010.

Hawai'i Turtles

COMMON NAME: Green Turtle, Green Sea Turtle
HAWAIIAN NAME: *Honu*
SCIENTIFIC NAME: *Chelonia mydas*
LEGAL STATUS: Threatened (Federal/State). Endangered (IUCN Red List). Protected under CITES.

APPEARANCE: Green sea turtles are the largest hard-shell sea turtle, averaging three feet in length and weighing 300 to 350 pounds. They have a heart-shaped shell that is smooth with shades of black, gray, green, brown and yellow on top and yellow-white on the bottom. All hatchlings have a black dorsal surface and a white ventral surface. Flippers of green sea turtles are single-clawed.

HABITAT: Green sea turtles utilize ocean beaches for nesting and open ocean and coastal areas for feeding. Female green sea turtles migrate between foraging areas and nesting beaches. Basking can occur on both nesting beaches and non-nesting areas.

DIET: Adult green sea turtles are almost exclusively herbivorous and feed primarily on seagrass and algae (*limu*).

REPRODUCTION: Green sea turtles nest primarily in the Northwestern Hawaiian Islands (NWHI), but frequent the main Hawaiian Islands (MHI) for much of the year feeding on *limu*. Females nest every 2 to 4 years after approximately 22 years of age. They return to the same beaches where they hatched. Nesting may occur May 15 – September 30. Females lay an average of 5 nests (or clutches) of 135 eggs each at approximately two week intervals. Eggs incubate for 65-80 days before hatching. Hatchlings emerge almost exclusively at night and move immediately to the water.

THREATS: Threats to all of Hawai'i's sea turtles include: loss of foraging and nesting habitat due to climate change (sea level rise), development, and pollution; recreational beach use (including nest damage by recreational vehicles); predation of eggs and hatchlings by mongoose, free-roaming cats and pigs; coastal development; beach erosion; artificial lighting; boat collisions; entanglement in fishing gear and marine debris; incidental take in sport and commercial fisheries; poaching; military testing and training activities on beaches; and the fibropapilloma virus.

NOAA FISHERIES and USFWS CONSERVATION STRATEGIES: Protect species through use of international agreements, protect primary nesting areas of the green sea turtle in the NWHI, enforce regulations prohibiting take of the species, mediate the adverse effects on nesting and foraging habitats, stop direct harvest of turtles and eggs through education and enforcement actions, reduce incidental harvest by deep water fisheries, and prevent capture in nearshore gillnets and hookings by nearshore fishers.

Hawai'i Turtles

MCBH CONSERVATION MEASURES

Green sea turtles are frequently seen in MCBH Kaneohe Bay's marine buffer zone and are, on rare occasions, seen basking along the Pu'uloa RTF shoreline. The first known nesting by a green sea turtle at MCBH occurred in June 2015 at MCBH Kaneohe Bay. Although the turtle was not sighted, six holes were detected and hatchling tracks and dead hatchlings were observed.

MCBH engages in a variety of conservation measures to support the continued health and viability of green sea turtles. Specific management actions detailed in the MCBH INRMP are assessed annually as part of the INRMP performance evaluation in cooperation with USFWS, NOAA Fisheries, and Hawai'i DLNR, and revised if necessary due to new information. The following management activities have been implemented and procedures established to protect green sea turtles to the greatest extent possible. They also apply to the less common hawksbill and olive ridley sea turtles. Management activities aimed at maintaining ecosystem health benefits these species indirectly, such as implementing measures to minimize erosion and polluted run-off and invasive species removal.

Predator Control. Predator control is conducted year round for the protection of MCBH's endangered waterbirds and MBTA-protected ground nesting seabirds (wedge-tailed shearwaters). Should a turtle nest be discovered outside an area covered by normal predator control efforts, additional control efforts will be instituted to protect the turtle nesting site.

Sea Turtle Monitoring. Natural Resources staff monitor for and record occurrences of sea turtle activity. Ability to monitor more frequently is constrained by personnel availability, vehicle availability, and the fact that there are miles of shoreline to monitor, much of which is currently accessible only by foot. MCBH consults with NOAA Fisheries and USFWS as necessary. Information collected during monitoring includes: survey date, turtle activity (e.g., nests, false crawl, non-nesting excavation, observation of adults), general location of nests, approximate size and age (adult/juvenile), and other noteworthy observations (e.g., tumors, tag).

- MCBH Kaneohe Bay Shorelines: Pyramid Rock, 2,000 ft; North Beach, 5,300 ft; Fort Hase, 6,300 ft with (3,100 ft within Wildlife Management Area)
  - Efforts will be made to enlist support from volunteers, water safety personnel, and NOAA monk seal volunteers to gain more visual coverage of Mōkapu Peninsula beaches.
  - Monitor all beaches at least 1x/week year-round for green sea turtles coming ashore to bask. Opportunistic monitoring will supplement routine monitoring.
  - During nesting season (May 15-Sep 30), monitor Fort Hase Beach (site of 2015 nesting) 2-3x/week.
  - Monitor any discovered nests 2-3x/week. Within 2 weeks of eggs hatching, monitor every other day or daily if personnel availability and time permits.
- MCTAB Shoreline [5,000 ft]
  - Will seek to enlist the support of Bellows Air Force Station (AFS) to help monitor MCTAB's shoreline.
  - Monitor once a week for green sea turtles coming ashore to bask.
  - Monitor 1-2x a week if a nest is discovered, more frequently if conditions allow.
- Pu'uloa RTF Shoreline [2,950 ft]
  - The Range's beach guards monitor Pu'uloa's restricted beach almost daily to prevent unauthorized access.
  - The beach is highly eroded, very narrow, and inland movement is restricted by impact berms.
  - On the rare occasions a green sea turtle comes ashore on the beach at Pu'uloa, it would be reported.

Hawai'i Turtles

Wildlife Friendly Lighting. Natural Resources staff work with facility engineers to minimize lighting issues throughout MCBH. Particularly near shorelines, lights have been removed, numbers of lights limited, or not installed in the first place. When lighting is required, all exterior lights for new construction and renovations are required to use International Dark-Sky compliant fixtures, unless otherwise required by the military mission.

Beach Management/Shoreline Protection. MCBH encourages plant growth, especially native beach strand vegetation on beach areas to reduce erosion and stabilize the firm land. Efforts are conducted to control invasive plant species.

Sea Turtle Protection Zones. Any incidences of basking or nesting sea turtles should be reported to the military police at (808) 257-2123. If a sea turtle comes ashore for basking or nesting on a beach where people frequent, designated personnel will erect barriers around the animal and monitor the site. Signs indicating these are protected species, that people and pets are required to remain at least 100 feet away, and contact information are placed near the barriers. Additional protective measures include:

Sea Turtle Basking:

- Only pre-approved military equipment (AAVs)/training and civilian vehicles used for emergency response, policing, debris removal, or biologic monitoring are allowed on beaches.
- Pets must be leashed at all times and are only allowed on certain beaches during specific times.
- Control invasive plant species.

Sea Turtle Nesting:

- Immediately control and sign the area.
- Limit the presence of people within 100 feet of the nesting site.
- Make beach off-limits to dogs until the hatchlings depart.
- Restrict nighttime beach activities.
- Stop alcohol consumption on beach.
- Minimize artificial lighting on beach.
- Prevent driving of any vehicles on the ocean-ward side of active nests, tire ruts will impede the movement of hatchlings. Rake ruts to ensure that emerging hatchlings have a clear path between the nest and water.
- If nest excavations will be conducted: Coordinate with the local government and USFWS a minimum of 72 hours after the first observed emergence, or according to the terms and conditions on an authorized Sec 10(a)(1)(a), endangered species permit.

Marine Debris Removal. MCBH conducts efforts to remove derelict fishing gear and other marine debris from MCBH jurisdictional waters. Monitor for and remove marine debris, including derelict fishing gear, nets, or other entanglement hazards, from the beach.

Hawai'i Turtles

Access Restrictions. MCBH has several regulations in place that provide protection for sea turtles. MCBH Kaneohe Bay has a 500 yard seaward buffer zone within which MCBH exerts control to all access and resources. Regulations restrict fishing, surfing, and other near shore activities. Enforcement is supported by two full-time federally-commissioned Conservation Law Enforcement Officers on the Environmental Department staff.

Protocols for Military Maneuvers and Large-scale Recreational Events. Beaches and nearshore waters in the vicinity of the event are surveyed at least one hour prior to the event and observed during the event. If sea turtles are present, the event may be postponed, cancelled, or moved at least 150 yards away from the marine animal. In the unlikely event a sea turtle comes ashore during an event people and equipment will be required to move at least 150 yards away from the area and regular protection zone protocols are followed.

Injured/Dead Response. If a sick, injured, stranded, entangled, or dead sea turtle appears in MCBH waters or on beaches it is immediately reported to the Military Police, protected, and reported to NOAA's Sea Turtle Stranding Hotline (808) 725-5730 or (808) 256-4377 (after hours) for rehabilitation and/or necropsy. If the turtle is in the water, bring ashore if safe to do so, and remove entanglement. Refrain from removing barbed hooks.

Educational Outreach. Briefings given to military personnel on Base include information on sea turtle reporting and appropriate procedures to follow in their presence. Informational material on sea turtles is provided to visitors staying at the Temporary Lodging Facility (TLF), beach cottages, cabanas and made available at all public events held on base. Fishermen are encouraged to use barbless circle hooks. Information on sea turtle reporting procedures is posted on the MCBH website or you may contact the Environmental Dept at (808) 257-7000 or (808) 216-7135.

Hawai'i Turtles

COMMON NAME: Hawksbill Turtle
HAWAIIAN NAME: *Honu'ua*
SCIENTIFIC NAME: *Eretmochelys imbricate*
LEGAL STATUS: Endangered (Federal/State). Endangered IUCN Red List. Protected under CITES.

APPEARANCE: Hawksbill turtles are a small to medium sized marine turtle; averaging two and a half feet in length and weighing 100 to 150 pounds (can grow as large as 200 pounds). The top shell is dark to golden brown with streaks of orange, red and black with a serrated back and overlapping thorny scales or plates. The bottom shell is clear yellow. They usually have 2 claws on each of their 4 flippers. Head is elongated and tapers to a point with a beak-like mouth.

HABITAT: Hawksbill turtles frequent rocky areas, coastal reefs, shallow coastal areas and estuaries, and prefer water less than 65 feet deep.

DIET: Hawksbill turtles are often associated with the coral reef community and feed primarily on sponges, other invertebrates, and algae.

REPRODUCTION: Hawksbill turtles nest in the MHI, predominantly on the Island of Hawai'i at the same beaches where they were born. Females nest every 2 to 3 years after they mature at about 30 inches in size (age unknown). Females lay an average of 3 to 5 nests (or clutches) of approximately 130 eggs each every 14 to 16 days. Eggs incubate for 2 months before hatching.

MCBH OCCURENCE: Although no hawksbill turtles have been officially recorded within areas of MCBH jurisdiction, the environmental conditions are favorable for their presence. An October 2016 nesting on Bellows AFS (adjacent to MCTAB) was suspected to be a hawksbill turtle.

CONSERVATION MEASURES: The same conservation measures afforded the green sea turtle will be applied to the hawksbill turtle where appropriate.

COMMON NAME: Olive Ridley Sea Turtle
SCIENTIFIC NAME: *Lepidochelys olivacea*
LEGAL STATUS: Threatened (Federal/State). Protected under CITES.

APPEARANCE: Adult olive ridley sea turtles average 100 pounds, are olive/ grayish green in color and have a heart shaped top shell with 5 to 9 pairs of thorny scales or plates. They have 1 to 2 claws on each of their 4 flippers. Hatchlings are mostly black with a bit of green on the sides

HABITAT: Olive ridley sea turtles primarily spend time in the open ocean but have been known to inhabit coastal areas. They migrate from pelagic foraging to coastal breeding and nesting grounds, back to pelagic foraging. They are globally distributed in the tropical regions of the world.

Hawai'i Turtles

DIET: Adult olive ridley sea turtles are carnivorous and feed on a wide variety of organisms including fish and mollusks.

REPRODUCTION: Nesting occurs throughout tropical waters, but rarely in Hawai'i. Olive ridley sea turtles are known for their habit of mass synchronized nestings where hundreds to thousands of females come ashore at once to lay their eggs. Females nest once or twice a season every year after about 15 years of age. They produce a clutch of approximately 100 eggs and incubation takes 50 to 60 days.

MCBH OCCURENCE: Although olive ridley sea turtles are rarely seen in Hawai'i, on July 16, 2009 one nested on MCBH's Pyramid Rock Beach; the first documented nesting on O'ahu. Although other known nestings occurred in on Maui (1985) and Hilo, Hawai'i (2002), the MCBH nesting was the most successful of all events, with over 50% of the eggs laid hatching in September 2009. Natural Resources staff collaborated with NOAA Fisheries and USFWS biologists to monitor the nest and relocate, protect, and conduct a public releasing of the hatchlings.

CONSERVATION MEASURES: The same conservation measures afforded the green sea turtle will be applied to the olive ridley sea turtle where appropriate.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Sections 4, 6, 7.4, 7.6, 7.7, 8, Appendix C & D.

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1. Andy Bruckner. NOAA. http://www.nmfs.noaa.gov/pr/species/turtles/photos.htm#green
2. Green Sea Turtle Nesting Attempt at Fort Hase Beach, MCBH
3. Nick Caloyianis. http://animals.nationalgeographic.com/animals/reptiles/hawksbill-turtle/
4. Photographer unknown, Nesting Olive Ridley at Pyramid Rock Beach, MCBH.
5. Lance Bookless, MCBH, Olive Ridley Hatchlings at Pyramid Rock Beach, MCBH.

Nesting Beach Surveys
Topic: Crawl Identification

Adapted from Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Guidelines for Marine Turtle Permit Holders
PIFWO Version: June 2016

GLOSSARY OF TERMS

Crawl – Tracks and other sign left on a beach by a sea turtle.

False crawl – A crawl resulting from an abandoned nesting attempt (a non-nesting crawl).

Nest -- A crawl resulting from a nesting attempt in which eggs were deposited.

Egg chamber – The cavity excavated by the rear flippers of a nesting turtle into which the turtle deposits a clutch of eggs.

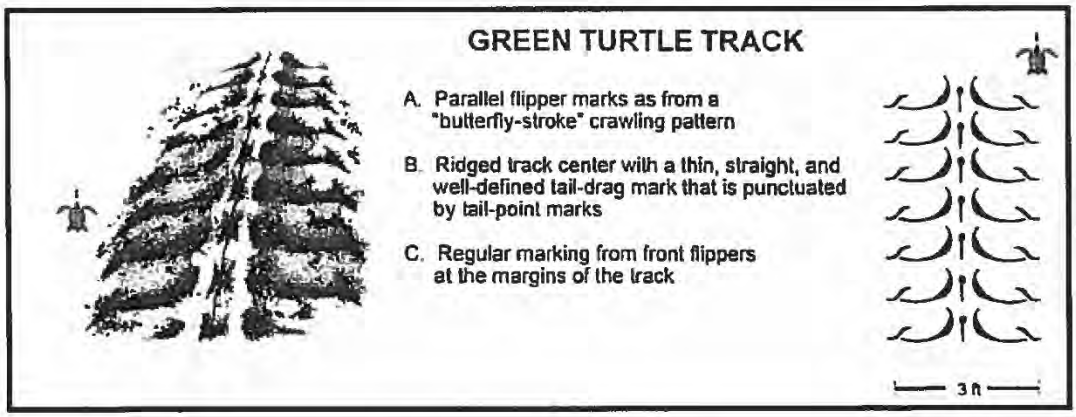
Primary body pit – The excavation made by a turtle on the beach just prior to digging the egg chamber.

Backstop – An approximately 45° incline made in the sand as sand is pushed back with the rear flippers during the excavation of the primary body pit. Such a steeply inclined backstop is not present in the secondary body pit.

Escarpment – The perimeter of the secondary body pit where the front flippers have cut away a small cliff into the surrounding sand.

CRAWL IDENTIFICATION

Green turtle (*Chelonia mydas*).tracks from a sea turtle with simultaneous limb movement, a center drag mark from the tail, and track width approximately 35 inches:



If the crawl is from a green turtle, is it a nest or a false crawl?

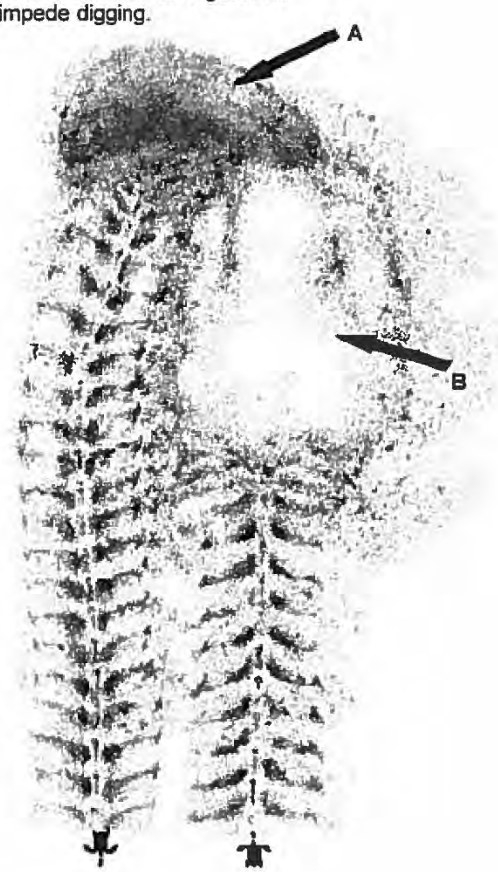
A. Identify emerging and returning tracks by their direction (Figure 1). As a green turtle crawls, it will push sand backward with each flipper stroke.

B. Follow the path taken by the turtle and look for the following attributes.

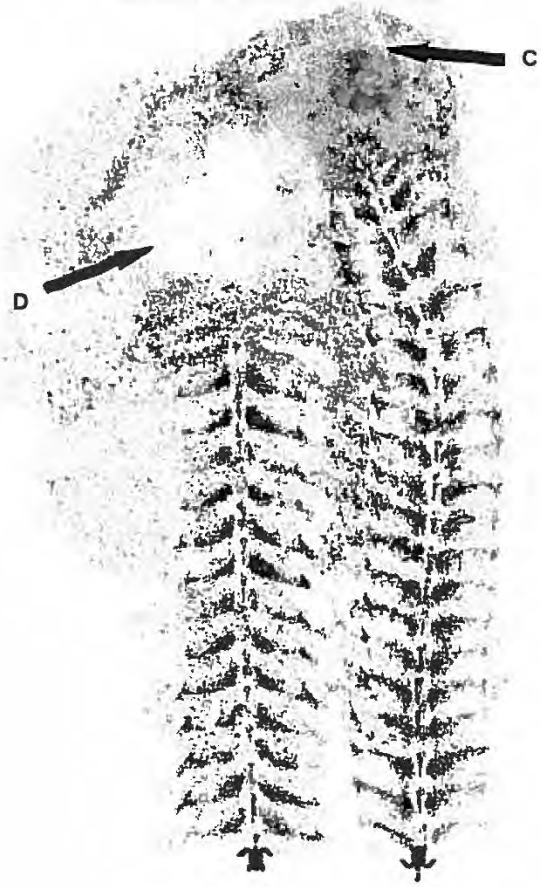
1. Evidence of front flipper covering (Figure 3). If present, the crawl is a **NEST**.
    a. Sand thrown into a mound that is more than twice as long as the visible body pit or a deep (1-2 foot) secondary body pit with an escarpment (Figure 3).
2. Evidence of an abandoned nesting attempt. If present, the crawl is a **FALSE CRAWL**.
    a. Very little or no sand disturbed other than tracks.
    b. Less sand thrown over the emerging track and a shallower body pit than in 1a above (Figure 3).

Figure 3. Characteristics of **green turtle crawls** indicating either that the turtle had previously nested (left a nest) or had abandoned its nesting attempt (left a "false crawl").

A **green turtle nest** site on an open beach showing a secondary body pit (**A**) and a mound of thrown sand (**B**) that is greater than twice as long as the visible secondary body pit. Note that smaller nest mounds are expected when obstacles or vegetation impede digging.



A **green turtle false crawl** on an open beach showing an abandoned primary body pit (**C**) and a mound of thrown sand (**D**) that is smaller than twice as long as the visible primary body pit. Note that many green turtle nests may have body pits and nest mounds that look similar to this.



Rice Corals

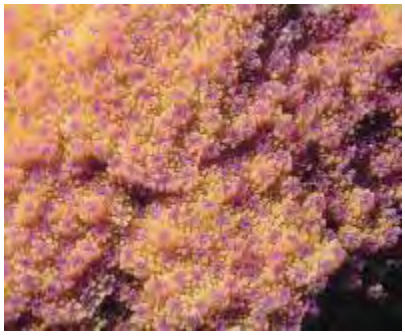
COMMON NAME: Rice Corals: Irregular rice coral/ Blue rice coral/ Sandpaper rice coral
HAWAIIAN NAME: koa (general name for several species of corals including rice corals)
SCIENTIFIC NAME: *Montipora dilitata/ Montipora flabellata/ Montipora patula*
LEGAL STATUS: Protected under HAR Chapter 13-95

APPEARANCE: *Montipora* species are included in the group stony corals due to their hard skeleton. *Montipora dilitata* colonies are usually purple or pale to dark brown and reach 3 feet in diameter. Morphology can be variable with colonies being a combination of encrustations, plates, knobs, and branches. They are characterized by a very smooth surface lacking papillae and verrucae. Corallite walls are well defined. *Montipora flabellata* are encrusting corals with irregular lobes that are usually blue in color (but may photograph pink), sometimes brown or purple. Corallites are small, papillae cover the colony surface and are sometime fused into ridges. Septa are poorly developed. They are normally a flat, ground covering coral. *Montipora patula* colonies are small encrusting or tiered plate corals chocolate brown in color with light borders. They can grow to over 6 feet across. Plates usually have free edges, corallites are small and irregular in height, and papillae are concentrated around corallites.

Montipora diltata

Montipora flabellate

Montipora patula



NATIVE RANGE: *Montipora* species are endemic to the Hawaiian Islands. *Montipora dilitata:* In the Main Hawaiian Islands it is only known to occur in Kāne'ohe Bay. Previously it was much more abundant in Kāne'ohe Bay. *Montipora flabellata*: Occurs around all of the Hawaiian Islands and is found within MCBH's 500 yd buffer zone. *Montipora patula*: Occurs around all the Hawaiian Islands.

HABITAT: *Montipora dilitata:* Restricted to shallow, sub-tidal environments with calm water. *Montipora flabellata*: Occurs in shallow, high wave-energy environments down to a depth of ten meters. *Montipora patula*: Occurs in reef flats down to a depth of ten meters.

DIET: *Montipora* species, like many coral species, have a mutually beneficial relationship with photosynthetic algae known as zooxanthellae that live within the coral's tissues. The coral provides protection for the algae and the algae provide energy and nutrients for the coral produced through photosynthesis. Stony corals with zooxanthellae can get up to 98% of their nutrition from the sugars produced by the algae. Stony corals may also feed on small plankton or dissolved organic matter that is in the water.

REPRODUCTION: Rice corals are hermaphrodites with each individual having both male and female sexual organs. They spawn through a synchronized release of eggs and sperm that is prompted by a particular combination of day length, tide, and moonlight. Fertilization occurs on the surface and the resulting coral larvae actively select substrate to settle on. *Montipora* species are also known to reproduce asexually by fragmentation. These species reach sexually maturity between three and eight years of age.

Rice Corals

ECOLOGICAL THREATS: Bleaching related to the rise in ocean temperatures as a result of global climate change. Bleaching events lead to mortality. Predation by crown-of-thorns starfish (*Acanthaster planci*). Diseases such as acute Montipora white syndrome, a tissue disease that can lead to mortality, are a threat but have not yet caused serious mortality of corals in Hawai'i. Alien alga species and invasive green alga can cover rice corals inhibiting the ability of zooxanthellae to photosynthesize. Pollution, such as high levels of nutrients, sediments, and fresh water, negatively impacts corals in the nearshore areas. Anchors, fish pots, swimmers, and divers can all cause damage to corals.

CONSERVATION STRATEGIES: It is illegal to take, break, or damage stony coral. Stony corals are extensively monitored by the DLNR Division of Aquatic Resources, NOAA Fisheries, and the Coral Reef Assessment and Monitoring Program partnership, including the University of Hawai'i. Agencies and groups work together to: increase education outreach (especially to tourists), prevent establishment of alien species, remove marine debris, restore habitat where feasible, expand or create Marine Protected Areas, and provide rapid respond to shipwrecks, oil spills, disease outbreaks, hurricanes, and other acute impacts.

MCBH CONSERVATION MEASURES: Rice corals occur in Kāne'ohe Bay within and adjacent to the 500 yard buffer zone. Conservation measures that benefit these species of rice coral include:

- **Habitat protection and enhancement**. Removal of marine debris is conducted on a regular basis. MCBH engages in management actions focused on reducing nonpoint source pollution as well as beach and shoreline erosion. MCBH manages spill risk as a part of its Natural Resource Trustee Responsibilities and complies with NRDA and spill response obligations. Assessment of the extent of the threat of alien species in ongoing.
- **Monitoring for presence to help direct management activities**. MCBH funds benthic community and habitat surveys in its jurisdictional waters and the near shore environment of MCTAB to record the abundance and health of marine resources. These surveys are used to direct management actions to avoid or minimize negative impacts. Monitoring includes photo-documenting marine resources as well as threats and risks. Natural Resources staff acknowledge that effects due to climate change are important to monitor and if possible, mitigate.
- **Education and outreach**. Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers. A focus is placed on avoiding damage to the corals while engaging in recreational activities. Natural Resources staff engage with MCCS about educating boaters and divers at the marina and those that rent their beach cottages. Interpretive exhibits are currently being developed, to include one panel specifically focused on coral reefs.

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3. Jodi N. Harney, Coral Reef Network. http://www.coralreefnetwork.com/marlife/corals/acrop.htm

Hawaiian Duck

COMMON NAME: Hawaiian Duck
HAWAIIAN NAME: *Koloa*
SCIENTIFIC NAME: *Anas wyvilliana*
LEGAL STATUS: Endangered (Federal and State). MBTA protected.

APPEARANCE: Hawaiian ducks, or koloa, are a small dabbling duck. Both sexes resemble a dark female mallard, mottled brown with blue wing bars bordered on both sides by white. Males have darker head and neck feathers, an olive colored bill, bright orange feet and legs, and are 19 to 20 inches long. Females have a more orange or gray colored bill with a dark mark on the upper ridge, feet and legs that are dull orange, and are 16 to 17 inches long. Data indicate that there has been extensive hybridization between koloa and feral mallards on O'ahu. There is often difficulty distinguishing genetically pure koloa (*Anas wyvilliana*) from true mallards (*Anus platyrhynchos*) and koloa-mallard hybrids, although mallards and hybrids tend to be larger. For management purposes the three species often must be grouped together as koloa/ hybrid/ mallard.

NATIVE RANGE: Endemic. Previously koloa inhabited all of the main Hawaiian Islands except Lāna'i and Kaho'olawe. They are now restricted to wild populations on Kaua'i and Ni'ihau and small reestablished populations on O'ahu, Hawai'i and Maui.

HABITAT: Koloa occupy coastal wetlands, freshwater pools, bogs, streams, and marshy areas. They prefer shallow water with nearby dense cover and safe roosting sites (islands).

DIET: Koloa feed on grass seeds and other vegetation, crustaceans, insects, nematodes, and algae.

REPRODUCTION: Information on the nesting biology of koloa is sparse. Nesting occurs year round with the majority of activity occurring between January and May. Koloa build their nests on the ground near water. They generally lay eight to ten eggs that incubate for less than one month.

ECOLOGICAL THREATS: The main threat to koloas is hybridization with feral mallards. Other threats include: habitat loss; altered hydrology (modifications to wetland habitats); alien plant encroachment; avian botulism; and introduced mammalian predators. Duckling predators include mongooses, cats, dogs, black-crowned night herons, and common mynas.

USFWS CONSERVATION STRATEGIES: Although there is not currently an active captive breeding program, koloa bred in captivity have previously been used for reintroductions. Captive breeding programs or future translocation of birds are still considered valid and valuable methods of increasing the population on certain islands. The importation of mallards is restricted by the State and efforts to eliminate koloa/mallard hybrids are being evaluated. Efforts to protect and restore wetlands and control predators benefit this species.

Hawaiian Duck

MCBH CONSERVATION MEASURES: Hawaiian ducks and/or hybrids have been recorded at MCBH Kaneohe Bay, MCTAB and Pearl City Annex. Regularly conducted surveys for waterbirds indicate that the number of Hawaiian duck/ hybrid/ mallards at MCBH has increased notably since 2002. Prior to 2002, surveys typically detected less than 20 ducks per visit. Between 2002 and 2010 the number present at MCBH has steadily grown, with over 100 recorded during regular counts in each year since 2010.

Conservation measures that benefit koloa include:

- **Habitat protection and enhancement.** Although maintaining healthy non-invasive vegetation is important, ducks on MCBH have adapted well to an urbanized environment. They are regularly found foraging in the open grassy areas around base and at the Water Reclamation Facility. Presence documented at Klipper Golf Course Ponds and the Percolation Ditch wetland has increased since the implementation of habitat enhancement projects in these locations in 2003 and 2007 respectively.
- **Limiting disturbance.** Hawaiian ducks appear unfazed by human activity, including normal light and noise pollution associated with the Base, and it doesn't appear to affect their breeding success. Established BMPs and conservation measures are employed when a project may disturb or otherwise modify a koloa's behavior.
- **Predator Control.** Koloa benefit from the on-going trapping of cats, mongoose, and rats within the Wildlife Management Area and wetlands.
- **Wildlife Friendly Lighting.** Although lighting on Base does not appear to be an issue, Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Monitoring to help direct management activities.** Natural Resources staff record occurrences and consult with USFWS as needed. Due to recent outbreaks of avian botulism, koloa at MCBH Kaneohe Bay will be closely monitored during summer months for symptoms of avian botulism in an effort to detect the disease in the earliest stages allowing for treatment of sick ducks and potentially limiting the spread of disease and the number of associated deaths.
- **Education and Outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6, 7.1, 7.2, 8, 9, Appendix C & D.

PHOTOS

1. Hawaiian Duck. USFWS, Pacific Islands Fish and Wildlife Office. https://www.fws.gov/refuge/Hanalei/wildlife_and_habitat/Hawaiian_Duck.html

Hawaiian Coot

COMMON NAME: Hawaiian coot
HAWAIIAN NAME: *'Alae ke'oke'o*
SCIENTIFIC NAME: *Fulica alai*
LEGAL STATUS: Endangered (Federal and State). Vulnerable (IUCN Red List). MBTA protected.

APPEARANCE: The Hawaiian coot is a small waterbird with a black head, a solid grayish-black body, a white bill, a prominent white frontal shield and white undertail feathers that are easily seen when the bird is swimming or displaying. Feet are lobed (not webbed) and are greenish-gray.

NATIVE RANGE: Endemic to Hawai'i, Hawaiian coots occur mainly in coastal plain wetlands below an elevation of 1350 feet. On the Island of Hawai'i Hawaiian coots use stock ponds at elevations up to 6600 feet and on Kaua'i they use ponds up to 4900 feet in elevation.

HABITAT: Hawaiian coots generally occur in lowland freshwater wetland habitats consisting of a mixture of emergent plant growth with open water. Occasionally they use brackish and saltwater habitats. They typically forage in shallow water (less than 12 inches), but will dive in water up to 48 inches deep.

DIET: Hawaiian coots generally feed close to nesting areas in somewhat open water. They are omnivorous, feeding on worms, snails, crustaceans, the adults and larvae of aquatic and terrestrial insects, small fish, and tadpoles. Coots also feed on the seeds and leaves of a variety of aquatic and terrestrial plants including sedges, grasses, and rushes. They will travel long distances, including between islands, to locate food sources.

REPRODUCTION: The coot nests primarily in fresh or slightly brackish shallow water (15–40 inches) interspersed with robust emergent wetland plants. They may construct floating nests with aquatic vegetation in open water or anchored to emergent vegetation. Nesting occurs year round but mainly between March and September. Clutch size is three to ten eggs.

ECOLOGICAL THREATS: Hawaiian coots are threatened by habitat loss, altered hydrology, non-native invasive plants, and introduced predators. Mongooses are especially harmful to ground nesting birds such as the Hawaiian coot. Other predators include dogs, feral cats, rats, and barn owls, which potentially prey on adults, young or eggs.

USFWS CONSERVATION STRATEGIES: Conservation actions are taken to protect current populations and breeding habitats as well as establish additional populations to reduce the risk of extinction. Efforts include restoration of wetland habitat, management of existing habitat, and continued monitoring of populations to assess the efficacy of management.

Hawaiian Coot

MCBH CONSERVATION MEASURES: Hawaiian coots occur in wetlands at MCBH Kaneohe Bay, primarily at the Percolation Ditch, the Klipper Golf Course Ponds, and fresh-water influenced portions of the Nu'upia Ponds Wildlife Management Area. They are also found at MCTAB. Conservation measures that benefit Hawaiian coots include:

- **Habitat protection and enhancement.** Although maintaining healthy non-invasive vegetation is important, Hawaiian coots on MCBH have adapted well to an urbanized environment.
- **Limiting disturbance.** Hawaiian coots appear unfazed by human activity, including normal light and noise pollution associated with the Base, and it does not appear to affect their breeding success. Established BMPs and conservation measures are employed when a project may disturb or otherwise modify a coot's behavior.
- **Predator Control.** Hawaiian coots benefit from the on-going trapping of cats, mongoose, and rats within the Wildlife Management Area and wetlands.
- **Wildlife Friendly Lighting.** Although lighting on Base does not appear to be an issue, Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Monitoring to help direct management activities.** Natural Resources staff record occurrences and consult with USFWS as needed.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

REFERENCES

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1. Hawaiian Coot. David Schultz. http://www.arkive.org/hawaiian-coot/fulica-alai/
2. Hawaiian Coot family at enhanced Percolation Ditch wetland habitat, MCBH Kaneohe Bay. Dr. Diane Drigot.
3. Hawaiian Coot feeding young at enhanced Percolation Ditch wetland habitat. MCBH Kaneohe Bay. Carroll Cox.

Hawaiian Common Moorhen

COMMON NAME: Hawaiian common moorhen or Hawaiian common gallinule
HAWAIIAN NAME: *'Alae 'ula*
SCIENTIFIC NAME: *Gallinoula chloropus sandvicensis*
LEGAL STATUS: Endangered (Federal and State)

APPEARANCE: The Hawaiian common moorhen is black on the top portion of its body with dark slate blue below and a white stripe on the flanks. They have a red shield over their red and yellow bill and feet are lobed rather than webbed. The *'alae 'ula* is associated with the goddess Hina and with legends about bringing the secret of fire-making to the Hawaiian people.

NATIVE RANGE: The Hawaiian common moorhen is a non-migratory, endemic subspecies of the common moorhen (*Gallinula chloropus*). Historically they occurred on all of the main Hawaiian Islands except Lāna'i and Kaho'olawe.

HABITAT: Hawaiian common moorhens generally occur in freshwater wetlands below 400 feet elevation. They are found in freshwater marshes, wetland agricultural areas, reservoirs, wet pastures, and occasionally brackish water.

DIET: The Hawaiian common moorhen's diet varies with habitat but includes algae, grass seeds, plant material, insects, and snails.

REPRODUCTION: Nesting habitat is restricted to areas of standing freshwater less than two feet deep with dense emergent vegetation. Nesting occurs year round, but mainly takes place during spring and summer months. Floating nests are constructed in dense vegetation.

ECOLOGICAL THREATS: Hawaiian common moorhens are threatened by habitat loss, non-native invasive plants, introduced predators, avian disease and environmental contaminants.

USFWS AND HAWAI'I DLNR CONSERVATION STRATEGIES: General conservation activities involve protecting current populations as well as establishing new populations to reduce the risk of extinction. Conservation efforts also include protection and management of existing habitat (including key breeding habitat), restoration of wetlands, and population monitoring.

Hawaiian Common Moorhen

MCBH CONSERVATION MEASURES: Hawaiian common moorhens occur in wetlands at MCBH Kaneohe Bay, primarily at the Klipper Golf Course Ponds, the Percolation Ditch wetland, and the fresh-water influenced sections of Nu'upia Ponds Wildlife Management Area. They are also found at MCTAB.

Regular conservation measures that benefit Hawaiian common moorhens include:

- **Habitat protection and enhancement.** Although maintaining healthy non-invasive vegetation is important, moorhens on MCBH have adapted well to an urbanized environment. Breeding activity documented at Klipper Golf Course Ponds and the Percolation Ditch wetland has increased since the implementation of habitat enhancement projects in these locations in 2003 and 2007 respectively. Established BMPs and conservation measures are employed when a project may have an effect on birds.
- **Limiting disturbance.** Hawaiian common moorhen appear unfazed by human activity, including normal light and noise pollution associated with the Base, and it does not appear to affect their breeding success.
- **Predator Control.** Moorhen benefit from the on-going trapping of cats, mongoose, and rats within the Wildlife Management Area and wetlands.
- **Wildlife Friendly Lighting.** Although lighting on Base does not appear to be an issue, Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Monitoring to help direct management activities.** Natural Resources staff record occurrences and consult with USFWS as needed.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Sections 7.1, 7.2, 7.3, Appendix C & D.

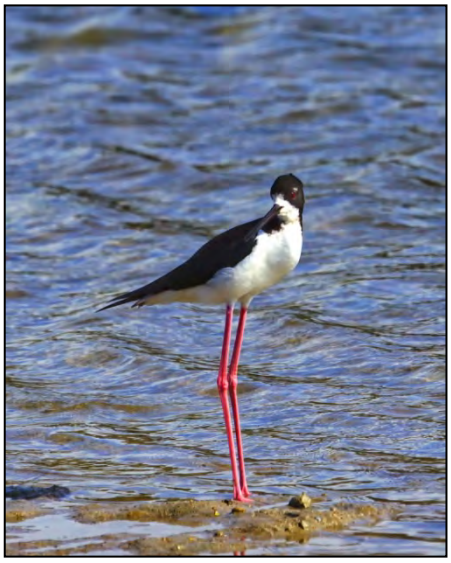
PHOTOS

1. Hawaiian common moorhen. MCBH.
2. Hawaiian common moorhen eggs. MCBH.
3. Hawaiian common moorhens parents and chicks. MCBH.

Hawaiian Stilt

COMMON NAME: Hawaiian stilt
HAWAIIAN NAME: *Ae'o*
SCIENTIFIC NAME: *Himantopus mexicanus knudseni*
LEGAL STATUS: Endangered (Federal and State). Vulnerable (IUCN Red List). MBTA protected.

APPEARANCE: The Hawaiian stilt is a slender, pink-legged, wading shorebird with black upper-parts, white under-parts, and a long black bill. It grows up to 15 inches in length. The Hawaiian subspecies differs from the North American stilt by having more black on its face and neck, a longer bill, tarsus, and tail.



NATIVE RANGE: Hawaiian stilts are non-migratory birds, endemic to Hawai'i. They were historically known to be on all major islands except Lāna'i and Kaho'olawe. They still occur on all major islands, except Kaho'olawe, with the majority of the population occurring on Maui and O'ahu.

HABITAT: Hawaiian stilts utilize fresh, brackish and saline coastal waters. They use little vegetation for nesting or feeding and breed in marshland, mudflats, shallow open water, flooded fields, borders of salt ponds, mangrove swamps, coastal playas and ephemeral wetlands. They require specific water depths of around five inches for optimal foraging. Nest sites are separated from feeding sites.

DIET: Hawaiian stilts feed in shallow water primarily on invertebrates, crustaceans, aquatic and terrestrial insects, and small fish.

REPRODUCTION: Hawaiian stilts nest on low relief shorelines, mudflats in wetlands, and small islands within bodies of water. Nesting occurs from March to August with a peak in May-June. At MCBH Kaneohe Bay stilt nesting season peaks in June-July, which is later than on the south side of O'ahu. During nesting, stilts move between a nesting area and a feeding area. Although chicks leave the nest immediately, immature birds stay in family groups through the winter until the next breeding season begins.

ECOLOGICAL THREATS: The primary cause of species decline is the loss and degradation of wetland habitat and predation by introduced species, especially the small Asian mongoose. Mongooses are voracious predators that are especially harmful to ground nesting birds such as the endangered Hawaiian stilt. Other factors include free roaming cats, alien plants, disease and some environmental contaminants.

USFWS AND HAWAI'I DLNR CONSERVATION STRATEGIES: Hawaiian stilts are listed as a species of primary importance in the U.S. Pacific Islands Regional Shorebird Conservation Plan. Although the population is considered stable, it remains at very low levels. State and Federal conservation efforts include wetland protection, enforcement of a stilt hunting ban, education, and working with private landowners.

MCBH CONSERVATION MEASURES: Hawaiian stilts have been recorded at coastal wetlands on MCBH Kaneohe Bay including Nu'upia Ponds Wildlife Management Area, on MCTAB, and at Pearl City Annex. The 'aeo is the mascot of Mokapu Elementary School on MCBH Kaneohe Bay.

Hawaiian Stilt

Conservation measures to benefit the stilt population include:

- **Habitat protection and enhancement**. Stilt habitat enhancement consists primarily of invasive weed removal. For example, invasive pickleweed (*Batis maritima*) is ground-up during the annual Mud Ops event. Other invasive weeds such as mangrove (*Rhizophora mangle*) are controlled through Weed Warrior service projects. Established BMPs and conservation measures are employed when a project may have an effect on bird behavior.
- **Limiting disturbance.** BMPs to benefit Hawaiian stilts include restrictions on construction and human activity at Nu'upia Ponds Wildlife Management Area and other wetlands. Hawaiian stilts appear unfazed by human activity, including normal light and noise pollution associated with the Base, and it does not appear to affect their breeding success.
- **Wildlife Friendly Lighting.** Although lighting on Base does not appear to be an issue, Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Predator control.** Hawaiian stilts benefit from the on-going trapping of cats, mongoose, and rats within Nu'upia Ponds Wildlife Management Area and other wetlands.
- **Monitoring to help direct management activities**. Natural Resources staff record occurrences and consult with USFWS as needed. Regularly conducted surveys for waterbirds indicate that the number of Hawaiian stilts at MCBH has remained steady since 1991.
- **Education and outreach.** Development and distribution of informational material regarding the Nu'upia Ponds habitat and stilts includes videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 7.1, 7.5, 9, Appendix C & D.

PHOTOS

1. Hawaiian stilt. MCBH.
2. Hawaiian stilt mother and chicks. MCBH.

Wedge-tailed Shearwater

COMMON NAME: Wedge-tailed shearwater
HAWAIIAN NAME: *ʻUaʻu kani*
SCIENTIFIC NAME: *Ardenna pacifica* [1]
LEGAL STATUS: MBTA protected

APPEARANCE: Wedge-tailed shearwaters are the largest tropical shearwater species with slender body, long thin wings, wedge-shaped tail, and hooked bill. Both sexes have two color phases, dark and light dusky brown. In Hawai'i, they tend to be light colored with grayish brown above, white underparts, and dark edges on wings and undertail.

NATIVE RANGE: Wedge-tailed shearwaters are indigenous to Hawai'i. "Wedgies" are among the most common nesting seabirds found on the main Hawaiian Islands.

HABITAT: Shearwaters spend most of their time airborne over the open ocean. They frequent offshore waters, land only to breed, and are site faithful to sand dune burrows and natural crevices in mountain cliffs.

DIET: Shearwaters feed on fish, squid and similar ocean food.

REPRODUCTION: Shearwaters nest annually, land only to breed, and are nocturnal at breeding sites. They nest underground in colonies at locations such as natural crevices or burrows dug in coastal sand dunes. Adults arrive to their nesting sites in February and March and lay a single white egg by mid-June. (At MCBH adults arrive in March). Once hatched (late July - August), chicks mature in-situ and are fed by their parents, who forage daily between dawn and dusk. On Kaua'i, the peak of chick fledging occurs in September and October. At MCBH, fledging occurs between November and December, peaking in mid-December.

ECOLOGICAL THREATS: Threats include mammalian predators, urban encroachment and avian malaria. Introduced mammalian predators, cats, dogs, rats, mongoose and pigs consume adults, eggs and young chicks. The native pueo is also suspected of predating on the wedgies at the Fort Hase colony. Another threat is collision with power cables, poles or other man-made structures, when young fledglings are disoriented by urban lights and fly inland rather than out to sea. This is known as "fallout." Shearwaters may become disoriented and collide with structures, potentially causing injury, or they become exhausted, causing them to land and making them more susceptible to injury or death by cars or predators. Yellow crazy ants can cause wedgies to abandon their nests due to infestation and can cause deformities in chicks due to their production of formic acid.

USFWS AND HAWAIʻI DLNR CONSERVATION STRATEGIES: State-organized recovery efforts save hundreds of immature birds annually and birders and resource managers note fall in Hawai'i as "shearwater fallout season."

[1] In 2016 the scientific name for the wedge-tailed shearwater was changed from *Puffinus pacificus* to *Ardenna pacifica*.

Wedge-tailed Shearwater

MCBH CONSERVATION MEASURES: Wedge-tailed shearwaters occur at MCBH Kaneohe Bay and MCTAB. "Wedgies" have established a colony at the Nu'upia Ponds Wildlife Management Area near the Fort Hase shoreline. Since its 1994 discovery, it has expanded from about 24 to over 700 active burrows, as documented in annual bird surveys.

MCBH employs conservation measures to benefit the wedge-tailed shearwater population including:

- **Habitat protection and enhancement.** Non-native invasive plants are opportunistically removed in and around the shearwater colony. Periodic shoreline trash removal and ocean debris removal also occurs. Restricted access and control of invasive species are important to maintaining a healthy population of shearwaters at the colony. Established BMPs and conservation measures are employed when a project may have an effect on birds.
- **Limiting disturbance.** Human access to the burrow area is restricted and pets are prohibited.
- **Controlling invasive species (plants, animals and insects).** Yellow crazy ant (*Anoplolepis gracilipes*) control is performed during nesting season. Yellow crazy ants can cause adults to abandon nests and chicks, resulting in increased mortality. On-going mammalian predator control of cats, rats and mongoose is performed in the burrow area, with efforts intensified during nesting season.
- **Wildlife Friendly Lighting.** Natural Resources staff work with facility engineers to minimize lighting issues throughout MCBH. Particularly near shorelines, lights have been removed, numbers of lights limited, or not installed in the first place. When lighting is required, all exterior lights for new construction and renovations are required to use International Dark-Sky compliant fixtures, unless otherwise required by the military mission.
- **Monitoring to help direct management activities.** Natural Resources staff, supported by volunteers from USFWS and OISC, conduct an annual census of occupied shearwater burrows. Monitoring involves identifying potential issues (e.g., yellow crazy ant and predation). Consultation with USFWS occurs as needed.
- **Education and Outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers. Information is disseminated via a Base-wide email and distribution of fliers regarding "shearwater fallout season" and the proper protocols for reporting downed and disoriented birds. Since 1984, records have been kept on numbers of reported fallen shearwaters transferred to appropriate authorities for rest/release.

Wedge-tailed Shearwater

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6, 7.1, 7.5, 8, 9, Appendix C & D.

PHOTOS

1. Forest and Kim Starr.http://www.starrenvironmental.com/images/image/?q=24894818446
2. Shearwater in burrow at MCBH Kaneohe Bay. Dr. Diane Drigot. 2010.

Red-footed Booby

COMMON NAME: Red-footed booby
HAWAIIAN NAME: *'A*
SCIENTIFIC NAME: *Sula sula rubripes*
LEGAL STATUS: MBTA protected.

APPEARANCE: Red-footed boobies are the smallest of the boobies. Adults have long white pointed wings trimmed in black, a long pointed tail, a long pale blue to bluish-green bill, and bright red webbed feet for swimming. Juveniles are usually brown, with a paler belly and darker band on the chest. Although several adult color phases exist, from white with black on the wings to entirely brown, most Hawaiian red-footed boobies are white. It is difficult to differentiate the sexes, except for subtle differences in beak color during mating season. See photo (male on left; female on right).

NATIVE RANGE: Red-footed boobies do not migrate, although they are far-ranging, year-round in the tropical and subtropical regions of the Atlantic, Pacific and Indian Oceans. They are indigenous to Hawai'i. The MCBH colony is only one of two in the Main Hawaiian Islands, and is the largest. The other is located at the USFWS Kilauea National Wildlife Refuge on Kaua'i.

HABITAT: Red-footed boobies feed at sea and nest and perch in colonies on coastal trees and shrubs.

DIET: Red-footed boobies feed on squid and fish and plunge dive to capture fish spotted from above, but are agile enough to snag flying fish from the air. They often hunt in large flocks and are strong flyers and swimmers. They can dive nearly 100 feet to pursue prey and travel up to 90 miles in search of food.

REPRODUCTION: Red-footed boobies build nest of twigs, grass and leaves on large open platforms, small trees and shrubs. Females lay one egg every 15 months. Parents mate for life and share parental duties, taking turns feeding their chick a semi-digested meal of fish and squid for about 18 to 20 weeks. During this time the chick transforms from being born naked, to acquiring a fluffy coat of white down, and finally donning flight feathers for an independent life (see right photo above of parent booby and downy white chick at MCBH).

ECOLOGICAL THREATS: Threats to red-footed boobies include decreasing food sources due to overfishing, predation on adults and nests, and habitat loss due to coastal development, especially the disappearance of shoreline trees and shrubs. In some Pacific islands, poaching them for food occurs.

USFWS CONSERVATION STRATEGIES: Conservation strategies include: the protection and enhancement of habitat, eradication or control of non-native plant and animal species (especially predators); effective oil spill response, marine debris removal, and mitigation of human disturbance.

Red-footed Booby

MCBH CONSERVATION MEASURES: Red-footed boobies roost and nest within Ulupa'u Head Wildlife Management Area on MCBH Kaneohe Bay at the northeast end of the impact area within an active weapons range training facility. Through diligent conservation measures, both "bullets and boobies" thrive there. The number of birds at the colony has more or less held steady over the last 15 years, at around 1,500 to 2,000+ birds, with up to 500 nesting pairs. The boobies build nests on kiawe and koa haole tree branches each year, primarily during the months of March through mid-September.

Conservation measures at MCBH that benefit the red-footed booby population include:

- **Habitat protection and enhancement.** Nesting platforms have been erected in less fire prone areas to supplement tree habitat. MCBH plans to replace the nesting platforms that have succumbed to age and fallen into disrepair. Thus far, efforts to establish native/Polynesian-introduced trees through planting have proven unsuccessful, mainly due to lack of water. Fire-adapted plants, primarily invasive grasses, cover the range and are responsible for carrying brush fires. Established BMPs and conservation measures are employed when a project may have an effect on birds.
- **Limiting disturbance.** The birds are not directly in the line of gunfire and do not appear to be bothered by the sound of gunfire or mortar rounds. Other than annual bird counts, public access to the colony is restricted, arranged in advance, and escorted on a non-interference basis with range training activities.
- **Predator Control.** The principal predatory threat is free-roaming (feral and domesticated) cats with a minimal concern about mongoose predation. Predator control poses challenges as the colony is located on an active range, so it has to be accomplished around the Range training schedule. Additionally, since the colony is located in an "impact area", EOD and sometimes medical support are required to access parts of the colony. Due to these limitations, predator control only occurs on an as needed basis.
- **Wildlife Friendly Lighting.** Although lighting on Base does not appear to be an issue, Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Fire suppression**. Dry invasive grasses combined with strong trade winds in the crater increases the threat of wildland fire. Invasive grasses are regularly herbicided along range roads. Fuel breaks and firebreaks within the impact area reduce the risk of fire spread. A water cannon system within Ulupa'u Crater is maintained to aid in quick suppression of any wildfires that venture too close to roosting and nesting trees. Strict regulations prevent accidental injury or killing of birds and ensure prompt reporting and response to fires should they occur.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

Red-footed Booby

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6, 7.1, 7.5, Appendix C & D.

PHOTOS

1. Mated pair of red-footed boobies. Tim Sutterfield. 2007.
2. Red-footed booby adult with chick. David Pereksta.
3. View from booby colony indicating how firebreaks contain fires. MCBH.
4. Nesting platforms to supplement tree habitat at MCBH red-footed booby colony. Carroll Cox. 2006.

Hawaiian Short-eared Owl

COMMON NAME: Hawaiian short-eared owl
HAWAIIAN NAME: *Pueo*
SCIENTIFIC NAME: *Asio flammeus sandwichensis*
LEGAL STATUS: State listed as endangered on O'ahu.

APPEARANCE: The pueo measures 13.4 to 16.9 inches long with a wingspan of 33.5 to 44.5 inches. It weighs between 7.3 and 16.8 ounces. The head contains black-rimmed yellow eyes surrounded by pale facial feathers and tiny, often concealed ear-tufts set close together near the center of the forehead. The crown and the neck are distinctly streaky dark on tawny brown. Under parts are buff colored and streaked or spotted with darker brown or grey. The majority of feathers on the body have dark centers with pale edges.

NATIVE RANGE: Pueo is an endemic subspecies of the nearly pandemic short-eared owl (*Asio flammeus*). They occur on all main Hawaiian Islands from sea level to 8,000 feet.

HABITAT: Unlike most owls, pueo are active during the day. They occupy a variety of habitats including forests, shrublands and urban areas, but are most commonly seen utilizing open habitats like grasslands.

DIET: Pueo primarily consume small mammals, specifically mice and rats, as well as insects. They are also known to eat small birds, although probably not regularly.

REPRODUCTION: The breeding biology of pueo is not fully known. Males try to attract females by performing aerial displays know as sky dancing. Pueo females build nests that consist of simple scrapes in the ground lined with grasses and feathers. Pueo lay between three to six eggs over a span of several months, resulting in babies being born at different times. Pueo nest on the ground and active nests have been found year round. On January 23, 2016, the first pueo nest was found in the Nu'upia Ponds WMA. Females build the nests and also perform incubation and brooding. Males feed females and defend nests. Chicks are fed by females with food delivered by males. Young depend on their parents for approximately six to eight weeks, and may fledge from the nest on foot before they are able to fly.

ECOLOGICAL THREATS: The primary cause of species decline is the loss and degradation of habitat and predation by introduced species, such as dogs, cats, rats and the small Asian mongoose. Collisions with moving vehicles and the hunting of pueo are increasing concerns. Other factors include disease and some environmental contaminants. It is believed that pueo are resistant to avian malaria and avian pox that threaten other native bird species.

Hawaiian Short-eared Owl

GENERAL CONSERVATION STRATEGIES: The State of Hawai'i does not have a standalone management plan but the pueo does benefit from conservation plans that outline actions designed to conserve other endangered birds. Additionally they may benefit from game bird management as high densities of pueo occur on lands where game birds are common. Public education and outreach is a continuing strategy of Hawai'i DLNR.

MCBH CONSERVATION MEASURES: Although pueo are occasionally seen at MCBH properties, the first known occurrence of a nesting pueo with eggs at MCBH occurred in January 2016 within Nu'upia Ponds Wildlife Management Area. Although predator traps are regularly deployed in the area, a subsequent visit to the nest did not reveal eggs or chicks.

Conservation measures to benefit pueo include:

- **Habitat protection and enhancement.** Maintaining healthy non-invasive vegetation and opportunistic and planned removal of non-native invasive vegetation. Pueo prefer tall grass for nesting.
- **Limiting disturbance.** Monitoring of vegetation removal. Limiting vegetation removal near any nests. Established BMPs and conservation measures are employed whenever management activities are performed in or around the Nu'upia Ponds WMA that may disturb or modify endangered waterbird behavior; the pueo would benefit from the same measures.
- **Predator Control.** Pueo benefit from the on-going trapping of cats, mongoose, and rats within the Wildlife Management Area. Mammalian predator control is increased in the event of nesting activity.
- **Wildlife Friendly Lighting.** Although lighting on Base does not appear to be an issue, Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Monitoring to help direct management activities.** Natural Resources staff record occurrences and consult with USFWS as needed.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6, 7.1, Appendix C & D.

PHOTOS

1. Pueo. Forrest and Kim Starr. http://mauiinvasive.org/2015/02/05/pueo-or-barn-owl-heres-the-difference/

1. Pueo nest and eggs. MCBH.

Nēnē

COMMON NAME: Hawaiian Goose
HAWAIIAN NAME: Nēnē
SCIENTIFIC NAME: *Branta sandvicensis*
LEGAL STATUS: Endangered (Federal and State). MBTA protected.

APPEARANCE: Nēnē are medium sized geese in the family *Anatidae* and genus *Branta*. Males and females have the same coloration but adult females are smaller in stature than males. Nēnē measure 24 to 27 inches long and are mostly dark brown with a black crown, face, bill and tail feathers and cream colored cheeks. Their necks are cream colored with diagonal black streaks on the front and sides, which gives the appearance of black and white stripes. Their rumps are pure white and legs and feet are dusty black. Nēnē have longer legs and less webbing on their feet than other geese, enabling them to run and climb over very rugged terrain.

NATIVE RANGE: Endemic. Before and during Polynesian colonization, nēnē occurred on all or most of the MHI and likely were widespread. Presently nēnē are found in the wild between sea level and 7,800 feet elevation on the islands of Hawai'i, Maui, Kaua'i and Moloka'i. In 2014, nēnē translocated to the Big Island from Kaua'i were found nesting on O'ahu. The pair of nēnē showed up at the USFWS James Campbell National Wildlife Refuge (near the north shore) and hatched three goslings. This was the first pair of nēnē known to nest on O'ahu since the 1700s. It is hypothesized that these geese were trying to return to nest from where they fledged (Kaua'i), as nēnē typically do.

HABITAT: Nēnē occupy a variety of open habitat types including grasslands, shrub/scrublands, cinder deserts, and woodland interfaces. They will utilize areas where grass is browsed or cut short, e.g., ranches and golf courses. They forage and nest in areas occupied by both native and non-native plant species. Nēnē do not require open water but will use it if it is near their nests. Nēnē typically do not move between islands, although they are capable of it.

DIET: Nēnē forage on seeds, leaves, buds, flowers, and fruits of at least 50 different species of native and non-native plants. Nēnē forage almost solely on land.

REPRODUCTION: Nēnē have the longest nesting season of any wild goose species. They nest on the slopes of volcanoes and in some lowland areas, typically in dense vegetation. Nēnē construct nests in hollows on the ground and fill them with plant material and down. Breeding season is from August to April, and pairs will usually return to the previous years' nest site. Breeding occurs once a year but not all pairs lay eggs every year. Females lay one to six eggs (usually three) and incubate the clutch for 30 days. Males will guard females while nesting, though not constantly. Young are not fed by their parents but will remain with them for up to one year. Nēnē mate for life and pairs typically remain together throughout the year.

ECOLOGICAL THREATS: The initial decline of the species in the 1800s and early 1900s is attributed to overhunting, with predation and loss of habitat being contributing factors. Currently the main threats to the species include loss of habitat, predation, human caused disturbance, and mortality due to dehydration, nutritional deficiencies, and exposure to the elements at high elevations.

Nēnē

USFWS CONSERVATION STRATEGIES: In the late 1940s and early 1950s the total population was near extinction, estimated to be approximately 30 individuals in the wild in 1951. Concerns over extinction led to the initiation of a variety of conservation efforts, including captive breeding. As of 2009, captive breeding programs have resulted in over 2,700 captive bred nēnē being released into the wild on private and public lands. The total population of nēnē living in the wild is approximately 2,000 individuals. This represents an increase from a 1998 estimate of around 885 birds. There are also approximately 2,000 nēnē held in captivity in zoos and breeding facilities worldwide. All wild populations have been or are being supplemented by captive-bred birds.

MCBH CONSERVATION MEASURES: In December 2014, four nēnē briefly visited the Klipper Golf Course. Base Water Reclamation Facility (WRF) personnel reported five nēnē in their compound in February 2016. These birds are believed to be the same nēnē that showed up uncharacteristically at the USFWS James Campbell National Wildlife Refuge.

Conservation measures at MCBH properties that benefit nēnē include:

- **Habitat protection and enhancement.** Although natural areas and maintaining healthy non-invasive vegetation is important, nēnē on other islands have been found grazing in areas with maintained landscapes and mowed grass such as golf courses and parks; both that are prominent aboard MCBH.
- **Limiting disturbance.** If nēnē nest, barriers and signs would be erected to warn people to keep their distance. If nēnē visit the Klipper Golf Course, golfers will be reminded before entering the course that harassment of protected species is illegal. Established BMPs and conservation measures used around other endangered wildlife will be employed should nēnē become more common place on Base as a visitor or permanent resident.
- **Predator Control.** Mammalian predator control would be initiated or increased near the nest in the event of nesting activity.
- **Wildlife Friendly Lighting.** Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Monitoring to help direct management activities.** Natural Resources staff record occurrences and consult with USFWS as needed.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6, 7.1, Appendix C & D.

PHOTOS

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Yellow-Faced Bees

COMMON NAME: Yellow-faced bee
HAWAIIAN NAME: nalo meli maoli
SCIENTIFIC NAME: *Hylaeus anthracinus / Hylaeus longiceps*
LEGAL STATUS: Endangered (Federal and State).

APPEARANCE: *Hylaeus* species have a wasp like appearance but can be distinguished from wasps because they have hair on their bodies.

Hylaeus anthracinus is a medium-sized black bee with clear to smoky wings and black legs. Males have a single large yellow spot on the face below the antennal sockets. Females are entirely black and can be distinguished from males by the black hairs on the end of the abdomen and a mandible containing three teeth.

Hylaeus longiceps is a medium-sized black bee with clear to slightly smoky wings. Distinguishing characteristics are its long head and facial marks on males. The male's lower face is entirely yellow and the yellow area extends to the sides in a broad stripe above the antennal sockets. Females are black and unmarked.


Male


Female

NATIVE RANGE: *Hylaeus* species are the only genus of bees native to Hawai'i. *Hylaeus anthracinus* are endemic to the Hawaiian Islands. They are known to occur on the islands of O'ahu, Moloka'i, and Maui, Hawai'i, Kaho'olawe, and formerly Lāna'i. *Hylaeus longiceps* are endemic to the Hawaiian Islands. They are known to occur on the islands of O'ahu, Moloka'i, and Maui.

HABITAT: *Hylaeus anthracinus* are generally found in coastal strand habitat, rarely at higher elevations in dry forest. *Hylaeus longiceps* are generally found in coastal strand habitat, but also inhabit dry shrubland.

DIET: *Hylaeus anthracinus* and *Hylaeus longiceps* have an affinity for native plants including naupaka (*Scaevola sericea*), ilima (*Sida Fallax*), akoko (*Chamaesyce* spp.), pohuehue (*Ipomea pes-caprae subsp. brasiliensis*), 'ohai (*Sesbania tomentosa*) and naio (*Myoporum sandwicense*). The non-native tree heliotrope or beach heliotrope (*Tournefortia argentea*) is also a preferred food source.

REPRODUCTION: Egg, larva, pupa and nesting habits are not well understood. *Hylaeus anthracinus* are believed to nest in holes in the stems of coastal shrubs, holes in stems within tree and shrub litter, and holes in coral rock.

Yellow-Faced Bees

ECOLOGICAL THREATS: Habitat alteration of native coastal strand vegetation due to development and increased non-native species limits available habitat for yellow-faced bees. Yellow crazy ants (*Anoplolepis gracilipes*) exclude yellow-faced bees from coastal strand habitat both by direct predation and by feeding on the nectar bees rely on. *Hylaeus strenuus*, a non-native bee species present on O'ahu, is spreading through coastal and lowland areas throughout the island and will likely become a competitor of *Hylaeus anthracinus* due to its similar size and habits.

USFWS CONSERVATION STRATEGIES: Seven species of *Hylaeus* (yellow-faced bee) were federally listed as endangered, effective October 31, 2016, including *Hylaeus anthracinus* and *Hylaeus longiceps*. USFWS has not yet developed a Recovery Plan, and critical habitat has not been designated.

MCBH CONSERVATION MEASURES: *Hylaeus anthracinus* occurs in coastal strand habitat at MCBH Kaneohe Bay and potentially MCTAB. Although *Hylaeus longiceps* has not been officially documented on MCBH properties, Ulupa'u Crater appears to be viable habitat for this species. MCBH will conduct surveys to try to determine where the species is present at MCBH properties during the 2017-2021 INRMP implementation period.

Conservation measures that benefit yellow-faced bees include:

- **Habitat protection and enhancement.** Protecting nectar plants in occupied habitat. Allow planting of tree heliotrope or beach heliotrope, which *Hylaeus* species have an affinity for (the species is on the approved plant material list of non-native plants for MCBH and currently occurs on Base).
- **Limiting disturbance.** *Hylaeus* species do not appear to be bothered by human presence. Minimize the removal of litter below trees in preferred habitat. Minimize driving near *Hylaeus* nesting areas to avoid crushing nests. BMPs and conservation measures are employed when a project may have an effect on bees.
- **Predator control.** Yellow crazy ant control may be performed if needed. Currently bees and yellow crazy ants do not occupy the same habitat at MCBH Kaneohe Bay.
- **Monitoring for presence to help direct management activities**. Natural Resources staff survey appropriate habitats, record occurrences and consult with USFWS as needed.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6, 7.1, Appendix C & D.

PHOTOS

1. Female *Hylaeus anthracinus*. Magnacca, K. N. (2013). https://www.flickr.com/photos/53189052@N08/20457882510
2. Male *Hylaeus longiceps*. Magnacca K. N. (2015). https://www.flickr.com/photos/53189052@N08/8642418296

Hawaiian Hoary Bat

COMMON NAME: Hawaiian hoary bat
HAWAIIAN NAME: ʻŌpeʻapeʻa
SCIENTIFIC NAME: *Lasiurus cinereus semotus*
LEGAL STATUS: Endangered (Federal)

APPEARANCE: ʻŌpeʻapeʻa have long, dense body fur that is brown to grey and tipped with white. The white tips give the ʻōpeʻapeʻa a hoary or frosted appearance from which it gets it common name, Hawaiian hoary bat. There is a patch of yellow fur on the throat and white patches on the wrists and shoulders. The ears of this species are short, round, and yellow, edged in black. Wings are long and narrow with a span of 10.5-13.5 inches. They measure 5.3 inches in total length with a 2.3 inch tail and weigh 0.4-0.7 oz. Females are typically larger than males.

NATIVE RANGE: Relatively little is known about the distribution and population status of ʻōpeʻapeʻa. Hawaiʻi's only native terrestrial mammal. They are endemic to the Hawaiian Islands and occur from sea level to the highest volcanic peaks. Historically they occurred on all of the main Hawaiian Islands except Niʻihau. In recent years there have been reported sightings from the islands of Hawaiʻi, Maui, Molokaʻi, Lanaʻi, Oʻahu, Kauaʻi and Kahoʻolawe, though substantial populations of ʻōpeʻapeʻa may only live on Hawaiʻi, Maui, and Kauaʻi.

HABITAT: ʻŌpeʻapeʻa are a nocturnal species that roosts solitarily during the day (except mothers and pups) in trees (native and non-native) or sometimes in rock crevices. Individuals begin to forage just after sunset and return to roost just before sunrise. ʻŌpeʻapeʻa may fly more than 12 miles one way while foraging over the course of a night. They usually return to their original roost but also have alternative roosts that may be located miles away from the original. ʻŌpeʻapeʻa switch roosts if original roost trees become unstable, or potentially in an effort to seek a warmer or cooler roost. They forage along the edges of forest and within shrublands and open spaces including pastures, windrows, roadways, forest gaps and over areas of fresh/brackish water as well as open saltwater.

DIET: ʻŌpeʻapeʻa are insectivorous bats that use echolocation to locate night flying insects and capture them in flight. They eat native and non-native insects including moths, beetles, crickets, mosquitoes, and termites. Each ʻōpeʻapeʻa establishes several small (approximately 300 yds diameter) feeding areas within their larger home range and it is believed that individuals move between these areas in a predictable sequence each night. Research suggests that individuals may utilize these same circuits for foraging for several years at a time.

REPRODUCTION: ʻŌpeʻapeʻa mate in autumn, most likely between September and December, at lower elevations. It is thought that after mating the female is able to store sperm until March/April. Females give birth to twins, but sometimes up to four pups, between May and July. Pups cling to the female or to a branch until they are able to fly, about 33 days after birth. They are weaned about six weeks after birth. Although the lifespan of ʻōpeʻapeʻa is currently unknown, their North American cousin, *Lasirus cinereus*, is believed to live six to seven years.

ECOLOGICAL THREATS: Habitat alteration, direct and indirect impacts of the use of pesticides, and roost disturbance are likely the primary threats to ʻōpeʻapeʻa. A reduction in tree cover is believed to be a large contributor to species decline, due to loss of roosting sites. Roosts are especially important for the growth, development, and survival of young bats and protection from the elements. Most bats use night roosts in close proximity to foraging areas. Roost disturbance can cause mothers to abandon pups. ʻŌpeʻapeʻa have been known to be injured or killed from collisions with man-made objects such as barbed wire fences, wind turbines, and other structures.

Hawaiian Hoary Bat

The effects of pesticides and herbicides on ʻōpeʻapeʻa in Hawaiʻi, or on bats in general, is not well understood. However, the effects of pesticides on birds may provide some insight. Studies have found that birds can suffer mortality from direct contact with pesticides and from feeding on invertebrates that are unable to escape predation because of pesticide intoxication.

USFWS CONSERVATION STRATEGIES: ʻŌpeʻapeʻa were federally listed as endangered on October 13, 1970. USFWS released a Recovery Plan on May 11, 1998. Critical habitat has not been designated. Lack of information on this species limits management recommendations for protection or recovery. However, an important conservation measure is limiting disturbance during times of breeding and roosting. This includes not clearing woody plants greater than 15 ft tall in ʻōpeʻapeʻa habitat during breeding season (June 1 - September 15).

MCBH CONSERVATION MEASURES: While it is unknown if ʻōpeʻapeʻa utilize MCBH properties for foraging, roosting or breeding, in 2014 the HIARNG RTI, located on leased property adjacent to MCTAB, conducted Hawaiian hoary bat surveys and captured numerous bat calls. The proximity indicates that the Hawaiian hoary bat may be present, whether foraging or breeding, on at least one MCBH property. During the 2017-2021 INRMP implementation period, MCBH plans to conduct surveys to try to determine if the species is present at MCBH properties. Conservation measures that benefit ʻōpeʻapeʻa include:

- **Habitat protection and enhancement.** ʻŌpeʻapeʻa that occur at MCBH benefit from maintaining healthy non-invasive vegetation and opportunistic and planned removal of non-native invasive vegetation.
- **Limiting disturbance.** Removal of trees greater than 15 ft tall that may be used for roosting and nesting will be monitored. MCBH will attempt to reconcile any issues associated with the Navy Landscape and Grounds maintenance contract for tree maintenance and potential impacts to roosting or nesting trees.
- **Predator control.** ʻŌpeʻapeʻa benefit from on-going mammalian predator control efforts.
- **Wildlife Friendly Lighting.** Although lighting on Base does not appear to be an issue, Natural Resources staff diligently work with Base and contract planners to incorporate International Dark-Sky lighting recommendations into all projects.
- **Monitoring for presence to help direct management activities**. Natural Resources staff will conduct surveys for and record occurrences. Consultation with USFWS will occur as needed.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Section 6 and 7.1.

PHOTOS

1. https://www.hawaii-forest.com/hawaiian_bat/

Capparis sandwichiana

COMMON NAME: Native caper
HAWAIIAN NAME: *maiapilo* or *pua pilo*
SCIENTIFIC NAME: *Capparis sandwichiana*
LEGAL STATUS: None
CONSERVATION ASSESSMENT: Vulnerable (IUCN Red List)

APPEARANCE: Maiapilo is a perennial woody sprawling shrub that grows along the ground as well as upright. It can reach up to 16.5 feet tall and spread 6 or more feet wide. Leaves are light green in color and hairy when young but hairless when older. Leaves can measure up to 2.5 inches long and are ovate, elliptic, or broadly elliptic. Flowers, which open only after sunset, are solitary, white and have a lemon fragrance. At daylight they turn pink and wilt. Flowers are approximately 4 inches tall by 4 inches wide. Flowers contain long, delicate, white stamens. The approximately 2 inch long fruit resembles a small cucumber and is filled with orange pulp and several small brownish-black seeds. Several different species of birds eat the fruit.

NATIVE RANGE: Endemic. While maiapilo occurs on all of the main Hawaiian Islands as well as some atolls, the plant is rare over most of its range and is only common along parts of the Kona coast on the Island of Hawai'i.

HABITAT: Maiapilo occurs in dry areas such as on lava rock and exposed cliffs, emerged coral reefs, and rocky ravines. It is generally found on the coast or slightly inland.

REPRODUCTION & DISPERSAL: Flowers typically bloom in spring and summer and are pollinated by native moths that feed on the nectar at night. Seeds are dispersed by birds that feed on the pulp and seeds of the fruit.

ECOLOGICAL THREATS: Maiapilo is threatened by habitat modifications including development of coastal areas, habitat disturbance by off-road vehicles, fire, competition from non-native plants, fruit and seed predation by rats, and grazing and trampling by feral and introduced animals.

HAWAI'I DLNR CONSERVATION STRATEGIES: Monitoring. Seed collection for potential future propagation.

Capparis sandwichiana

MCBH CONSERVATION MEASURES: For over a decade Natural Resources staff periodically monitored the maiapilo plants growing on the 'a'ā lava flows near the Pali Kilo beach cottages at MCBH Kaneohe Bay. Continued monitoring and seed collection is encouraged by Hawai'i DLNR DOFAW botanists, who informed MCBH that maiapilo is becoming increasingly rare to find on Hawaiian shorelines and is a State *Species of Greatest Conservation Need*. They also noted that MCBH may have the largest population of maiapilo found on O'ahu.

Conservation measures that benefit maiapilo include:

- **Habitat protection and enhancement.** Maintaining healthy non-invasive vegetation and opportunistic and planned removal of non-native invasive vegetation.
- **Limiting disturbance.** Control foot traffic in the area where the plants are found to the greatest extent possible.
- **Monitoring to help direct management activities.** Natural Resources staff monitor existing plants for threats to survival and occurrence of new individuals. MCBH will continue to work with DLNR to attempt to collect seeds for the State's seed bank.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers. MCBH provides DLNR access for seed collection for inclusion in the State seed bank.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Sections 6 and 7.5

PHOTOS

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2. Bryan Harry. Plants of Kaloko-Honokohau National Historic Park. http://www.botany.hawaii.edu/basch/uhnpscesu/htms/kahoplnt/fish_pops/capparac/plant01.htm

Nama sandwicensis

COMMON NAME: Nama, Hawaiian fiddleleaf
HAWAIIAN NAME: *Hinahina kahakai*
SCIENTIFIC NAME: *Nama sandwicensis*
LEGAL STATUS: None
CONSERVATION ASSESSMENT: Vulnerable (IUCN Red List)

APPEARANCE: Herbaceous plant with less than a 1 foot by 1 foot spread and variable height between 4 and 12 inches tall. Small succulent leaves with many hairs and no leaf stalks. Flowers are small purple-blue to white tubular flowers. Fruits and seeds brown round capsules.

NATIVE RANGE: Endemic. Historically nama occurred on all of the main Hawaiian Islands, but is becoming more uncommon.

HABITAT: Nama prefers dry habitat in full sun. Mainly found on coastal dunes and cliffs with rocky or sandy soils.

REPRODUCTION & DISPERSAL: Nama is a short lived annual that reproduces by self-seeding.

ECOLOGICAL THREATS: Nama is threatened by habitat modifications including development of coastal areas, habitat disturbance by off-road vehicles, fire, competition from non-native plants, and grazing and trampling by feral and introduced animals.

HAWAI'I DLNR CONSERVATION STRATEGIES: Conservation activities should include habitat protection as this species occurs in habitat desirable for development. Collection and dispersal of seeds could help increase population, but is not currently practiced.

MCBH CONSERVATION MEASURES: Natural Resources staff has been monitoring nama plants growing on the sand dunes overlooking Pyramid Rock Beach at MCBH Kaneohe Bay for several years. Monitoring and seed collection was urged by Hawai'i DLNR DOFAW botanists who informed MCBH that nama is becoming increasingly rare to find on Hawaiian shorelines and is a State *Species of Greatest Conservation Need*.

Conservation measures that benefit nama include:

- **Habitat protection and enhancement.** Maintaining healthy non-invasive vegetation and opportunistic and planned removal of non-native invasive vegetation.
- **Limiting disturbance.** Control foot traffic and training in the area where the plants are growing to the greatest extent possible.
- **Monitoring to help direct management activities.** Natural Resources staff monitor existing plants for threats to survival and occurrence of new individuals.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers. MCBH is also developing a stand-alone interpretive exhibit that will include information and protective measures for nama. MCBH provides DLNR access for seed collection for inclusion in the State seed bank.

Nama sandwicensis

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Sections 6 and 7.5

PHOTOS

1. Nama at Pyramid Rock. MCBH.

Sesbania tomentosa

COMMON NAME: 'Ohai
HAWAIIAN NAME: *'Ohai*
SCIENTIFIC NAME: *Sesbania tomentosa*
LEGAL STATUS: Endangered (Federal and State)

APPEARANCE: 'Ohai is a sprawling shrub or small tree that grows up to 19 feet tall. It can be erect or prostrate. Each compound leaf is comprised of a series of 0.5 to 1.5 inch long, oblong leaflets. Leaves are silvery to dark green in color, hairy, and range in size depending upon habitat. Showy pea-like flowers are approximately one inch long and are salmon tinged with yellow, orange red, scarlet or yellow in color. Square bean shaped seeds occur in long (3 to 9 inch) green pods that turn brown when ripe.

NATIVE RANGE: Endemic. Historically occurred widely on all of the main Hawaiian Islands.

HABITAT: 'Ohai occurs on dry shrubland, sandy beaches, dunes, soil pockets on lava, rocky ridges, and occasionally on pond margins at elevations from sea level to an elevation of 1770 feet. Generally found on the coast and infrequently inland, 'ohai is tolerant of windy locations.

REPRODUCTION & DISPERSAL: 'Ohai reproduces by seed dispersed by wind.

ECOLOGICAL THREATS: 'Ohai is threatened by habitat modifications including development of coastal areas, habitat disturbance by off-road vehicles, fire, competition from non-native plants, and grazing and trampling by feral and introduced animals. Seed predation and grazing by deer and rats reduce survival and reproduction in some areas.

HAWAI'I DLNR CONSERVATION STRATEGIES: Critical habitat for 'ohai was approved in 2003. General conservation activities involve: protecting current populations as well as establishing new population to reduce the risk of extinction; creating barriers to protect plants from grazing and seed predation; and removal of non-native plants in order to reduce competition.

MCBH CONSERVATION MEASURES: In 2008, Natural Resources and USFWS staff discovered two self-established plants at MCBH Kaneohe Bay Nu'upia Ponds WMA. Observations in October 2009 that rodents were eating the leaves, stems, and flowers led staff to intensify rodent trapping in the area and protect plants with custom built exclosures. Although exclosures were removed in 2014, rodent trapping in the area continues. Plants are regularly monitored and assessed for rodent damage. There has been no new evidence of rodent damage to the 'ohai since removal of the exclosures.

Sesbania tomentosa

Conservation measures that benefit 'ohai include:

- **Habitat protection and enhancement.** Maintaining healthy non-invasive vegetation and opportunistic and planned removal of non-native invasive vegetation.
- **Limiting disturbance.** Monitoring any activities in the area to avoid disturbance of existing plants. 'Ohai benefits from trapping of rodents in the area.
- **Monitoring to help direct management activities.** Natural Resources staff monitor existing plants for threats to survival and occurrence of new individuals. Consultation with USFWS for all federally listed species occurs as needed.
- **Education and outreach.** Development and distribution of informational material including videos, fact sheets, and briefings for military personnel and civilians on Base including new arrivals, and outreach with volunteers. MCBH provides DLNR access for seed collection for inclusion in the State seed bank.

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For more information: MCBH Integrated Natural Resources Management Plan. 2016. Sections 7.5 and 8.

PHOTOS

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2. 'Ohai exclosure. MCBH.
3. 'Ohai. MCBH.

C3. SPECIES OF CONTROL CONCERN MANAGEMENT

This appendix includes general information on the approach to managing species of control concern (e.g., non-native invasive species) on MCBH properties. The key to addressing biosecurity concerns is focusing on minimizing the risk of introduction and spread of harmful non-native invasive species from other locales, through various pathways, to and within the MCBH properties or to other non-Marine Corps lands. As described throughout the INRMP, management actions, including control of species of concern, are implemented by Natural Resources staff, with assistance from other organizations (e.g., O'ahu Invasive Species Committee, USDA Wildlife Services). Control of invasive species is a priority both to prevent the increase and spread of invasive populations and because, in many instances, control and removal can provide benefits to wildlife and military training. For example, removal of invasive plants from wetland areas enhances waterbird habitat and can result in improved water retention capacity and flood control. Removal of flammable invasive grasses from military training areas reduces fire and erosion risks and helps prevent the degradation of training lands.

The information in this section is representative, but not exhaustive, and focuses on recent management efforts. Invasive species are also managed under the Integrated Pest Management Program (Section 8.1.9). While not all invasive species are actively managed, the Environmental Department is aware of and generally tracks their occurrence. A more comprehensive list of invasive and non-native species found on MCBH properties is included in Appendix C1. Detailed information on many of the invasive species and recommendations for control can be found in related plans including:

- *MCBH Landscape Manual* (MCBH Environmental Department 2014) (plants)
- *MCBH Integrated Pest Management Plan (IPMP)* (NAVFAC 2016) (plants and animals)
- *MCBH Invasive Species Management Study (ISMS)* (Garrison et al. 2002) (plants and animals)

In addition, the *National Invasive Species Management Plan*, developed by the National Invasive Species Council for years 2016-2018, identifies high priority, inter-departmental actions for the Federal government and its partners to take to prevent, eradicate, and control invasive species.[1]

BIOSECURITY

As the Marine Corps progresses with its plans to establish a base in Guam and develop training facilities and ranges on various islands within the Commonwealth of Northern Mariana Islands, the transfer of invasive species to Hawai'i, and MCBH Kaneohe Bay in particular, is a potential problem that could have significant consequences. Many foreign aircraft that can act as pathways for transporting invasive species visit MCAS from around the world (i.e., Australia, Japan) as well from the US mainland.

The vulnerability of Hawai'i to invasion has been attributed to a variety of factors. In general, biological communities on Hawai'i have evolved and diversified in relative isolation, with limited gene exchange, over many millennia. As a result, the Hawaiian Islands typically exhibit high species endemism, low numbers of top predators, and species and communities that are highly specialized. These characteristics, combined with other factors, make island flora and fauna especially vulnerable to impacts from the introduction of non-indigenous species (Vermeij 1991; Paulay 1994).

As of January 2017, Hawai'i had over 500 threatened or endangered species listed under the Federal ESA and is ranked first in the number of Federally-protected species among the 50 states.[2] The single greatest

[1] https://www.doi.gov/invasivespecies/management-plan
[2] http://ecos.fws.gov/ecp0/reports/species-listed-by-state-report?state=HI&status=listed

threat to native wildlife in Hawai‘i is the large number and diversity of introduced species that has resulted in a myriad of impacts to native flora and fauna. There are numerous examples of harmful introductions, with the most notable being the impacts on the native bird fauna of the Hawaiian Islands by invasive species such as cats (*Felis catus*) and mosquitos (avian malaria); and on native Hawaiian flora by the coconut rhinoceros beetle (CRB) (*Oryctes rhinoceros*) that bores into and eventually kills palm trees, the erythrina gall wasp (*Quadrastichus erythrinae*) a destructive pest on native wiliwili trees, and a fungus (*Ceratocystis fimbriata*) that causes Rapid Ohi‘a Death. Public health concerns from mosquitos and their associated pathogens (dengue, Zika) has been extensive. Millions of dollars are expended each year to keep the brown tree snake (*Boiga irregularis*), which has heavily invaded Guam, from becoming established in Hawai‘i. Hawai‘i’s forested watersheds face major threats from feral ungulates (pigs) and invasive plants like miconia (*Miconia calvescens*) that degrade their health and negatively impact their ability to provide ecosystem services. Introduction of invasives like Fountain grass, Devilweed, kiawe, and fire ants can severely degrade training lands and pose harm to those training. Invasive species pose a constant and costly threat to Hawai‘i’s native ecosystems, ecosystem functions, biodiversity, and watersheds, as well as DoD training lands. There may be economic and public health impacts, as well as a decline in the quality of life of the Base community – active duty and civilian.

The U.S. Department of Defense, Department of the Navy completed a Regional Biosecurity Plan for Micronesia and Hawai‘i in April 2015 (University of Guam and the Secretariat of the Pacific Community 2014). The plan is an unprecedented effort to analyze risks and coordinate enhancements in biosecurity. It was initiated as part of the environmental impact analysis for a plan to relocate military personnel from Okinawa, Japan. The relocation of military personnel could bring large-scale shifts in transportation patterns and the movement of goods to Hawai‘i and MCBH. Risk assessments identifying pathways and risk assessments regarding the potential for invasive species to be accidentally moved along shifting travel routes were conducted for terrestrial, freshwater, and marine ecosystems.

To address the risk of introducing unwanted and potentially harmful organisms to MCBH properties, which includes land and marine environments, MCBH needs to evaluate and begin planning how to reduce the risk of invasive introductions from military activities associated with movement between Hawai‘i (MCBH) and Commonwealth of Northern Mariana Islands, Guam, and other locations in the Pacific. Efforts to prevent the transport or import of potentially harmful species must focus on vector management. Vigilant monitoring is central to minimizing the risk of introductions and limiting their impacts.

Planning Considerations

The three principal methods of transporting potentially harmful vectors to MCBH are waterborne transportation (i.e., military ships and recreational boats), ground transportation (i.e., vehicles), and air transportation (principally military aircraft). To address these transportation avenues of concern, rules, regulations, and/or procedures will need to be established within the constraints of available funding and facilities. Essential biosecurity components are: capabilities for inspection, enforcement of regulatory requirements, and operable equipment and materials. In conjunction with existing policies and procedures, MCBH may adopt procedures from the USDA’s Animal and Plant Health Inspection Service (APHIS) Multi-Agency Coordination and individual animal product and plant port of entry manuals (USDA-APHIS-PPQ 2013). MIL-STD-904B, which provides guidance on the detection, identification, and prevention of pest infestations, may also be used.[3]

[3] MIL-STD-904B, Military Standard: Detection, Identification, and Prevention of Pest Infestation of Subsistence (10 Mar 2000). This standard describes a set of practices that enable DoD personnel to effectively detect and prevent the infestation or contamination of subsistence items from exposure to insects, rodents, birds, or other animals, and to reduce the impact of infestation or contamination.

Reductions in pest arrivals and introductions would ultimately be the best way to protect end points from the impacts of invasive species. This would also require lower levels of resources to intercept pests on arrival and to establish and support management and eradication programs. The following are actions to consider that may be adopted in whole or in part, or some variation on them:

Shipping: Develop SOPs, standards, and procedures to minimize the introduction of invasive organisms associated with commercial and military shipping. Explore whether the same standards should be applied to private and other recreational vessels arriving at the MCBH marina from outside Hawai‘i.

- Identify percent of time vessels spend outside Hawai‘i and are stationary to determine risk of transporting an organism by sea.
- Develop protocols for hull biofouling management associated with troop transports, supply vessels, barges, floating dry-docks, small craft, or auxiliaries associated with Navy and Marine Corps activities.
- Require all military and commercial vessels associated with MCBH visiting or conducting operations in Kān‘eohe Bay to have regular in-water inspections for extent and type of biofouling coverage.
- Require hull inspections that are good for a certain timeframe.
- Conduct in-water surveys using SCUBA to access biofouling communities on hull surfaces and niche areas on one side (non-dock side) of each vessel.
- Obtain agreement that Navy vessels perform ballast water exchanges at the extreme end of their current range of 3-12 nautical miles from shore to decrease the likelihood of non-native coastal species transfers.

Ground Arrivals: Develop SOPs, standards, and procedures to minimize the introduction of invasive organisms associated with US military ground transportation involving movement between countries, within the Hawaiian islands, and between different training areas on O‘ahu. Ground transportation includes vehicles and mobile combat equipment, as well as the Marine himself, clothing, and gear.

- Develop invasive species training initiatives and outreach efforts to the public, contractors, and military personnel. For deploying units, conduct briefings focused on the threats and risks of the deployment area before and after movement regarding the prevention of non-native introductions of animals, plants, and insects to Hawai‘i.
- Cargo, equipment, clothing, and vehicles should be thoroughly inspected and cleaned before departure from deployment or training areas. Sanitize if any soil, insects, or other animal life, plant parts, or seeds are discovered. Inspection and cleaning should occur before departing locations outside Hawai‘i if at all possible. If anything is discovered, contain it until it can be determined if it is a threat.
- Incorporate USDA-APHIS recommendations where appropriate.
- Develop on-site decontamination/treatment areas on MCBH should cleaning not be possible at the departure location.
- Include portable power washers that will be mobilized with the unit deploying or performing local training.
- Have well-trained and well-equipped staff perform the inspections.
- Curtail smuggling of illegal, invasive pet and plant species.

Air Arrivals: Develop SOPs, standards, and procedures to minimize the introduction of invasive organisms associated with US military aircraft arriving with cargo or visiting foreign aircraft.

- Identify percent of time aircraft spend outside Hawai'i and are stationary to determine risk of transporting an organism by air.
- Review and evaluate MCAS's ability to obtain, fund, maintain, and man infrastructure associated with inspection activities, for example:
    - Staging areas
    - X-ray equipment, detector dogs, and other inspection resources
    - On-site decontamination/treatment areas
    - On-site quarantine facilities
    - Dedicated inspection facilities within MCAS environs
    - Regulated garbage disposal equipment/facilities
    - Information technology and necessary equipment

MAMMALS

Removal of non-native mammalian predators (e.g., rats, cats, and mongoose) reduces predation of protected species, spread of disease, and damage to habitat. Ongoing since FY02, MCBH has maintained an agreement, currently with USDA Wildlife Services, for predator control services. Natural Resources staff are responsible for managing the predator control program and providing instruction to personnel performing control work on which control efforts have priority. USDA Wildlife Services field personnel communicates regularly with Natural Resources staff to determine which sites are high priority for predation control and where new traps or bait stations are needed.

Mammalian predator control is conducted primarily in areas that provide habitat for protected species. Control consists mainly of using live traps (Tomahawk) and humane kill traps (DOC 250). The greatest effort is at Nu'upia Ponds WMA and other jurisdictional wetlands because these locations provide nesting habitat for endangered waterbirds and ground-nesting seabirds. Ulupa'u Head WMA is monitored approximately every two months through spotlight surveys for cats, and control is conducted as needed. The results of a study by Russell and VanderWerf (2010) indicate that mongoose appear to be having little, if any, current impact on the breeding success of the nesting red-footed booby population at Ulupa'u Crater (the species of conservation concern at this location). Feral pigs cause habitat damage (e.g., facilitate the spread of invasive plants) and pose a risk to human health and safety (e.g., mosquito infestations in pig wallows). Feral pigs are controlled at periodically at MCTAB and monthly at Camp Smith or as circumstances dictate. A set of articles related to the threats feral cats pose to Hawaiian wildlife is included on the Reference CD. Measures of effort, including trap placement and species captured, are recorded to facilitate determining the success rate. Control of vertebrate predators is addressed in COA 7.1 and 7.2.

BIRDS

The Bird Airstrike Hazard (BASH) program is required to minimize accidental collisions between aircraft and birds in and around the MCBH flightline. The BASH program has been executed by cooperative agreement and under contract with MCAS airfield manager on Kaneohe Bay and USDA Wildlife Services, with the Environmental Department providing technical expertise and quality control oversight. The Environmental Department also maintains the depredation permit obtained from USFWS that authorizes the harassing and/or 'taking' of nuisance birds that pose flightline hazards, however lethal control is used as the last resort (Appendix E1). BASH is addressed in COA 7.1.

Two nuisance birds, chickens (*Gallus gallus*) and pigeons (*Columba livia*), have become more problematic in recent years. Increases in the populations of both species at Camp Smith are of concern due to sanitary and disease issues and have prompted additional monitoring and control.

TERRESTRIAL AND WETLAND PLANTS

Regular control of invasive plants is conducted to prevent and reduce protected species habitat loss and the spread of plant species that can affect the health and safety of military personnel in training and living areas. Invasive plants are controlled using mechanical and chemical treatments through in-house staff, contractor resources, regularly recurring interagency cooperative teams, or volunteer activities (e.g., "Weed Warrior" events).

Several species of concern have been actively managed for many years, resulting in enhanced habitat as revealed by an increase in native wildlife (i.e., protected waterbirds and seabirds). For decades, the annual Mud Ops, led by Natural Resources staff, has been conducted by the 3d Marines Combat Assault Company utilizing their AAVs in the Nu'upia Ponds. The plowing action of these 26-ton tracked vehicles helps control invasive pickleweed (*Batis maritima*) and shape the muddy substrate in a manner that improves endangered Hawaiian stilt (*Himantopus mexicanus knudseni*) habitat. Mangrove (*Rhizophora mangle*) removal efforts, which have been occurring since the 1980s, are conducted several times a year through volunteer "Weed Warrior" service projects. The banks of the Percolation Ditch wetland are periodically cleared of guinea grass, Christmasberry, koa haole and California grass (Appendix G2). Control of invasive plants is addressed in COA 7.1, 7.2, 7.3, and 7.5.

Other plant species of concern are tracked and controlled due to associated fire, erosion, loss of wildlife habitat, and/or flood risks. For example, California grass is periodically controlled in wetlands at Kaneohe Bay and in Waimānalo Stream at MCTAB for flood control, training area maintenance, and wildlife habitat enhancement purposes. Highly flammable fountain grass has also been found and controlled on MCTAB.

A new plant species of control concern, devilweed (*Chromolaena odorata*), was detected on the hillside above the housing area at Camp Smith in 2015. Follow-on surveys by OISC discovered it had spread into numerous forested and grassed areas across Camp Smith. Devilweed, which is an aggressive colonizer, is one of the world's worst tropical weeds. In the tropics it grows extremely fast and forms dense thickets, smothering other vegetation and preventing establishment of other species both due to competition and allelopathic effects. Devilweed reproduces mainly by seed, which is easily dispersed by wind due to their small size and light weight. Seeds also cling to hair, clothing, shoes or equipment; are transported on and blown around by mowers and line trimmers; and are spread by feral pigs moving about after foraging in the infested areas. Devilweed can also reproduce vegetatively as pieces of the crown of the plant can readily take root and grow. Control of devilweed is difficult due to its prolific seed production and ability to reproduce easily. When dry, it is a flash fuel that promotes wildland fire. MCBH, OISC, and the Army Garrison Schofield Barracks have an ongoing collaboration to eradicate devilweed at and around Camp Smith.

REPTILES

The brown tree snake poses an enormous threat to Hawai'i, based on the impact it has had on Guam. It is responsible for the extirpation of most of Guam's native terrestrial vertebrates, including fruit bats, lizards, and virtually all of the island's forest birds. Although there have been no confirmed sightings of brown tree snakes on MCBH properties, with the increasing air traffic to MCBH Kaneohe Bay from Guam, its introduction is possible, and raises significant biosecurity concerns. General inspections are performed by the U.S. and State Departments of Agriculture, as well as other agencies, on all aircraft arriving from areas other than the Hawaiian Islands or U.S. Mainland to MCBH. Flights arriving from Guam require a brown tree snake inspection for both the aircraft and all cargo. Procedures are in place for rapid response from the State in the event of a sighting of a brown tree snake.[4] However, procedures need to be developed and

[4] Through Federal and State funding, multi-agency "Rapid Response" teams have been training periodically in Guam to be able to respond to possible sightings of brown tree snakes in Hawai'i.

implemented regarding how to handle cargo and personnel that will arrive in the future from Guam, Commonwealth of Northern Mariana Islands, and other Pacific island locations where the brown tree snake occurs. Snakes are an invasive species, and no military personnel are authorized to bring snakes into Hawai‘i. If anyone has any information about a snake sighting aboard Base, they should call the 24-hour MCBH Military Police Department Desk Sergeant or the State of Hawai‘i’s toll-free pest hotline [808-643-PEST (7378)] immediately.

INSECTS

Yellow crazy ants (*Anoplolepis gracilipes*), introduced to Hawai‘i in the 1950s as a stowaway on cargo ships, have infested the wedge-tailed shearwater colony at Nu‘upia Ponds. They have a detrimental effect on breeding success of seabirds by causing adult birds to abandon eggs and chicks, as well as causing distress to and deformities of the chicks. The colony at MCBH is treated prior to nesting season with a killing bait to reduce the population of yellow crazy ants. Presence and control of yellow crazy ants is addressed in Section 6 and COA 7.1 and 7.5.

Coconut rhinoceros beetle, an invertebrate pest that lives in decaying material, has detrimental effects on coconut palm trees, other palms, as well as the native hala. It was first identified on O‘ahu in 2013 at JBPHH and the nearby Mamala Bay Golf Course. In March 2014, CRB adults and larvae were discovered at Pu‘uloa RTF. Grubs feed on decaying wood and organic material for about 4-6 months before pupating. Grubs and adults can be spread through green waste disposal. Adults can spread though flight, hitchhiking, and high wind events. At the time of this update, Pu‘uloa RTF and Iroquois housing area remain hotspots of CRB detection. Trials conducted utilizing a variety of control methods have mostly failed to control CRB. Applying pesticide in the crown of the tree was successful, however it required monthly application to the 27 coconut palms that is not worth the ecological risk to beneficial pollinators or the cost of labor/pesticide to do indefinitely. State agencies and organizations (HDOA, OISC) and the military are working to eradicate this destructive pest beetle. Presence and control of CRB is addressed in Section 6 and COA 7.1 and 7.5.

Mosquito-borne diseases are a potential threat to human and native wildlife. The mosquito-borne diseases like dengue, chikungunya, and Zika may cause serious illness in humans bitten by infected mosquitoes. They are transmitted by the day-biting *Aedes* (*Stegomyia*) mosquitoes, which are found in Hawai‘i. Avian malaria, which has been devastating to Hawai‘i’s native bird population is transmitted by the mosquito *Culex quinquefasciatus*.

MARINE SPECIES

Identification and monitoring of invasive marine species is an important part of eradicating accidental invaders before they can spread. Invasive marine species may consume or outcompete native species for food, space, and light, resulting in loss of biodiversity and altering the structure of coral reef communities. *Avrainvillea amadelpha*, an invasive algae that has recently been discovered offshore of MCTAB, forms thick communities that cover the substrate, and invade the reef community outcompeting other algae and the endemic seagrass *Halophila hawaiiana*. Gorilla ogo (*Gracillaria salicornia*) has spread throughout Nu‘upia Ponds and heavily infests the five seaplane ramps that are periodically used for recreational events. Three of the five seaplane ramps have healthy corals growing on or near them that will be injured by disturbing the invasive algae. Identification and control of invasive marine species at MCBH requires interagency cooperation. Further information on the invasive marine species present at MCBH may be found in COA 7.4 and the USFWS and USGS Benthic Community Surveys (2013, 2017 in prep).

SPECIES THAT POSE THE GREATEST THREATS TO MCBH WILDLIFE

Small Asian Mongoose (*Herpestes javanicus*)

Wild Pig (*Sus scrofa*)

Cat (*Felis catus*)

1

Brown Tree Snake (*Boiga irregularis*)

Rat (*Rattus* sp.)

Yellow crazy ants (*Anoplolepis gracilipes*)

Wedge-tailed shearwater (*Ardenna pacifica*)

Deformity caused by yellow crazy ants.

C4. ESA AND MBTA BIRD SPECIES PROTECTION MEASURES

This appendix highlights laws and regulations, management actions, and data analysis at MCBH to support birds protected under the ESA and MBTA.

LAWS AND REGULATIONS

A set of laws and regulations calls for DoD to promote the conservation of ESA and MBTA-listed bird populations while sustaining the use of military managed lands and airspace for testing, training, and operations (Appendix A).

- Endangered Species Act (ESA): provides a framework to conserve and protect endangered and threatened species and their habitats. By providing States with financial assistance and incentives to develop and maintain conservation programs the ESA also serves as a method to meet many of the United States' international responsibilities to treaties and conventions such as the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES) and the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere.
- Migratory Bird Treaty Act (MBTA): makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations.
- *Memorandum of Understanding to Promote the Conservation of Migratory Birds* between the DoD and USFWS: details specific actions that should be taken by the DoD including advance conservation, minimize take, and comply with the MBTA.
- DoD Migratory Bird Rule (50 CFR Part 21): provides authorization of take incidental to military readiness activities with clearly defined limitations and process requirements.
- Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds): directs agencies to take actions to further implement the MBTA by outlining responsibilities of Federal agencies to protect migratory birds.

Not all MBTA-protected birds are protected under the ESA and not all birds protected under the ESA are protected under the MBTA.

MANAGEMENT ACTIONS

Conservation measures (Appendix D4) and management actions that support protection of ESA and MBTA-listed birds are detailed in this INRMP. This appendix highlights routine management actions aimed at conservation of ESA and MBTA-listed birds that are detailed in the COAs (Table C4-1).

Table C4-1. Routine Management Actions Supporting Conservation of ESA and MBTA-Listed Birds

Routine Management Action	COA
Support interagency cooperative management to benefit MCBH natural resources.	7.0
Bird surveys	7.1
Wedge-tailed shearwater monitoring	7.1
Avian botulism monitoring	7.1
Activity analysis	7.1

Routine Management Action	COA
Feral and nuisance animal control	7.1
Invertebrate pest control	7.1
BASH/Depredation Permit	7.1
Injured bird treatment	7.1
Plant trees at KBRTF	7.5
Operation of wireless controlled water cannons that protect the red-footed booby colony	7.5
Invasive vegetation control activities	7.5
Informational sessions	7.6
Educational materials	7.6
Support for scientific research	7.6
Support for educational tours and service projects	7.6
Natural resources data maintenance	7.7
Spatial GIS data maintenance	7.7
Ensure MCBH staff and contractors adhere to procedures that must be followed when a project (e.g., construction, dredging) may have an effect on any native birds	App D4

The 2001 MCBH INRMP/EA and each successive update detailed specific projects aimed at conservation of migratory birds. While some of these are considered routine management actions, as they have been performed regularly for years, others are specific one-time projects intended to be initiated during that INRMP implementation period. This INRMP details the following non-recurring management actions that may be initiated during this INRMP implementation period to benefit conservation efforts for ESA and MBTA-listed birds (Table C4-2).

Table C4-2. STEP Projects to be Implemented in Support of Conservation of ESA and MBTA-Listed Birds

STEP Projects	COA
Inventory and study the State endangered Hawaiian owl	7.1
Endangered waterbirds study - Nu‘upia Ponds and MCTAB	7.1
Flyway-flight pattern analysis of migratory and endangered birds at MCBH, Kaneohe Bay	7.1
Replace existing fence - Pa‘akai Pond	7.1
Endangered species observation towers	7.1
Construct water crossing points to improve access within Nu‘upia Ponds	7.1
Repair / replace Nu‘upia Ponds footbridge	7.1
Seabird relocation study	7.1
Repair / replace artificial nesting platforms for migratory birds in Ulupa‘u Crater	7.1
Wetland inventory and delineation - Nu‘upia Ponds and MCTAB	7.2
Wetland restoration plan - Kaneohe Bay and MCTAB	7.2
Nu‘upia Hema wetland restoration	7.2
Salvage Yard wetland restoration	7.2
Repair / replace aeration system and install waterline in Klipper Golf Course Ponds	7.2
Percolation Ditch: using salt water to control California grass	7.2
Invasive vegetation control: H3-Kāne‘ohe Bay	7.5
Invasive vegetation control: Nu‘upia Ponds and Base wetlands	7.5
Integrated Wildland Fire Management Plan	7.5
Maintenance and repair of water cannons supporting migratory bird conservation	7.5

STEP Projects	COA
KBRTF fire suppression system	7.5
Environmental Learning Center	7.6
Nu‘upia Ponds Recreational Running Trail Signage	7.6

MONITORING DATA

Data and trends are used to inform Natural Resources staff on the need for and efficacy of management actions. The information is used in a variety of ways including to: conduct analysis to track changes and prioritize natural resources management activities (e.g., population trends); inform proposed actions (e.g., military training exercises, recreational activities, infrastructure changes); and provide information for various reports (e.g., annual INRMP implementation evaluation, ESA reports to Congress); and inform other departments and agencies. Examples of data analysis are presented, illustrating the value of maintaining a coordinated bird monitoring plan and database that allows managers to track population changes.

Red-Footed Boobies

The number of red-footed boobies present in Ulupa‘u Crater is surveyed annually during the Hawai‘i Audubon Christmas Bird Count. Anecdotal observations indicate that the number of red-footed booby utilizing the colony has more or less been steady over the last 15 years, at around 1,000 to 2,000 birds. Natural Resources staff attribute data fluctuations to the time of day that the colony was surveyed. MCBH has recently changed its practice to conduct the survey at twilight when the majority of birds would be at the colony roosting. Management actions that support the continued sustainability of the red-footed booby colony include tree planting in the crater, nesting platform replacement, the relocation study, and the expansion of the water cannon system.

Table C4-3. Red-Footed Booby Census at MCBH (2001-2015)

Year	Number of Red-Footed Boobies
2001	1085
2002	1136
2003	515
2004	995
2005	829
2006	267
2007	432
2008	337
2009	333
2010	525
2011	875
2012	522
2013	866
2014	1473
2015	1750
Average	796

Wedge-tailed Shearwaters

Fallout of wedge-tailed shearwaters is monitored year round at MCBH (COA 7.1). MCBH maintains a bird handling database that includes known wedge-tailed shearwater fallout incidence since 1984. The database includes the date, status of the bird, the location where the bird was found, and the outcome of the action (where the bird was transferred or relocated to). Table C4-4 is an excerpt of the most recent data added to this database.

Table C4-4. Total Reported Fallout of Shearwaters at MCBH (2011-2016)

Year	Number of Shearwaters Reported[1]
2011	133
2012	108
2013	54
2014	22
2015	14
Total	331

Tracking locations of active burrows (using GPS) and reproductive success occurred in 2006 and has been ongoing since 2010.[2] Tracking both the locations of active burrows and the number of chicks provides an understanding of utilization patterns and population stability. Figure 5a, Appendix B represents a cluster of GPS points collected for burrows counted in 2006 and for 2010 through 2016.

The data indicates that chick density at most of the colony is stable. Tracking the locations of active burrows allowed MCBH to determine that one area (adjacent to the fenceline shared with Kaimalino community), had 128 chicks in 2014, but only three in 2015. It is hypothesized that this is due in part to feral cat predation.

Table C4-5. Active Burrows and Reproductive Success of Shearwaters at MCBH

Year	Number of Active Burrows	Number of Chicks
2006	426	186
2010	520	94
2011	667	235
2012	881	359
2013	805	443
2014	812	355
2015	733	333
2016	708	343

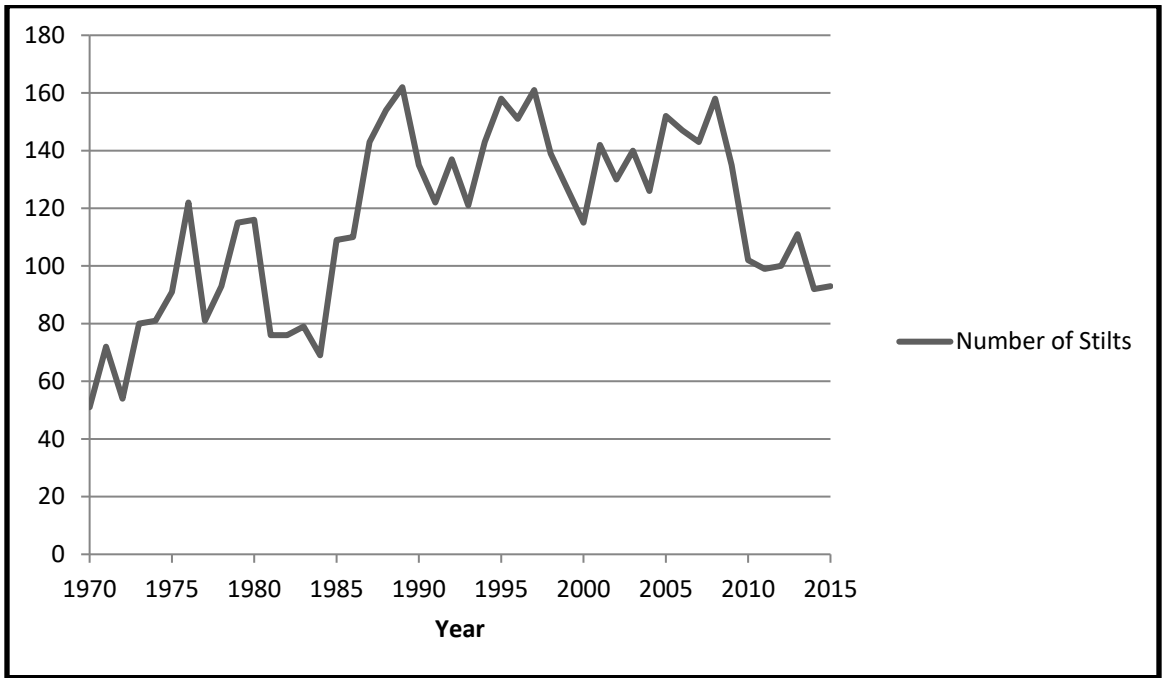
[1] Fallout seems to vary widely based on the weather and moon phase, and probably the fledging success (the more juvenile birds that fledge, the more that will fallout). Also, not all fallouts are reported. MCBH makes a concerted effort to get the word out about reporting fallout, and the Environmental Department provides datasheets to anyone who responds.

[2] USFWS and OISC field staff assist Natural Resources staff with the annual burrow count.

Hawaiian Stilts

Management actions to enhance habitat for endangered Hawaiian stilts have been conducted at MCBH since 1970 (e.g., wetland enhancements including the annual "Mud Ops" maneuvers at Nu'upia Ponds and mangrove removal). Monitoring the presence of Hawaiian stilts and, when possible, nesting activity, helps gauge the success of these efforts (Figures 5b & 5c, Appendix B; Exhibit C4-1). Fluctuations in counts may be due to weather, time of day, movement of birds to off-Base wetlands, or inability to access areas. However, the data does reveal an overall uptrend in the stilt population at MCBH, indicating that management actions are likely beneficial to the conservation of this species.

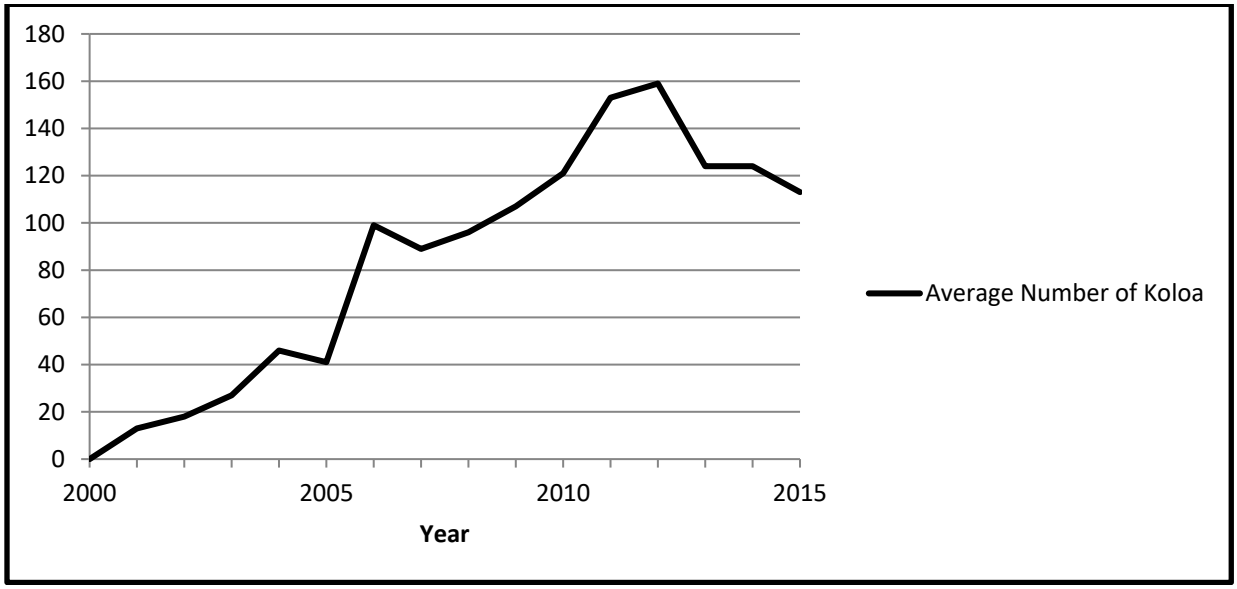
Exhibit C4-1: Hawaiian Stilt Counts at MCBH (1970-2015)

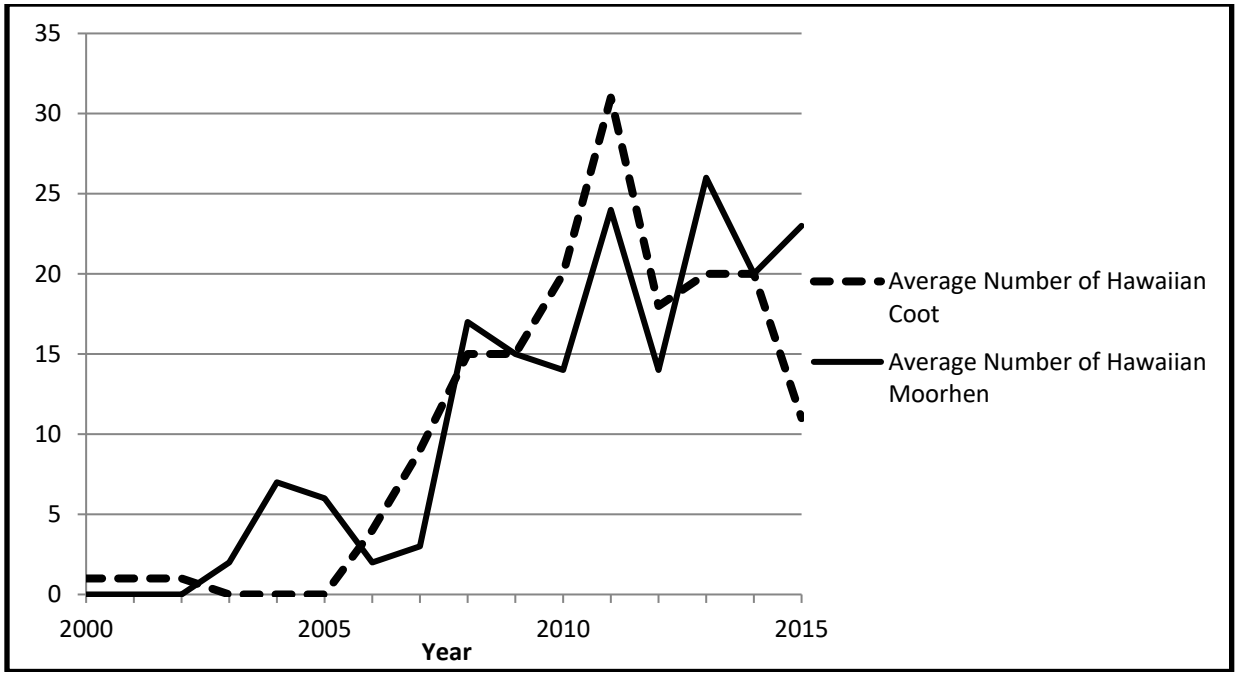


Waterbirds with Protected Status

The annual Audubon Christmas bird count data and the semi-annual Hawai'i DLNR waterbird count data provides valuable information for population trend analysis. Data can be analyzed in a variety of ways including by species and time of year. Of particular interest are any trends in the presence or absence of birds with protected status. As an example, Exhibit C4-2 represents the number of three waterbirds with protected status observed during these counts over a 15 year period.[3] Increased efforts to enhance waterbird habitat beginning in 2005, appear to have promoted increased use by these species.

Exhibit C4-2: Population Trend of Waterbirds with Protected Status at MCBH (2000-2015)





[3] Counts of Hawaiian duck include mallards (*Anas platyrhynchos*), hybrid koloas, and genetically pure koloas (*Anas wyvilliana*).

APPENDIX D
PROCEDURES

This appendix includes information on procedures used for MCBH INRMP implementation.

COA 7.1: Wildlife Management

D1. Briefing Information on MCBH Natural Resources

D2. Shearwater Fallout Procedures

D3. Bird Counts

D4. Protection Measures for ESA and MBTA Birds

COA 7.4: Coastal and Marine Resources Management

D5. Procedures to be Followed in Event of Hawaiian Monk Seal or Sea Turtle Encounter

D6. Designated Critical Habitat at MCBH

COA 7.5: Landscape Maintenance and Vegetation Management

D7. Best Management Practices for Landscape Maintenance

COA 7.6: Natural Resources-Based Outdoor Recreation, Outreach, and Public Access Management

D8. Access for Research Activities

D9. Access for Educational Tours and Service Projects

COA 7.7: Resource Information Management

D10. MCBH Specifications for Digital Data

D1. BRIEFING INFORMATION ON MCBH NATURAL RESOURCES

Federally and State Protected Species found within MCBH properties and coastal waters.

There are **9** regularly present, Federally-listed Threatened and Endangered (T&E) flora and fauna species found on MCBH properties or in the surrounding coastal waters.

LAND-BASED

T&E resident species:

4 endangered waterbird species - **Hawaiian stilt** (*Himantopus mexicanus knudseni*), **Hawaiian moorhen** (or gallinule) (*Gallinoula chloropus sandvicensis*), **Hawaiian coot** (*Fulica alai*), and **Hawaiian duck** (koloa-like & hybrid) (*Anas wyvilliana*) residing in Nu‘upia Ponds Wildlife Management Area (WMA), as well as the Base wetlands: Klipper Golf Course, Sag Harbor, Salvage Yard, Percolation Ditch, Motor Pool, and TLF. Some species can be seen foraging/loafing at the Water Reclamation Facility, and in Waimānalo Stream on MCTAB.

1 endangered insect: **Hawaiian Yellow-faced bee** (*Hylaeus anthracinus*). They are found on coastal native vegetation and the non-native tree heliotrope on the Mōkapu Peninsula shorelines.

1 endangered plant: **‘Ohai** (*Sesbania tomentosa*), discovered in 2008. Two plants have established themselves along the eastern shoreline (Ulupaʻu dunes) of the Nu‘upia Ponds WMA.

1 State-listed (Oʻahu only) endangered raptor (not Federally-listed) - the **Hawaiian short-eared owl or pueo** (*Asio flammeus sandwichensis*).

Possible, but not documented: Future surveys are planned for MCBH properties for the Federally-endangered **Hawaiian hoary bat** (*Lasirus cinereus semotus*).

Rare species:

2 rare coastal strand plants (State Species of Greatest Conservation Need) - both could be listed as threatened in the future.

- ***Hinahina kahakai*** *(Nama sandwichensis),* found on the sand dunes of our northern beach at Pyramid Rock; and
- ***Maiapilo*** *(Capparis sandwichiana),* endemic to Hawai‘i, found on the lava field near the beach cottages.

OCEAN ENVIRONMENT

T&E resident species:

1 endangered marine mammal, the **Hawaiian monk seal** (*Neomonachus schauinslandi*), frequently hauls out on all Mōkapu beaches, and sometimes at Pu‘uloa Range Training Facility (RTF) and MCTAB.

1 threatened reptile – **Hawaiian green sea turtle** (*Chelonia mydas*).

1 endangered reptile – **Hawaiian Hawksbill sea turtle** (*Eretmochelys imbricata*).

Federally-protected semi-resident species:

Humpback whales (*Megaptera novaeangliae*) seasonally winter in Hawai‘i (Dec-Apr). Their migration route passes close to our shorelines. NOAA delisted the Central North Pacific Distinct Population Segment (DPS) of the humpback whale in 2016. Humpback whales remain a State-listed endangered species and are also protected under the Marine Mammal Protection Act (MMPA).

Occasional T&E Visitors:

Olive ridley turtle (*Lepidochelys olivacea*). MCBH hosted a rare in-Hawai‘i hatching of a Federally-threatened olive ridley turtle, which nested on Pyramid Rock beach in 2009; only the third time documented nesting in Hawai‘i and the *first* successful hatching ever!

OTHER FEDERALLY-PROTECTED SPECIES

MCBH hosts 50+ species of birds (permanent residents and visitors) protected under the federal Migratory Bird Treaty Act (MBTA). Among those 50 species, MCBH preserves and protects the following resident nesting seabird colonies:

- Over 2,000 tree dwelling **red-footed boobies** (*Sula sula rubripes*) located in the heart of the Kaneohe Bay RTF in Ulupa‘u Crater in the 25 acre Ulupa‘u Head WMA; and
- Over 700 **wedge-tailed shearwaters** (*Ardenna pacifica*) that nest in sand dune burrows along the eastern shoreline of the Nu‘upia Ponds WMA.

PROTECTED AQUATIC RESOURCES

The Nu‘upia Ponds contain 16 species of native fish.

MCBH protects some of Hawai‘i’s most pristine coral reefs and marine life within the 500-yard buffer zone around the Mōkapu Peninsula. Per USFWS, some of MCBH’s coral reefs rival areas of the Northwest Hawaiian Islands.

MCBH has approximately 14 miles of shoreline.

D2. SHEARWATER FALLOUT PROCEDURES

The attached flyer is disseminated annually in October, prior to young shearwaters fledging. Natural Resources staff provides airfield operations and squadrons with a copy of the flyer for distribution. The flyer provides information on how to report or handle (if necessary) downed and disoriented birds.

FEDERALLY PROTECTED WEDGE-TAILED SHEARWATER SEABIRDS NEED YOUR HELP!

Nov/Dec is "annual shearwater fallout" season on base and around the islands. Juvenile Wedge-tailed Shearwaters (seabirds) are learning to fly, often get disoriented by city lights, fly inland instead of toward the sea, fall to ground and get injured or become vulnerable to predators, road kill, etc.

WHAT TO DO IF SHEARWATER IS FOUND

Contact Military Police at **257-2123**.

-working hours: seabird will be picked up

-after hours: response may be delayed until next day , seabird may need to be secured (see below)

How and When to Handle Shearwaters

If the seabird is in a safe location, and will be picked up soon, then leave it there. However, if after hours and/or seabird is in harm's way (e.g. road kill, predation), seabird should be secured in a **cardboard box**. When handling (see picture), cusp the bird "firmly without squeezing". Keep wings close to body. Birds have strong muscles, but fragile bones. **Gloves are desirable**; although their bite is not hard, their fish-catching beak is very sharp. A towel or t-shirt may be used to cover seabird prior to handling. Keep the box in a **quiet location** until picked up.

Wedge-tailed Shearwaters nest in burrows near the ocean.

Juvenile shearwaters may still have down on their head. Handle them "firmly without squeezing".

D3. BIRD COUNTS

Biannual Waterbird Surveys: Hawai‘i DLNR coordinates with Natural Resources staff to conduct biannual surveys at MCBH Kaneohe Bay (see example DLNR Bi-Annual Waterbird Survey notification sent out each year on following page). Surveys occur the second week of January and the second or third week of August. Waterbird survey protocol and data sheet are provided by Hawai‘i DLNR DOFAW. Waterbirds and shorebirds are counted at the Kaneohe Bay wetlands, which includes the Nu‘upia Ponds complex, and the Base Water Reclamation Facility. A complete copy of the survey protocol, data sheet, and identification guide is included on the Reference CD.

Audubon Christmas Bird Count. The Hawaiian Audubon Society hosts an annual Christmas bird count at MCBH Kaneohe Bay, which has been conducted aboard the Mōkapu Peninsula property since 1947. Surveys occur on or around December 15. All bird species – seabirds, shorebirds, waterbirds, and forest birds are counted throughout the Base, including the red-footed booby colony. The data is compiled by the Audubon representative and then provided to MCBH for entry in the database.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FORESTRY AND WILDLIFE
OAHU BRANCH
2135 Makiki Heights Drive
Honolulu, Hawaii 96822

January 8th, 2016

Memorandum

To: Jared Underwood—USFWS
Phil Bruner—Brigham Young University
Olive Vanselow—Hoomaluhia Park
Todd Russell—MCBH Hawaii
Laurent Poole—Waimea Falls Arboretum
Megan Laut—USFWS
Darren Phelps—USDA-Wildlife Services
Joy Hiromasa-Browning—USFWS
Rebecca Smith—NAVFAC HI
Peter Donaldson
Hugo DeVries

From: Jason Misaki, Oahu Wildlife Manager

Subject: Bi-Annual Waterbird Survey

Our bi-annual waterbird survey is scheduled for **Wednesday, January 20th, 2016**. Please try to complete the survey on this date but if necessary, use Thursday the 21st. Spend at least 10-15 minutes at each site even if no birds are immediately visible.

Record the following data:

1. Number of all waterfowl seen
2. Shorebirds that are using the wetland (not perched on adjacent lawns, roads, etc.)
3. Record time surveyed, wetland condition and weather on codes provided on field forms
4. Count all mallards
5. Note location and approximate size of any egret rookeries.

Do Not:

1. Separate male and female stilts (count all as adults)
2. Conduct coot shield separation

Please include notes on the following:

1. Habitat observations, trends or extreme changes
2. Anything that is inconsistent with previous waterbird surveys.
3. Please check stilts for bands, and band combos. Banded birds have three plastic color bands and one aluminum band, or a single aluminum band on the right leg.

Waterbird Survey Field Form

Wetland Condition Codes		Weather Codes	
Water Level (WL): 0 = dry 1 = lower than normal 2 = normal 3 = higher than normal	Human Impact (HI): 0 = indirect (little garbage, few people present) 1 = moderate 2 = heavy (many people present) (e.g. on boat, wading, fishing, etc.)	Rain Fall (RF): 0 = no rain 1 = mist or fog 2 = drizzle 3 = light rain 4 = heavy rain 5 = snow or hail	Wind: 0 = no wind, <1 mph 1 = smoke drifts, 1-3 mph 2 = wind felt on face, 4-7 mph 3 = leaves and twigs rustle, 8-10 mph 4 = dust raises, branches stir, 13-18 mph 5 = small trees sway, >19 mph
Vegetation Cover (VC): 0 = open water (<25%) 1 = 26-50% cover 2 = 51-75% cover 3 = >75% cover	Shoreline Condition of Tidal Wetlands (SC): 0 = water at high tide mark (leave blank if NA) 1 = 25 feet from high tide mark 2 = 50 feet from high tide mark 3 = >50 feet from high tide mark	Cloud Cover (CC): estimate to nearest 10%	

Date: _____ Observers: _____

Island: _____ _____

_____

Wetland Name																				
Condition	WL	VC	HI	SC	WL	VC	HI	SC	WL	VC	HI	SC	WL	VC	HI	SC	WL	VC	HI	SC
Weather	CC	RF	Wind		CC	RF	Wind		CC	RF	Wind		CC	RF	Wind		CC	RF	Wind	
Time	Start		Stop		Start		Stop		Start		Stop		Start		Stop		Start		Stop	
COOT - adult																				
- juvenile																				
MOORHEN - adult																				
- juvenile																				
STILT - adult																				
- juvenile																				
KOLOA - adult																				
- juvenile																				
Koloa/Mallard hybrid																				
Mallard (domestic)																				
Muscovy																				
Other Dom. Waterfowl																				
Black-cr. Night-Heron																				
Cattle Egret																				
Pacific Golden Plover																				
Ruddy Turnstone																				
Sanderling																				
Wandering Tattler																				

COMMENTS: Note all chicks, stilts or other birds with bands, and anything interesting or unusual.

Retain a copy of this form for your records version June 2005

1


Ulupa'u Head WMA
FINISH
Fossil Beach
Ulupa'u Crater
Pacific Ocean
Kaneohe Klipper Ponds
Koloa
'Ae'o
'Iwa
Pu'u Hawai'iloa
Pyramid Rock
Kekepa Island (Turtle Rock)
Hale Koa
Sag Harbor
Fort Hase Beach
Motor Pool
Percolation Ditch
MCDC
Salvage Yard
START
Heleloa
Temporary Lodging Facility
Halekou
Nu'upia 'Ekahi
Nu'upia 'Elua
Nu'upia 'Ekolu
Wai Pūnā
Pa'aka
Kaluapuhi
Nu'upia Ewa
Nu'upia Ponds WMA
Nu'upia Hema
NOTES: Access along route by government vehicle (van) except at Klipper Golf Course Ponds (dotted line = golf course access) and within Nu'upia Ponds complex (by teams on foot on dotted line or by van along pond maintenance access road on solid line).
There are minor variations in the route each year based on temporary or permanent road alterations or detours. If time is running short the route may be cut short through housing in order to make it to the Range gate in time for escorted access to the boobies.
Source: MCB Hawaii GIS Data Repository
Aerial photo from ESRI
N
Miles
0 0.125 0.25 0.5 0.75
Legend
Wildlife Management Area
ACOE Jurisdictional Wetlands (Ching 2010)
Transit Type
Van
Golf Cart
Walk
MCB Hawaii, Kaneohe Bay
Audubon Christmas Count Survey Route
November 2016

D4. PROTECTION MEASURES FOR ESA AND MBTA BIRDS

MCBH has established a set of BMPs and conservation measures to follow when a project (e.g., construction, dredging) may have an effect on birds - endangered or otherwise. The following will be implemented at the project site to avoid and minimize effects to ESA and MBTA-listed birds. They will be instituted as appropriate, before, during, and after the project work is performed. These protection measures will be referenced in any informal or formal consultation with USFWS.

BMPs

- All workers associated with a project (e.g., employee, contractor) shall be fully briefed on the conservation measures and the requirement to adhere to them for the duration of their involvement in the project.
- Appropriate materials to contain and clean potential spills shall be stored at the work site, and be readily available.
- All project-related materials and equipment placed in the water shall be free of pollutants.
- The project manager and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected, and shall not proceed until the leak is repaired and equipment cleaned.
- Fueling of land-based vehicles and equipment shall take place at least 50 feet away from the water, preferably over an impervious surface.
- Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.
- A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project. Silt curtains spanning the waterway will be placed upstream and downstream of the work site.
- Excavation, mowing, and other vegetation treatments will not be conducted in waterbird nesting habitat during the breeding season for endangered waterbirds.

Conservation Measures

- Given that waterbirds in Hawai'i have been known to nest year-round, in areas where endangered waterbirds have been observed, particularly the Hawaiian moorhen, nest searches will be conducted by Natural Resources staff prior to any work being conducted and after any subsequent delay of three or more days (during which birds may attempt nesting).
- If a nest with eggs is discovered, work should cease in the vicinity for a minimum of seventy days (10 weeks); if a nest with chicks is discovered, work should cease for a minimum of 49 days (7 weeks). These guidelines are intended to protect chicks, and may be shortened if monitoring is conducted often enough to note when chicks have fledged (usually five to six weeks after hatching).

If a previously undiscovered nest is found after work begins, all work should cease within a minimum radius of 100 feet of the nest and USFWS will be contacted within 48 hours.

D5. PROCEDURES TO BE FOLLOWED IN EVENT OF HAWAIIAN MONK SEAL OR SEA TURTLE ENCOUNTER

For the Public

Hawaiian monk seals (*Neomonachus schauinslandi*) are observed hauling out to rest at MCBH beaches, mainly at Mōkapu Peninsula. Sea turtles infrequently come ashore on MCBH beaches and shorelines. MCBH has a duty and responsibility to protect them in accordance with Federal and State laws. The ESA and its amendments impose severe penalties (fines and jail sentences) if a person intentionally harasses or harms an endangered monk seal or threatened or endangered sea turtles. Procedures to be followed in the event of a Hawaiian monk seal or sea turtle encounter have been developed based on protocols set forth by NOAA Fisheries for such incidences.

In the event a monk seal or sea turtle appears on any of the MCBH beaches or shorelines, do NOT approach them, but notify any of the following:

Monk Seal Sighting Hotline (NOAA Fisheries) 808-220-7802	Senior Natural Resources Manager 808-257-7000
Turtle Stranding Hotline (NOAA Turtle Rescue) 808-725-5730	Natural Resources Manager 808-216-7135
Military Police (Primary Point of Contact) 808-257-2123	Wildlife Technician 808-257-7129
Animal Control Officers 808-257-1821	Conservation Enforcement Officer 808-216-5178 / 808-479-7361

If a monk seal or sea turtle comes ashore, all persons and pets must remain at least 100 feet away from them.

Do not harass monk seals or sea turtles, e.g., yelling, throwing things at them, poking them or in any manner annoying or disturbing them.

Do not attempt to give monk seals or sea turtles food or water.

If a monk seal is active in a surfing area, all surfing activity must cease until the monk seal departs the area.

D6. DESIGNATED CRITICAL HABITAT AT MCBH

Section 7 of the ESA requires all Federal agencies to ensure that any actions they take, fund, or authorize are not likely to jeopardize the continued existence of a listed species or destroy or adversely modify its designated critical habitat.[1]

Designated Critical Habitat for the Hawaiian Monk Seal (Final)

The final rule to revise designated critical habitat for Hawaiian monk seals in the Northwestern Hawaiian Islands and MHI was issued by NOAA Fisheries, effective September 21, 2015.[2] In determining what areas should be included or excluded as part of designated critical habitat on O'ahu, NOAA Fisheries evaluated the conservation measures implemented under the 2011 MCBH INRMP to determine if they continue to provide a benefit to monk seals. NOAA Fisheries determined, as discussed in the final rule, "...the INRMPs for the MCBH, the PMRF, and the JBPHH each confer benefits to the Hawaiian monk seal and its habitat, and therefore the areas subject to these INRMPs are precluded from Hawaiian monk seal critical habitat" (80 Federal Register 50925). However, NOAA Fisheries determined that MCTAB offshore did not warrant exclusion due to potential impacts on national security because "The boundaries of this area remain ill-defined and other Federal activities occurring within this area may affect essential features." The area seaward of MCTAB from the seafloor to 10 meters above the seafloor from the mean lower low water mark to the 200 m depth contour line was designated critical habitat. MCTAB's terrestrial environment (shoreline) is precluded from critical habitat designation. MCBH continues the practices outlined in the 2011 INRMP and revises or adds procedures as necessary in light of any new information.

Proposed Critical Habitat for the Green Sea Turtle

The final rule to list eleven DPSs of the green sea turtle as threatened and endangered under the ESA was issued by NOAA Fisheries and USFWS, effective May 6, 2016.[3] The rule stated that "critical habitat is not determinable at this time, but will be proposed in a future rulemaking".

In July 2016, USFWS notified DoD that upon its final listing determination for listing the Central North Pacific green sea turtle DPS as threatened, NOAA and USFWS were required to designate critical habitat "to the maximum extent prudent and determinable". In the notification, USFWS identified the shorelines of Pu'uloa RTF and Fort Hase as candidates for critical habitat designation. Follow-on discussions with USFWS also identified MCTAB's shoreline as a candidate due to the successful hatching of sea turtles on Bellows AFS over the last two years. The letter identified numerous conservation measures that were included in this 2017 INRMP Update and that may preclude areas from being designated critical habitat based on those areas being managed by MCBH in a way that provides a benefit to the species (Appendix C2).

[1] The ESA requires the Federal government to designate 'critical habitat' for any species it lists under the ESA. 'Critical habitat' is defined as: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation (ESA Sec 3(5)(A); 50 CFR Section 424.02). Section 4(a)(3)(B)(i) of the ESA allows exemptions to critical habitat designation if a military installation's INRMP is providing adequate conservation measures and species benefit as determined by USFWS or NOAA.

[2] https://www.federalregister.gov/articles/2015/08/21/2015-20617/endangered-and-threatened-species-final-rulemaking-to-revise-critical-habitat-for-hawaiian-monk#h-34

[3] https://www.federalregister.gov/documents/2016/04/06/2016-07587/endangered-and-threatened-wildlife-and-plants-final-rule-to-list-eleven-distinct-population-segments

Proposed Critical Habitat for Yellow-Faced Bees

The final rule to list seven species of yellow-faced bees native to Hawai'i as endangered under the ESA was issued by USFWS, effective October 11, 2016.[4] The rule stated that "critical habitat is not determinable at this time".

[4] https://www.federalregister.gov/documents/2016/09/30/2016-23112/endangered-and-threatened-wildlife-and-plants-endangered-status-for-49-species-from-the-hawaiian

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Part II

Department of Commerce

National Oceanic and Atmospheric Administration

50 CFR Part 226

Endangered and Threatened Species: Final Rulemaking To Revise Critical Habitat for Hawaiian Monk Seals; Final Rule

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 226

[Docket No. 110207102–5657–03]

RIN 0648–BA81

Endangered and Threatened Species: Final Rulemaking To Revise Critical Habitat for Hawaiian Monk Seals

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: We, the National Marine Fisheries Service (NMFS), issue a final rule to revise the critical habitat for the Hawaiian monk seal (*Neomonachus schauinslandi*) pursuant to the Endangered Species Act. Specific areas for designation include sixteen occupied areas within the range of the species: ten areas in the Northwestern Hawaiian Islands (NWHI) and six in the main Hawaiian Islands (MHI). These areas contain one or a combination of habitat types: Preferred pupping and nursing areas, significant haul-out areas, and/or marine foraging areas, that will support conservation for the species. Specific areas in the NWHI include all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and including marine habitat through the water's edge, including the seafloor and all subsurface waters and marine habitat within 10 meters (m) of the seafloor, out to the 200-m depth contour line around the following 10 areas: Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island. Specific areas in the MHI include marine habitat from the 200-m depth contour line, including the seafloor and all subsurface waters and marine habitat within 10 m of the seafloor, through the water's edge 5 m into the terrestrial environment from the shoreline between identified boundary points on the islands of: Kaula, Niihau, Kauai, Oahu, Maui Nui (including Kahoolawe, Lanai, Maui, and Molokai), and Hawaii. In areas where critical habitat does not extend inland, the designation ends at a line that marks mean lower low water. Some terrestrial areas in existence prior to the effective date of the rule within the specific areas lack the essential features of Hawaiian monk seal critical habitat because these areas are inaccessible to seals for hauling out (such as cliffs) or lack the natural areas necessary to support monk seal conservation (such as hardened harbors, shorelines or buildings) and therefore do not meet the definition of critical habitat and are not included in the designation. In developing this final rule we considered public and peer review comments, as well as economic impacts and impacts to national security. We have excluded four areas because the national security benefits of exclusion outweigh the benefits of inclusion, and exclusion will not result in extinction of the species. Additionally several areas are precluded from designation under section 4(a)(3) of the ESA because they are managed under Integrated Natural Resource Management Plans that we have found provide a benefit to Hawaiian monk seals.

DATES: This final rule becomes effective September 21, 2015.

ADDRESSES: The final rule, maps, and other supporting documents (Economic Report, Endangered Species Act (ESA) Section 4(b)(2) Report, and Biological Report) can be found on the NMFS Pacific Island Region's Web site at *http://www.fpir.noaa.gov/PRD/prd_critical_habitat.html.*

FOR FURTHER INFORMATION CONTACT: Jean Higgins, NMFS, Pacific Islands Regional Office, (808) 725–5151; Susan Pultz, NMFS, Pacific Islands Regional Office, (808) 725–5150; or Dwayne Meadows, NMFS, Office of Protected Resources (301) 427–8403.

SUPPLEMENTARY INFORMATION:

Background

The Hawaiian monk seal (*Neomonachus schauinslandi*) was listed as endangered throughout its range under the ESA in 1976 (41 FR 51611; November 23, 1976). In 1986, critical habitat for the Hawaiian monk seal was designated at all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and ocean waters out to a depth of 10 fathoms (18.3 m) around Kure Atoll, Midway Islands (except Sand Island), Pearl and Hermes Reef, Lisianski Island, Laysan Island, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island in the NWHI (51 FR 16047; April 30, 1986). In 1988, critical habitat was expanded to include Maro Reef and waters around previously designated areas out to the 20 fathom (36.6 m) isobath (53 FR 18988; May 26, 1988).

On July 9, 2008, we received a petition dated July 2, 2008, from the Center for Biological Diversity, Kahea, and the Ocean Conservancy (Petitioners) to revise the Hawaiian monk seal critical habitat designation (Center for Biological Diversity 2008) under the ESA. The Petitioners sought to revise critical habitat by adding the following areas in the MHI: Key beach areas; sand spits and islets, including all beach crest vegetation to its deepest extent inland; lagoon waters; inner reef waters; and ocean waters out to a depth of 200 m. In addition, the Petitioners requested that designated critical habitat in the NWHI be extended to include Sand Island at Midway, as well as ocean waters out to a depth of 500 m (Center for Biological Diversity 2008).

On October 3, 2008, we announced a 90-day finding that the petition presented substantial scientific information indicating that a revision to the current critical habitat designation may be warranted (73 FR 57583; October 3, 2008). On June 12, 2009, in the 12-month finding, we announced that a revision to critical habitat is warranted because of new information available regarding habitat use by the Hawaiian monk seal, and we announced our intention to proceed toward a proposed rule (74 FR 27988). Additionally, in the 12-month finding we identified the range of the species as throughout the Hawaiian Archipelago and Johnston Atoll.

Following the 12-month finding, we convened a critical habitat review team (CHRT) to assist in the assessment and evaluation of critical habitat. Based on the recommendations provided in the draft biological report, the initial Regulatory Flexibility Analysis and section 4(b)(2) analysis (which considers exclusions to critical habitat based on economic, national security and other relevant impacts), we published a proposed rule on June 2, 2011 (76 FR 32026) to designate sixteen specific areas in the Hawaiian archipelago as Hawaiian monk seal critical habitat. In accordance with the definition of critical habitat under the ESA, each of these sixteen areas contained physical or biological features essential to conservation of the species, and which may require special management consideration or protections. In the proposed rule, we described the physical or biological features that support the life history needs of the species as essential features, which included (1) areas with characteristics preferred by monk seals for pupping and nursing, (2) shallow, sheltered aquatic areas adjacent to coastal locations preferred by monk

Although the Army and the Air Force provided INRMPs for review, areas under consideration for Hawaiian monk seal critical habitat no longer overlap with Army or Air Force INRMP managed areas; therefore, these INRMPs require no review under section 4(a)(3)(B)(i).

The Marine Corps' MCBH, and the Navy's PMRF and the JBPHH INRMPs continue to overlap with areas under consideration for monk seal critical habitat, and these INRMPs were reviewed in accordance with section 4(a)(3)(B)(i) of the ESA. Areas subject to the MCBH INRMP that overlap with the areas under consideration for critical habitat include the 500-yard buffer zone in marine waters surrounding the MCBH–KB on the Mokapu Peninsula, Oahu; and Puuloa Training Facility, on the Ewa coastal plain, Oahu. Overlap areas for the PMRF INRMP include Kaula Island and coastal and marine areas out to 10 m in depth around the island of Niihau, which are leased for naval training activities and use. Overlap areas for the JBPHH INRMP include Nimitz Beach, White Plains Beach, the Naval Defensive Sea Area, the Barbers Point Underwater Range, and the Ewa Training Minefield, all on Oahu.

To determine whether a plan provides a benefit to the species, we evaluated each plan with regard to the potential conservation benefits to the species, the past known implementation of management efforts, and the management effectiveness of the plan. Plans determined to be a benefit to the species demonstrated strengths in all three areas of the review. While considering the third criterion, we determined that an effective management plan must have a structured process to gain information (through monitoring and reporting), a process for recognizing program deficiencies and successes (review), and a procedure for addressing any deficiencies (allowing for adaption for conservation needs).

Although we previously determined that the 2006 MCBH INRMP provided a benefit to the Hawaiian monk seal (76 FR 32026; June 2, 2011), the 2012 MCBH INRMP was evaluated for this final rule to ensure that conservation measures implemented under the renewed INRMP continue to provide a benefit to the Hawaiian monk seal as well as the refined essential features. In review, the MCBH INRMP identifies multiple conservation measures that may confer benefits to the Hawaiian monk seal or its habitat, including debris removal, prohibitions against lay nets and gill nets in the 500-yard buffer zone, restrictions on fishing, enforcement of established rules by a Conservation Law Enforcement Officer, interagency cooperation for rehabilitation events, use of established procedures for seal haul-out and pupping events, educational outreach for protected species (including classroom briefs, Web page, news articles, brochures, service projects, and on-site signage and monitoring), protected species scouting surveys prior to training exercises along the beach; invasive species removal (*e.g.,* removing invasive mangroves to support native species habitat), ecological assessments in marine resources surveys and inventories, and water quality projects (minimizing erosion and pollution). Additionally, management effectiveness and plan implementation are demonstrated in the plan's appendices, which outline the conservation measures goals and objectives, provide reports and monitoring efforts from past efforts, report on the plan's implementation, and describe the achievement of the goals and objectives. Meeting all three criteria for review, we have determined that the MCBH INRMP provides a benefit to the Hawaiian monk seal and its habitat.

In 2011, we found the Navy's two INRMPs did not meet the benefit criteria established for review and identified concerns with plan implementation and management effectiveness (76 FR 32026; June 2, 2011). Since 2011, the Navy has worked with us to recognize and revise plan deficiencies. Additionally, the Navy has enhanced the management efforts associated with Hawaiian monk seal conservation that are implemented under the JBPHH and PMRF INRMPs. Plan effectiveness has been addressed for both INRMPs by including a performance monitoring element to the INRMPs, which creates an annual review with State and Federal wildlife agencies. During review, management measures and outcomes are evaluated to ensure that plan deficiencies are identified and addressed. Additionally, the Navy has enhanced the management efforts associated with Hawaiian monk seal conservation that are implemented under these INRMPs as follows. In review, the JBPHH INRMP demonstrates conservation benefits for the species, including marine debris removal, monitoring, and prevention; pet restrictions; restriction of access; protocol to prevent disturbance during naval activities; staff and public education; training to prevent ship groundings; marine mammal stranding and response training and protocols; enforcement (through base police and the game warden); and compliance and restoration programs for contaminants. Based on these benefits provided for the Hawaiian monk seal, and in combination with the concerted effort made by the Navy to enhance the plan's implementation and management effectiveness, we determined that the JBPHH INRMP provides a benefit to the Hawaiian monk seal and its habitat.

Since 2011, the Navy has revised the PMRF INRMP's monitoring plan for Kaula Island to better reflect logistical constraints and accurately identify monitoring capabilities for this area. Additionally, the Navy has coordinated with NMFS staff to improve the effectiveness of monitoring activities for the Island. In addition to these changes, the Navy has amended the PMRF INRMP to include coastal and marine areas out to 10 m in depth surrounding the Island of Niihau, which are leased for Navy training activities and use. Conservation measures on Niihau related to Hawaiian monk seals or their habitat include the following: a coastal monitoring program for Hawaiian monk seals and sea turtles, periodic removal of feral pigs, bans on ATVs (to preserve the sand dunes and coastal areas), bans on dogs (to prevent disturbance to native wildlife), and continued limited access for guests. In review, the PMRF INRMP demonstrates elements of a successful conservation program that will benefit the species, including marine debris removal, monitoring, and prevention; trapping of feral pigs, cats, and dogs; pet restrictions; restriction of public access in certain areas; protocols to prevent wildlife disturbance; public education; training to prevent ship groundings; monk seal monitoring and reporting; and compliance and restoration programs for contaminants. Based on these benefits provided for the Hawaiian monk seal, and in combination with the concerted effort made by the Navy to enhance the plan's implementation and management effectiveness, we determined that the PMRF INRMP provides a benefit to the Hawaiian monk seal and its habitat.

In conclusion, we have determined that the INRMPs for the MCBH, the PMRF, and the JBPHH each confer benefits to the Hawaiian monk seal and its habitat, and therefore the areas subject to these INRMPs are precluded from Hawaiian monk seal critical habitat.

ESA Section 4(b)(2) Analysis

Section 4(b)(2) of the ESA requires the Secretary to consider the economic, national security, and any other relevant impacts of designating any particular area as critical habitat. Any particular

TABLE 2—SUMMARY OF THE ASSESSMENT OF PARTICULAR AREAS REQUESTED FOR EXCLUSION BY THE DOD BASED ON IMPACTS ON NATIONAL SECURITY—Continued

DOD Site (size); Agency	Overlapping particular area (size)	Exclusion warranted?	Significant weighing factors
(6) Commercial Anchorages B, C, D (1 mi^2, or 2.6 km^2)—Navy.	Area 14—Oahu (363 mi^2, or 940 km^2).	No	It is unlikely that Navy activities will affect essential features at this site and the Navy has no control over other Federal activities occurring within this area. The benefits of designation outweigh the benefits of exclusion.
(7) Fleet Operational Readiness Accuracy Check Site (FORACS) (9 mi^2, 22 km^2)—Navy.	Area 14—Oahu (363 mi^2, or 940 km^2).	No	This area is believed to be of high conservation value to Hawaiian monk seals. It is unlikely that Navy activities will affect essential features at this site and other Federal activities occurring within this area may affect these features. The benefits of designation outweigh the benefits of exclusion.
(8) Marine Corps Training Area Bellows Offshore—Navy and USMC (size not estimated).	Area 14—Oahu (363 mi^2, or 940 km^2).	No	The boundaries of this area remain ill-defined and other Federal activities occurring within this area may affect essential features. The benefits of designation outweigh the benefits of exclusion.
(9) Shallow Water Minefield Sonar Training Range off Kahoolawe (4 mi^2, or 11 km^2)—Navy.	Area 15—Maui Nui (1,445 mi^2, or 3,742 km^2).	Yes	The area requested is relatively small in comparison to the total area. Impacts to national security may result from section 7 consultations specific to the construction and maintenance of the training range. The benefits of exclusion outweigh the benefits of designation for this area.
(10) Kahoolawe Danger Zone (49 mi^2, or 127 km^2)—Navy.	Area 15—Maui Nui (1,445 mi^2, or 3,742 km^2).	No	Area supports all three essential features and is considered of high conservation value for Hawaiian monk seals. Navy activities in this area are infrequent and other Federal activities may benefit from section 7 consultation requirements for this area. The benefits of designation outweigh the benefits of exclusion.

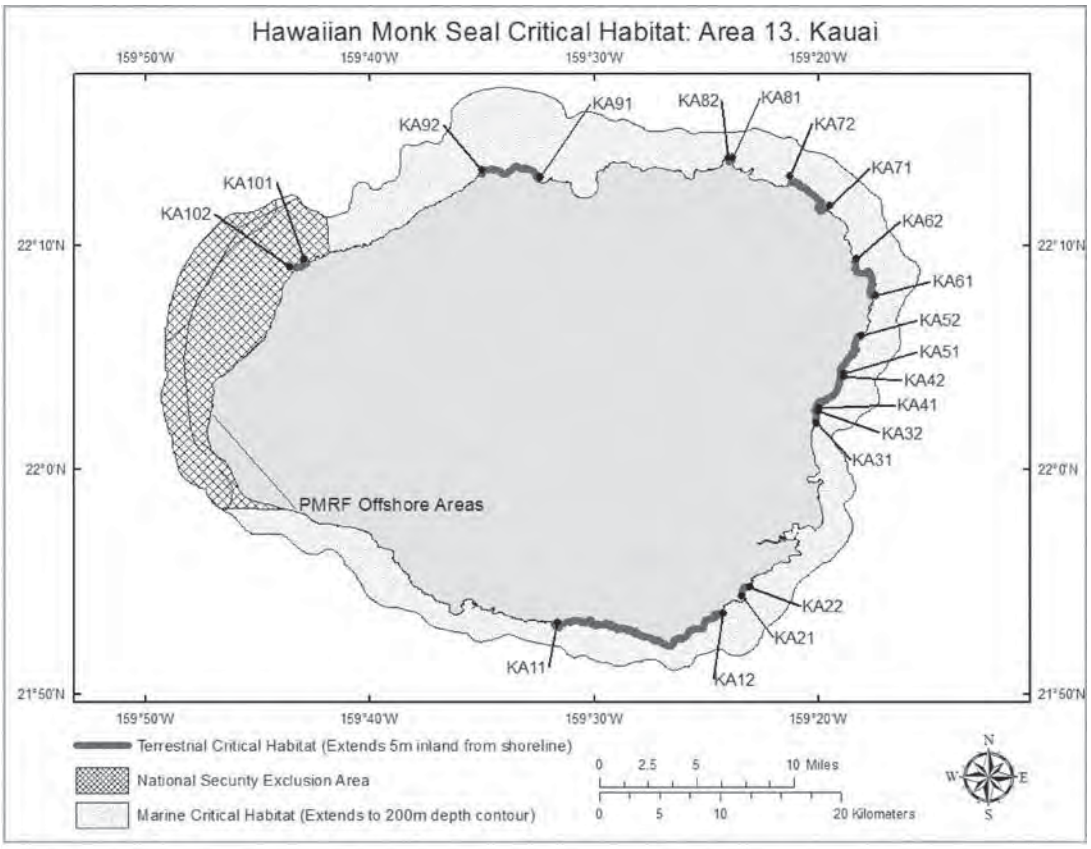
Exclusions Based on Other Relevant Impacts

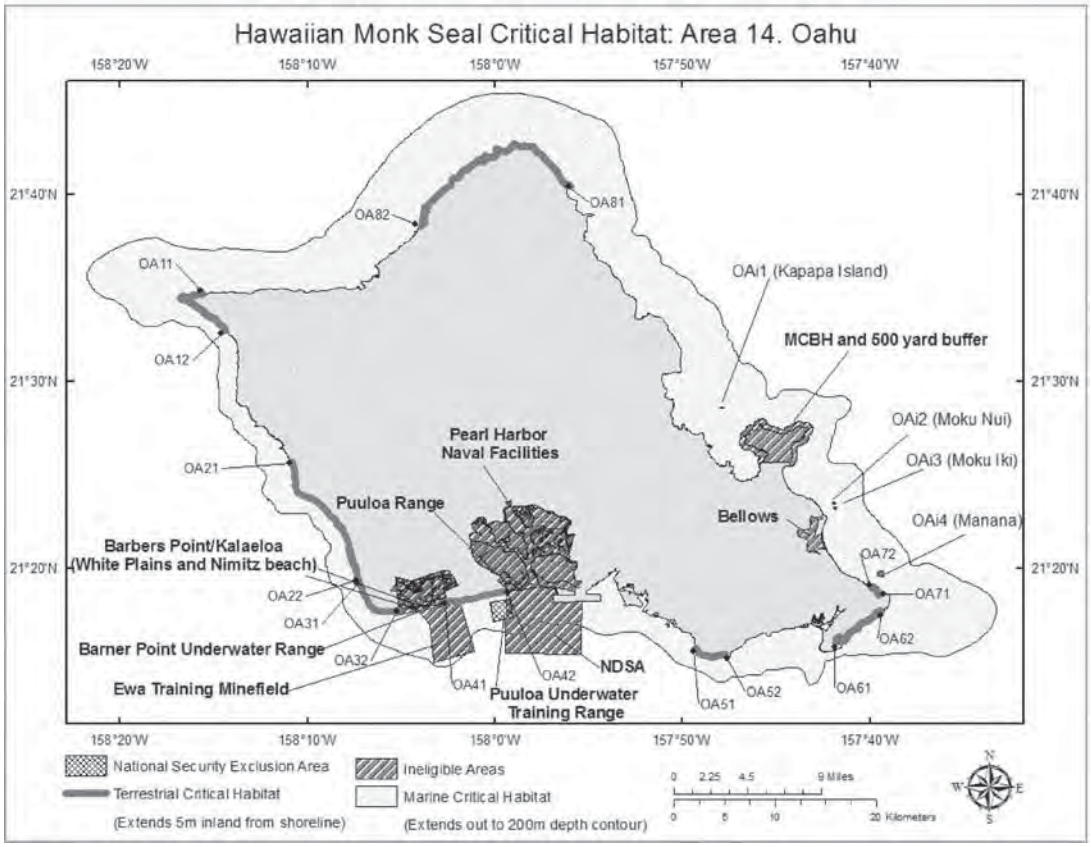
Section 4(b)(2) of the Act also allows for the consideration of other relevant impacts associated with the designation of critical habitat. Prior to the proposed rule we received comments from the USFWS requesting exclusion for Sand Island at Midway Islands due to economic and administrative burdens from the proposed designation. Similar to the National Security Analysis, we could not quantify the impacts on the USFWS in monetary terms or in terms of some other quantitative measure. To assess the benefits of excluding Sand Island, we evaluated the relative proportion of the area requested for exclusion, the intensity of use of the area, and the likelihood that actions on site will destroy or adversely modify habitat requiring additional section 7 delays, costs, or burdens. We also considered the likelihood of future section 7 consultations and the level of protection provided to critical habitat by existing USFWS safeguards. Sand Island at Midway Islands provides important habitat with the essential features of significant haul-out areas and preferred pupping areas in the northwest end of the NWHI chain. USFWS noted that their management plans provide protections for Hawaiian monk seals from disturbance and revealed no additional plans to encroach on haul-out areas. In considering the above-listed factors we were not able to identify any additional costs, *i.e.,* activities that the USFWS wished to engage in at this site that would require additional management measures or modifications to protect Hawaiian monk seal essential features. Therefore, Sand Island at Midway Islands was not proposed for exclusion in the proposed rule (76 FR 32026; June 2, 2011) because we found that the benefit of designation outweighed the benefits of exclusion.

For the final designation, due to the refinements made to the designation and additional comments received from USFWS, we re-evaluated the benefit of excluding Sand Island. Because Sand Island provides Hawaiian monk seals with preferred pupping and significant haul-out areas and we have no new information regarding the extent to which consultations would produce an outcome that has economic or other impacts, we conclude that the benefits of designation outweigh the benefits of exclusion. Therefore, this area has not been excluded from designation.

Critical Habitat Designation

Based on the information provided above, the public comments received and the further analysis that was done since the proposed rulemaking, we hereby designate as critical habitat for Hawaiian monk seals Specific Areas 1–16, of marine habitat in Hawaii, excluding the four military areas discussed under Exclusions Based on Impacts to National Security and in this section. The designated critical habitat areas include approximately 6,712 mi^2 (17,384 km^2) and contain the physical or biological features essential to the conservation of the species that may require special management considerations or protection. This rule excludes from the designation the following areas based on national security impacts: Kingfisher Underwater Training area in marine areas off the northeast coast of Niihau; PMRF Offshore Areas in marine areas off the western coast of Kauai; the Puuloa Underwater Training Range in marine areas outside Pearl Harbor, Oahu; and the Shallow Water Minefield Sonar Training Range off the western coast of Kahoolawe in the Maui Nui area. Based on our best scientific knowledge and expertise, we conclude that the exclusion of these areas will not result in the extinction of the species, nor impede the conservation of the species. Additional areas are precluded from designation under section 4(a)(3) of the ESA because the areas are subject to management under three different DOD INRMPs that we found to provide a benefit to Hawaiian monk seals. These areas include Kaula Island; coastal and marine areas out to 10 m in depth around the Island of Niihau; and, on Oahu, the 500-yard buffer zone in marine waters surrounding the Marine Corps Base Hawaii (on the Mokapu Peninsula) (MCBH–KB), Puuloa Training Facility on the Ewa coastal plain, Nimitz Beach, White Plains Beach, the Naval Defensive Sea Area, the Barbers Point Underwater Range, and the Ewa Training Minefield.


Hawaiian Monk Seal Critical Habitat: Area 13. Kauai
159°50'W
159°40'W
159°30'W
159°20'W
22°10'N
22°0'N
21°50'N
KA91
KA82
KA81
KA92
KA72
KA71
KA101
KA102
KA62
KA61
KA52
KA51
KA42
KA41
KA32
KA31
PMRF Offshore Areas
KA22
KA21
KA11
KA12
Terrestrial Critical Habitat (Extends 5m inland from shoreline)
National Security Exclusion Area
Marine Critical Habitat (Extends to 200m depth contour)
0 2.5 5 10 Miles
0 5 10 20 Kilometers
N
W
E
S


Hawaiian Monk Seal Critical Habitat: Area 14. Oahu
158°20'W
158°10'W
158°0'W
157°50'W
157°40'W
21°40'N
21°30'N
21°20'N
OA82
OA81
OA11
OAi1 (Kapapa Island)
MCBH and 500 yard buffer
OA12
OAi2 (Moku Nui)
Pearl Harbor
Naval Facilities
OA21
OAi3 (Moku Iki)
Puuloa Range
Bellows
OAi4 (Manana)
Barbers Point/Kalaeloa
(White Plains and Nimitz beach)
OA72
OA22
OA71
OA31
Barner Point Underwater Range
OA62
OA32
NDSA
OA41
OA42
Ewa Training Minefield
Puuloa Underwater
Training Range
OA51
OA52
OA61
National Security Exclusion Area
Terrestrial Critical Habitat
(Extends 5m inland from shoreline)
Ineligible Areas
Marine Critical Habitat
(Extends out to 200m depth contour)
0 2.25 4.5 9 Miles
0 5 10 20 Kilometers
N
W
E
S

D7. BEST MANAGEMENT PRACTICES FOR LANDSCAPE MAINTENANCE

Concerns about the potential spread of invasive species require institution of BMPs for landscape maintenance. Dumping of soil and green waste in open land spaces not designated for that specific purpose (i.e., Base landfill, off-site private landfill) with land use controls/BMPs, is not authorized. The following protocols apply to anyone managing green waste or soil at MCBH, including Facilities ground maintenance staff and contractors.

GREEN WASTE DISPOSAL

- Storage of stockpiles green waste or mulch piles is not permitted on any MCBH properties due to the threat of the coconut rhinoceros beetle (CRB).
- Soil removed from areas that potentially contain weed seeds of highly invasive plants (i.e., devilweed at Camp Smith) will not be stored or utilized in areas that do not contain the same weed species. The only exception to stockpiling soils is at MCTAB where, upon O&T approval, soils from any area at MCTAB could be beneficially reused for military training, (i.e., heavy equipment training that requires moving around large volumes of soil).
- Soil and green waste generated by landscaping shall be disposed of only in designated authorized areas or per contract terms.
- All landscape equipment (e.g., mowers, line trimmers) shall be cleaned prior to moving to another site to avoid the spread of highly invasive weeds (e.g., devilweed) and invertebrate pest species (e.g., CRB).

COMBATING COCONUT RHINOCEROS BEETLE

CRB, a pest species that lives in decaying plant material or green waste, is a concern of HDOA, OISC, DoN, and MCBH as it has been responsible for the death of many coconut palms and poses injurious concerns for other palms and related plant species. There is currently a two mile CRB quarantine/buffer area extending outward from JBPHH that encompasses Pu‘uloa RTF, Manana, Pearl City Annex, and Camp Smith. Efforts to contain the spread of this species requires adherence to the following BMPs.

- Green waste created at Pu‘uloa RTF should be inspected prior to removal from the site. If green waste is known or thought to contain CRB larvae, juveniles, or adults, it will be disposed of by incineration and will not be transported to any landfill.
- **Manana, Pearl City Annex, and Camp Smith**: Routine green waste disposal is in effect. The grounds maintenance and tree trimming contractor puts green waste in a Honolulu Disposal Service container on Camp Smith and Honolulu Disposal Service removes and disposes of the waste.
- **Pu‘uloa RTF**: Due to the CRB threat, special green waste disposal procedures are in place. At the time of writing, all material is being taken to the Kalaeloa (Barbers Point) green waste facility. Only whole, not chipped material is currently permitted there; chipped material disposal has been suspended, but may be authorized again at some future date.
- Chipped material will no longer be allowed to be stockpiled on any MCBH property. For the western properties, chipped material not immediately transported and kept overnight must be tightly covered to prevent the CRB from getting into it.
- Any green waste transported from Pu‘uloa RTF, Manana, Pearl City Annex, and Camp Smith needs to be tightly covered to prevent the escape of CRB in the event there is any CRB that was not discovered in the material.

D8. ACCESS FOR RESEARCH ACTIVITIES

Natural Resources staff coordinate access requests for Federal and State agencies, educational institutions, and other non-Federal entities to come aboard MCBH to engage in natural resource-related research activities. All requests to perform scientific research on MCBH properties must have a nexus to the natural resources program and support its management objectives. Research must benefit the researcher and MCBH if it is to be conducted within the Base's jurisdiction. Research requests are closely scrutinized as they can take significant staff time to process and monitor. Only non-commercial, non-profit research will be given consideration; research supporting commercial activities will not.

The process to obtain access for research involves:

1. Requester provides a hardcopy letter to the MCBH CO and an electronic copy to Natural Resources staff that includes:
    a. a detailed project description
    b. how the project can benefit/support the natural resources program
    c. what reciprocal support is needed from the Base
    d. timeframe of the project
    e. other agencies involved with the project
    f. number of participants/vehicles/equipment requiring access.
2. Natural Resources staff may be required to draft an informational paper for command review.
3. Natural Resources staff consults with Sikes Act partners if needed.
4. Natural Resources staff coordinates with other departments (e.g., O&T, WFO, MPD, Water Safety, Base Safety).
5. Natural Resources staff drafts an Access Authorization letter, with terms and conditions, for command signature.

If approval for the research is given, Natural Resources staff will be required to:

1. Provide an orientation brief to the researchers
2. Escort/supervise researchers as necessary
3. Monitor progress of researchers
4. Follow-up to obtain reports on their research.

Examples of terms and conditions to grant access to conduct research are attached.

UNITED STATES MARINE CORPS
MARINE CORPS BASE HAWAII
BOX 63002 KANEOHE BAY, HAWAII 96863-3002

IN REPLY REFER TO:
5090
LE/112-14
May 9, 2014

Molly Hagemann
Vertebrate Zoology Collection Manager
Bishop Museum
1525 Bernice Street
Honolulu, Hawaii 96817

Dear Ms. Hagemann:

We acknowledge your April 23, 2014 letter requesting a Right of Entry permit to collect avian and mammalian fossils from the Ulupa'u Crater area aboard Marine Corps Base Hawaii, Kaneohe Bay.

Your right of entry permit is granted from 1 June, 2014 and expires June 30, 2015. While two specific dates are requested, it is understood that there may be follow-on visits to collect more data in the near future. Please ensure that all future visits outside of the dates requested are coordinated with the point of contact listed below. Furthermore, please have Carla Kishinami, Teresa Lopez, Nicholas Griffith, Noa Dettweiler, and yourself review the enclosed "Concurrence and Release" form, initial the lower right hand corner of each page, sign and return it to this office. Copies are authorized. Also, send proof of Third Party Liability Insurance coverage as indicated in the release form.

This letter, together with our receipt of your signed copies of the enclosure and proof of insurance constitutes our approval of your revocable right of entry to the installation. Before accessing the site, you must also provide a signed and dated Hold Harmless and Waiver of Liability (enclosure 2). Please continue to send us all lists of catalogued collected material pertinent to your collection at Ulupa'u as it becomes available. Point of contact on these matters is Lance Bookless, Senior Natural Resources Management Specialist, phone (808) 257-7000 or lance.bookless1@usmc.mil.

Sincerely,

D. R. GEORGE
Captain, U.S. Marine Corps
Director, Environmental Compliance
and Protection Department
By direction of the Commanding Officer

Enclosure: (1) Concurrence and Release form
(2) Hold Harmless and Waiver of Liability

UNITED STATES MARINE CORPS
MARINE CORPS BASE HAWAII
BOX 63002 KANEOHE BAY HAWAII 96863-3002

IN REPLY REFER TO:
11000
LE
February 23, 2015

Ms. Angela Richards Donà & Mr. Raphael Ritson-Williams
University of Hawaii - Manoa
Hawaii Institute of Marine Biology
Honolulu, HI 96822

Dear Ms. Donà and Mr. Ritson-Williams:

SUBJECT: UH DOCTORAL CANDIDATE'S REQUEST TO CONDUCT BLUE RICE CORAL RESEARCH WITHIN MCB HAWAII'S 500 YARD NAVAL DEFENSE SEA AREA (NDSA)

Per review of your February 02, 2015 email requesting access to MCB Hawaii's 500 yard Naval Defense Sea Area (NDSA) to conduct scientific research involving Blue Rice Coral (*Montipora flabellata*), we hereby grant you access for the period March 1, 2015 to February 29, 2016, with a one year extension based on your adherence to the conditions, rules, and regulations of Marine Corps Base Hawaii and those noted in this letter.

Your access is subject to a number of understandings and conditions, as identified below:

- Technical review and approval must be performed by the Marine Corps Base Hawaii (MCB Hawaii) Environmental Department on any data collected within our NDSA, also known as the buffer zone, and before any report or publication is released to other agencies or the public. Submit data and report in digital format in either Microsoft Word or Adobe Acrobat.

- You will email, to the Environmental Department's point of contact (POC) found at the end of this letter, a copy of your government issued ID. Each of you must sign, date, and return to the POC, a Hold Harmless and Waiver of Liability Agreement (Enclosure (1)).

- Each of you must have on your person or the ability to quickly access your government-issued (federal or state) personal identification.

- You shall NOT sponsor other people aboard MCB Hawaii. If other researchers are needed, you must submit a separate request to the Environmental Department for their access.

- Before conducting your research in the water, you must receive a briefing from Base Safety, which will be coordinated through the Environmental Department

- Coordination must be made with MCB Hawaii's natural resources staff, three days before entering the NDSA for the first time. You must contact them by voice or voicemail each day you enter the NDSA and upon departure. The natural resources points of contact are Lance Bookless at(808) 257-7000 or Todd Russell at (808) 216-7135

- Your activities, vehicle, and personal belongings are subject to questioning and inspection at any time by the Federal Conservation Law Enforcement Officers (CLEOs).

11000
LE
February 23, 2015

- Your access to the research site is only from the shoreline by the Pali Kilo recreational beach cottages. Boat access is not authorized without special permission and prior coordination with the Environmental Department Authorized parking and access to the shoreline is identified on Enclosure (2).

- Extreme caution must be taken when operating in the ocean environment. There will be no water safety personnel on site or emergency rescue readily available to assist you.

- Keep all valuables with you or secured in your vehicle.

- No marine life, to include live coral, is to be taken for recreation, commercial, or scientific purposes.

- You must always enter the Base through the H-3 security gate and take the most direct route to and from the beach cottages where you will be conducting your research. You are not authorized to use any facility or access other shorelines without written permission from the Environmental Department.

- Report any suspect, unauthorized or illegal activity occurring in the area you will be conducting research as soon as possible to the CLEOs at (808) 216-5178 or (808) 479-7361; if you are unable to reach the CLEOs, contact the Military Police Department desk sergeant at 257-2123. Inform the natural resources staff within 24 hours regarding what you observed.

My point of contact is Mr. Lance Bookless, Senior Natural Resources Management Specialist, at (808) 257-7009 or lance.booklessl@usmc.mil.

Sincerely,

ROBERT M. LOTTIE
Director, Installations, Environment
and Logistics
By direction of the Commanding Officer

Enclosures: 1. Hold Harmless and Waiver of Liability Agreement
2. Authorized Parking Location and Beach Access

Copy to: MPD/O&T/MCCS/LE

2

HOLD HARMLESS AND WAIVER OF LIABILITY AGREEMENT

For and in consideration of the permission granted by the United States Marine Corps to enter upon Marine Corps Base Hawaii, Kaneohe Bay, Hawaii on: [Date] _____/_____/ 2015, to participate in the **UH Coral Research in the Pali Kilo Cove**, and being informed of all the activities that I will engage in during this project, I, [*Insert name (print)*]:_____, forever discharge and hold harmless the United States/United States Marine Corps, and all of its officers and personnel, employees, representatives, successors, and assigns, including the Commanding Officer, Marine Corps Base Hawaii, Kaneohe Bay, Hawaii from any and all liability under the Federal Tort Claims Act (28 U.S.C., Sections 1346(b), 2671-2680). I also waive all claims, demands, damages, actions, or suits of any nature or legal basis against the United States of America, United States Marine Corps, and their agencies, departments, officers, employees, personnel, successors, or assigns arising from any injury or alleged injury, including death, and property damage or loss that occurs incident to my entering upon, engaging in any physical activities while conducting **UH Coral Research in the Pali Kilo Cove** conducted within Marine Corps Base Hawaii's 500 yard Naval Defensive Sea Area (NDSA), transportation aboard government or private vehicles or vessels, or use of any facilities located on Marine Corps Base Hawaii, Kaneohe Bay, Hawaii.

I understand and am aware that recreational watercraft uses the area. I am aware that potentially hazardous conditions may exist in the area of the project, including, but not limited to the following: natural and man-made obstacles that may be visible or camouflaged, hazardous surf conditions, strong currents, normal or rogue waves, rip-rap, and other terrain and underwater features. I understand that there will be no food, water, or emergency medical services provided by the government at any the areas to be visited in the course of the underwater filming project.

This waiver is legally binding on me and my heirs, executors, and administrators.

I acknowledge that I am aware of the risks involved in my participation in the **UH Coral Research in the Pali Kilo cove** on: [Date] _____/_____/2015__. I acknowledge my understanding that I am not authorized to collect, sample, or remove any coral, sediment, other marine life or any natural or cultural resource specimens of any kind from Marine Corps Base Hawaii and its waters.

I further acknowledge that I have carefully read this release, understand the contents thereof and sign this release as my free and voluntary act.

_____	_____	____/_____/ 2015
Participant's signature	Participant [Print name]	Date
_____	_____	____/_____/ 2015
Parent or Guardian's Signature (participants under 18 years old)	Parent or Guardian [Print name]	Date

ENCLOSURE (1)

D9. ACCESS FOR EDUCATIONAL TOURS AND SERVICE PROJECTS

Natural Resources staff accommodate on- and off-Base public access requests for resource-compatible educational tours and service projects as limited time and staff permit.

The following applies to educational tours or field trips involving natural resources:

- Must be coordinated with Natural Resources staff
- If non-Federal entity, must be coordinated with the Community Relations section of the Strategic, Plans & Engagement (SP&E) Directorate
- Tour group size limited to 10-20 people; individual tours are not provided due to staff limitations
- Vehicle access is limited to ten vehicles due to parking limitations and the ability to maintain control of a long caravan of vehicles.

Coordination and planning effort by Natural Resources staff involves:

- Coordinate tour date and time with the requestor
- Sponsor tour participants aboard Base
  - Ensure drivers have a current driver's license, safety check, registration, and proof of insurance
  - Large tours can be expedited if participants provide full name and SSN. This info is provided to the Provost Marshal's Office 10 days in advance of tour.
- Prepare a talk.

Common educational tours and services projects include:

Red-footed Booby Tour

- Requires Range Facility Management Support System request
- Only conduct 2-3 tours a year so as to minimize stress on the colony
- Must be requested 90 days in advance
- May require EOD and/or medical/corpsman support; none required if only going to the "Lollipop Rd"
- Has to be conducted around Range operations
- No private vehicles allowed on Range, only Government vehicles – participants have to walk.

Nu'upia Ponds Tour

- Requires moderate coordination and planning effort
- Only conduct 2-4 tours a year, depending on workload and staff availability.
- Depending on the current Base Commander's guidance and SP&E desired level of involvement, Community Relations can assist with sponsoring personnel aboard Base and evaluating non-Federal entity access.

Natural Resources Service Project

- Mainly involves removing invasive species (e.g., bi-monthly "Weed Warrior" event)
- Many of these projects occur during non-working hours on weekdays and weekends when volunteers are most available, resulting in an extended work week for MCBH staff.
- Participants can be sponsored aboard the Base the day of the event.

UNITED STATES MARINE CORPS
MARINE CORPS BASE HAWAII
BOX 63002 KANEOHE BAY, HAWAII 96863-3002

IN REPLY REFER TO:
5090
LE/021-13
February 26, 2013

Ms. Ruby Hodges
740 Oneawa Street
Kailua, HI 96734

Dear Ms. Hodges:

SUBJECT: ACCESS FOR HALA TREE LEAF HARVEST

This responds to your February 20, 2013 updated request for access to Marine Corps Base Hawaii to harvest leaves from hala trees in locations depicted in enclosure (1). We are happy to inform you that access is hereby granted for one day a week from February - August 2013. Individuals covered by this permit are: Ruby Hodges and Ann Ng. Both individuals are subject to conditions below and attached. Please ensure that each individual listed herein have a copy of this letter in their possession and available for inspection on each access date.

- Harvesting is limited to the tree areas depicted in enclosure (1).
- The Environmental Office must be notified by phone or email, each time you will be on the Base to collect hala leaves.
- Access for hala leaf harvesting is permitted once per week, Monday - Friday, between 7:00 a.m. and 4:30 p.m. and enclosure 2 must be submitted by each individual prior to commencing this schedule.
- Harvesting is on a not-to-interfere basis. For example, access is not permitted near the WWII Memorial if a ceremony is in progress.
- Green waste generated during the project must be removed off-site (on the day it is generated) to a proper off-base disposal area.
- Authorized harvesting tools are hand-held clippers and a long pole with attached hook as used before.
- Ladders or climbing trees are not allowed; trees will not be totally stripped of leaves.
- Leaves gathered from this access will be used to make products for personal and educational enjoyment and not offered for commercial sale.
- This access permit is not "open-ended" and future requests will be considered on a case-by-case basis.

5090
LE/021-13
February 26, 2013

Our point of contact for coordination and receiving liability waivers prior to your first visit is Lance Bookless, Senior Natural Resources Management Specialist, phone: (808) 257-7000 or lance.bookless1@usmc.mil

Sincerely,

D. R. GEORGE
Captain, U.S. Marine Corps
Director, Environmental Compliance and
Protection Department
By direction of the Commanding Officer

Enclosures: 1. Authorized Hala Plant Access Locations
2. Hold Harmless and Waiver of Liability Agreement

UNITED STATES MARINE CORPS
MARINE CORPS BASE HAWAII
BOX 63002 KANEOHE BAY HAWAII 96863-3002

IN REPLY REFER TO:
11000
CO
Nov 14, 2013

Mr. Jordan Ching
Sanctuary Ocean Count Project Coordinator
Hawaiian Islands Humpback Whale
National Marine Sanctuary
6600 Kalanianaole Hwy, Suite 301
Honolulu, HI 96825

Dear Mr. Ching:

SUBJECT: BASE ACCESS FOR OCEAN COUNT OF HUMPBACK WHALES

Per review of your request for National Marine Sanctuary volunteers to access Marine Corps Base Hawaii for the purpose of counting Humpback whales, is hereby granted. This authorization approves you indefinitely for Base access each year in January, February, and March, but can be revoked at any time at the Base's discretion and without advance notice. Access is subject to the following conditions, as listed below:

- You will coordinate with the Environmental Department point of contact (POC) listed below prior to each event.
- A list of participants will be provided to the POC in advance of each event via email. Additionally, all participants must sign, date, and return to the POC, a hold harmless and waiver of liability (enclosure (1)). This requirement is necessary regardless of whether or not the participant has base access for another purpose.
- Participants will attend a safety and environmental awareness brief on the morning of each event.
- The number of participants for each site is limited to 20 individuals.
- Pets are not allowed.
- All participants must have on their person some form of government-issued (federal or state) personal identification.
- Participants must park in the designated public parking area at Pyramid Rock Beach. At the Monument Point designated location near the Range, volunteers must use the KBay RTF graveled parking lot. Carpooling is encouraged due to limited parking availability.
- Participants are not allowed to deviate from the authorized activity of counting whales.
- Following each event, please provide a summary of data collected to the POC.

My primary point of contact is Todd Russell, Natural Resources Management Specialist, MCB Hawaii at phone:(808) 216-7135, or via email todd.russell@usmc.mil. The alternate POC is Lance Bookless, Senior Natural Resources manager at (808) 257-7000.

Sincerely,

D. R. GEORGE
Captain, U. S. Marine Corps
Director, Environmental Compliance and Protection Department
By direction of the Commanding Officer

Enclosures: 1. Hold Harmless and Waiver of Liability Agreement
2. Approved Whale Count Locations and Routes

D10. MCBH SPECIFICATIONS FOR DIGITAL DATA

ATTACHMENT A
STATEMENT OF WORK
SPECIFICATIONS FOR DIGITAL DATA
MARINE CORPS BASE HAWAII

SPECIFICATIONS FOR DIGITAL DATA. Any maps, drawings, figures, sketches, databases, spreadsheets, or text files prepared for this contract shall be provided in both hard copy and digital form. The hard copy deliverables are defined in a previous section of this statement of work.

Text, Spreadsheet, and Database Files:

The Marine Corps standard computing software is Microsoft Office 2003. Final Reports and other text documents shall be provided in Microsoft Word format **AND** Adobe Portable Document Format (PDF). Spreadsheet files shall be provided in Microsoft Excel format. Databases shall be provided in Microsoft Access format, unless specified otherwise, as approved by the Government. **Prior to database development, the contractor shall provide the Government with a Technical Approach Document** for approval, which describes the contractor's technical approach to designing and developing the database. All text, spreadsheet, and database files shall be delivered on a compact disk read-only memory (CD-ROM) with ISO-9660 format.

Maps, Drawings, and Sketches (Digital Geospatial Data):

1. **Geospatial Data Software Format**:
Geographic data must be provided in a form that does not require translation, preprocessing, or post processing before being loaded to the installation's regionally hosted geodatabase. The Contractor shall validate any deviation from this specification in writing with the Government (Installation Geospatial Information & Services (IGI&S) Manager via the Project Manager). Digital geographic maps and the related data sets shall be delivered in one of the following software formats:

A. CADD: All CADD data shall be provided in AutoCAD 2008 and shall be in the same projection and use the same coordinate system, datum, and units as stated below in the paragraph #3 titled Geospatial Data Projection. Drawing files shall be full files, uncompressed, unzipped, and Geo-referenced.

Note: The Government **may** approve the use of AutoCAD when it is determined that the format will not compromise the spatial accuracy or structure of the delivered data and that the data will easily integrate with the enterprise GIS system.

- AND / OR -

B. GIS: Personal geodatabase format (Access database file) using ArcGIS 9.2. The personal geodatabase must be importable to a multi-user geodatabase using ArcSDE 9.2. The delivered data layer(s) shall be provided with x,y domain precision of 1000.

(NOTE: AutoCAD is software produced by Autodesk,Inc. ARC/INFO, ArcGIS, and ArcSDE are geographic information system software produced by the Environmental Systems

Research Institute (ESRI) of Redlands, California. These software are used by the Marine Corps GEO*Fidelis* Program)

2. Geospatial Data Structure:

A. CADD Drawings/Data – The Contractor shall develop all CADD data in conformance with the latest version of the following standards and policies:

U. S. National CADD Standards (NCS)
CADD/GIS Technology Center's AEC CADD Standards (same address above)
NAVFACINST 4250.1, Electronic Bid Solicitation

-AND / OR-

B. GIS Data Sets – When developing/delivering geospatial data, the Contractor shall develop the initial structure consistent with the most current version of the GEOFidelis Data Model. The GEOFidelis Data Model shall be followed for geospatial database table structure, nomenclature, and attributes. The Contractor shall consult with the Government concerning modifications or additions to the GEOFidelis Data Model. The Government may approve modifications to the Model if it is determined that the Model does not adequately address subject datasets. Copies of the GEOFidelis Data Model may be obtained by contacting the Facilities Department POC. When delivering updates to existing feature classes, the Contractor shall obtain a copy of the subject data in a personal geodatabase to use as a template for all subsequent data collection processes. As installations sometimes modify the SDSFIE structure for many feature classes to accommodate operational needs, the SDSFIE structure may not reflect the actual structure used in the geodatabase. If further modifications to structure are required as a result of this Scope, the Contractor will consult with the Government (IGI&S Manager) for direction and final approval.

3. **Geospatial Data Projection**:

Geographic data (regardless of format) shall be delivered in the **projected** coordinate system North American Datum 1983 (NAD83), adjusted to the HARN, Hawaii State Plane Zone #3, distance unit: meters. This is also known as NAD_1983_HARN_StatePlane_Hawaii_3_FIPS_5103, distance units meters.

The maps and data shall use the Geodetic Reference System (GRS) 1980 spheroid and the North American Datum 1983 (NAD83) readjusted to the High Accuracy Reference Network (HARN). This projection requirement applies to all CADD drawings such as as-designed and as-built project plans, as well as GIS data layer deliverables. Each data set shall have a projection file if appropriate based on format. Map or drawing **scales** will be determined by the Project Manager, if applicable. Mapping **accuracy** for the agreed scales will conform to the American Society for Photogrammetry and Remote Sensing (ASPRS) "Accuracy Standards for Large-Scale Maps", "Interim Accuracy Standards for Large-Scale Maps", and "Geospatial Positioning Accuracy Standards". Copies of these standards can be obtained on the Internet at http://www.asprs.org, and/or at http://www.fgdc.gov, or by contacting:

American Society for Photogrammetry and Remote Sensing
5410 Grosvenor Lane, Suite 210
Bethesda, MD 20814-2160

4. **Geospatial Data Collection:**

A. **Mapping grade Global Positioning System** (GPS) data collection (+ 1-5 meters horizontal accuracy) shall be performed when specified in the statement of work and shall be completed in accordance with the National Geodetic Survey's Hawaii State Plane Zone 3, NAD83 adjusted to the HPGN/HARN. Default horizontal accuracy for mapping grade GPS data collection efforts shall meet a sub-meter threshold unless otherwise specified to be survey grade, sub-foot or sub-5 meter in the statement of work. Note: NGS no longer adjusts projections to the OLD HI datum. *Spatial accuracy requirements are as follows:*

- Sub foot: 95 % of all points are within ± 12 inches

-OR-

- Sub meter: 95% of points are within ± 1 Meter

*-OR_*

- Sub 5 meter: 95% of points are within ± 5 Meter

-AND / OR-

B. **Survey grade GPS** data collection shall be performed in lieu of mapping grade when specified in the statement of work. . As survey processes are highly regulated by federal, state, and/or local technical and licensing requirements, they are in general beyond the scope of this document. However, survey grade GPS data collection shall at a minimum use the Geoid2003 CONUS epoch (or a more current epoch if available at the time of this project) and spatial accuracy requirements for survey grade are 95 % of GPS points are within ± 1 centimeter. Every effort shall be made to capture feature locations without using offsets unless obstructions are present. Any offsets used shall be annotated in the "user flag" field.

Data sets derived from GPS data collection efforts (mapping or survey grade) shall include metadata to record descriptions of the receiver and other equipment used during collection and processing, base stations used for differential corrections, software used for performing differential corrections, estimated horizontal and vertical accuracies obtained, and conversion routines used to translate the data into final geographic data delivery format. All metadata shall comply with the metadata format requirements as described in this document. Final geographic data delivery format shall comply with the specifications described in this document.

> **NOTE: None of the GPS collection information is to be included in the table structure of the delivery, unless it is specifically part of the SDSFIE or established installation feature format.**

5. **Media for Geospatial Data Deliverables**:

Geographic data shall be delivered on a separate compact disk read-only memory (CD-ROM) –or-, digital versatile disk read-only memory (DVD-ROM), or other digital media such as external hard drives or flash drives if approved by the government. This media shall **contain only the value-added data sets** as designated in the Task sections of the statement of work. Do not include the Contractor's working files or original installation data sets that may have been used by the Contractor to develop the deliverables. "READ ME" files may be included on the geographic data media if such files provide explanation of the delivered data sets. However, these "READ ME" files should not be delivered in lieu of standard metadata.

6. **Geographic Data Documentation (Metadata):**

For each digital file delivered containing geographic information (regardless of format), **the Contractor shall provide documentation** consistent with the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM). Both 'Mandatory' and 'Mandatory as Applicable' fields shall be completed for each geographic data set. The documentation shall include, but not be limited to, the following:

- The name, description, abstract, and purpose of the data set/data layer
- The source of the data and any related data quality information such as accuracy and time period of content
- Descriptions of the receiver and other equipment used during collection and processing, base stations used for differential corrections, software used for performing differential corrections, estimated horizontal and vertical accuracies obtained, and conversion routines used to translate the data into final geographic data delivery format.
- Type of data layer (point, line, polygon, etc.),
- Field names of all attribute data and a description of each field name
- Definition of all codes used in the data fields
- Ranges of numeric fields and the meaning of these numeric ranges
- The creation date of the map layer and the name of the person who created it
- A point of contact shall be provided to answer technical questions.

Metadata generation tools included in the ArcGIS suite of software (or equivalent technology) shall be used in the production of the required metadata in XML format. Regardless of the tools used for metadata creation, the Contractor must insure that the metadata is delivered in XML format and can be easily imported to the installation's enterprise geodatabase. Copies of the FGDC metadata standard can be obtained on the Internet at http://www.fgdc.gov or by contacting:

FGDC Secretariat
c/o U.S. Geological Survey
590 National Center
Reston, Virginia 22092,
(703) 648-5514

NOTE: The metadata should be formatted from the installation database perspective, not the Contractor project perspective. Therefore such items as Point of Contact should be the installation POC currently associated with the data and NOT the Contractor's Project Manager. The Contractor shall use language and format consistent with existing installation metadata.

7. **Geographic Data Review**:

The digital geographic maps, related data, and text documents shall be included for review in the draft and final contract submittals. The data will be analyzed for discrepancies in subject content, correct format in accordance with these specifications, and compatibility with the existing GIS system. The Contractor shall incorporate review comments to data and text prior to approval of the final submittal. For each review of digital geospatial data deliverables, the Contractor shall provide a technical consultant to meet on-site at the installation with the IGI&S Manager and functional area subject matter experts to visually review the data deliverables on a Windows 2000 compatible system unless otherwise approved by the government.

Ownership:
All digital files, final hard-copy products, source data acquired for this project, and related materials, including that furnished by the Government, shall become the property of *Marine Corps Base Hawaii* and will not be issued, distributed, or published by the Contractor.

Contact Information:

For project inquiries, please contact the Project Manager. For specific geospatial questions, upon the approval of the Project Manager, you may contact:

Mr. Richard Cassidy
IGI&S Manager
(808) 257-2718
richard.cassidy@usmc.mil

Or

Jon Chun
GIS/Geographer
808-257-7138
jon.chun@usmc.mil

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APPENDIX E
NATURAL RESOURCES GUIDANCE AND REGULATIONS

MCBH follows a suite of Federal, State, and Base laws, regulations, orders, and guidance in protecting its natural resources (Section 5 and Appendix A3). This appendix highlights several items directly related to MCBH INRMP implementation as outlined in the COA. These selected items provide a snapshot of some of the key regulations that Natural Resources staff either directly oversee or implement, or those they have input into based on the current status of potentially affected natural resources.

COA 7.1: Wildlife Management

E1. MCBH Kaneohe Bay Migratory Bird Depredation Permit

COA 7.5: Landscape Maintenance and Vegetation Management

E2. NPDES Pesticides General Permit

E3. *Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes (Reference CD only)*

COA 7.6: Natural Resources-Based Outdoor Recreation, Outreach, and Public Access Management

E4. Marine Corps Base Hawaii Fishing Regulations (per Base Order P1710.1: Base Recreational Activities)

E5. Rules and Regulations for the Nu‘upia Ponds Recreational Running Trail (per Base Order P1710.1: Base Recreational Activities)

E6. Summary of Hunting Regulations for Marine Corps Base Hawaii (per Base Order 1711)

E7. Memo on Trespassing at Haiku Stairs

E8. *Pet and Wildlife Regulations (Base Order P5233.2) (Reference CD only)*

E9. *Base Recreational Activities (Base Order P1710.1) (Reference CD only)*

E10. *Hunting Regulations for Marine Corps Base Hawaii (Base Order 1711) (Reference CD only)*

E1. MCBH KANEOHE BAY MIGRATORY BIRD DEPREDATION PERMIT

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
Migratory Bird Permit Office
911 NE 11th Ave. - Portland, OR 97232
Tel: 503-872-2715 Fax: 503-231-2019
Email: permitsR1MB@fws.gov

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USD 703-712

REGULATIONS
50 CFR Part 13
50 CFR 21.41

1. PERMITTEE

MARINE CORPS BASE HAWAII
COMMANDING OFFICER
ATT: ENVIRO DEPT (TODD RUSSELL)
BOX 63002
MCBH KANEOHE BAY, HI 96863-3062
U.S.A.

3. NUMBER
MB684851-0

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
02/01/2015	01/31/2016

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
W. M. ROWLEY
DIRECTOR, ENVIRONMENTAL COMPLIANCE AND PROTECTION DEPARTME

9. TYPE OF PERMIT
DEPREDATION AT AIRPORTS

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
Physical location: MARINE CORPS BASE HAWAII; KANEOHE BAY
Records maintained at: Address in block 1 above
ISLAND OF OAHU, HONOLULU COUNTY, HI

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. You are authorized to take, temporarily possess, and transport the migratory birds specified below to relieve or prevent injurious situations impacting public safety. All take must be done as part of an integrated wildlife damage management program that emphasizes nonlethal management techniques. You may not use this authority for situations in which migratory birds are merely causing a nuisance.

(1) The following may be lethally taken:

500 Migratory Birds not native to Hawaii (primarily Barn Owl, Cattle Egret, House Finch, Mourning Dove, Northern Cardinal)

(2) The following may be live-trapped and relocated:

20 Laysan Albatross (eggs may be donated for research/education purposes or placed in foster nests with state approval)

Unlimited - shearwater and other seabird fall out (birds may be picked-up and relocated into the wild in a predator-free area or transported to a federally permitted rehabilitator)

E. You are authorized in emergency situations only to take, trap, or relocate any migratory birds, nests and eggs, including species that are not listed in Condition D (except bald eagles, golden eagles, or endangered or threatened species) when the migratory birds, nests, or eggs are posing a direct threat to human safety. A direct threat to human safety is one which involves a threat of serious bodily injury or a risk to human life.

You must report any emergency take activity to your migratory bird permit issuing office *PermitsR1MB@fws.gov* within 72 hours after the emergency take action. Your report must include the species and number of birds taken, method, and a complete description of the circumstances warranting the emergency action.

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
Annual reports are due by January 31
Report Take Jan 1 - Dec 31
Forms are available on the Internet at: http://www.fws.gov/forms/3-202-9.pdf

ISSUED BY	TITLE	DATE
	CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 1	06/09/2015

F. You are authorized to salvage and temporarily possess migratory birds found dead or taken under this permit for (1) disposal, (2) transfer to the U.S. Department of Agriculture, (3) diagnostic purposes, (4) purposes of training airport personnel, (5) donation to a public scientific or educational institution as defined in 50 CFR 10.12, (6) donation to persons authorized by permit or regulation to possess them, or (7) donation of migratory game birds only to a public charity (those suitable for human consumption). Any dead bald eagles or golden eagles salvaged must be reported within 48 hours to the National Eagle Repository at (303) 287-2110 and to the migratory bird permit issuing office at *PermitsR1MB@fws.gov*. The Repository will provide directions for shipment of these specimens.

G. You may not salvage and must immediately report to U.S. Fish and Wildlife Service Office of Law Enforcement any dead or injured migratory birds that you encounter that appear to have been poisoned, shot, electrocuted, have collided with industrial power generation equipment, or were otherwise killed or injured as the result of potential criminal activity. See USFWS OLE contact information below.

H You may use the following methods of take: (1) firearms; (2) nets; (3) registered animal drugs (excluding nicarbazin), pesticides and repellents; (4) falconry abatement; and (5) legal lethal and live traps (excluding pole traps). Birds caught live may be euthanized or transported and relocated to another site approved by the appropriate State wildlife agency, if required. When using firearms, you may use rifles or air rifles to shoot any bird when you determine that the use of a shotgun is inadequate to resolve the injurious situation. You may use paint ball guns to haze birds or deter birds only when other methods of hazing are ineffective.

Anyone who takes migratory birds under the authority of this permit must follow the American Veterinary Medical Association Guidelines on Euthanasia when euthanization of a bird is necessary (http://www.avma.org/issues/animal_welfare/euthanasia.pdf).

I. You may temporarily possess and stabilize sick and injured migratory birds and immediately transport them to a federally licensed rehabilitator for care.

J. The following subpermittees are authorized: MCB Hawaii - Environmental Department (Todd Russell, Lance Bookless, Gordon Olayvar) and USDA-WS personnel (Darrin Phelps, John Cody, Ronald Ige, Erik Rutka)

In addition, any other person who is (1) employed by or under contract to you for the activities specified in this permit, or (2) otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

K. You and any subpermittee(s) must comply with the attached Standard Conditions for Migratory Bird Depredation Permits. **These standard conditions are a continuation of your permit conditions *and must remain with your permit.***

For suspected illegal activity, immediately contact USFWS Law Enforcement at: 808.861.8525

Standard Conditions
Migratory Bird Depredation Permits
50 CFR 21.41

All of the provisions and conditions of the governing regulations at 50 CFR part 13 and 50 CFR part 21.41 are conditions of your permit. Failure to comply with the conditions of your permit could be cause for suspension of the permit. The standard conditions below are a continuation of your permit conditions and must remain with your permit. If you have questions regarding these conditions, refer to the regulations or, if necessary, contact your migratory bird permit issuing office. For copies of the regulations and forms, or to obtain contact information for your issuing office, visit: http://www.fws.gov/migratorybirds/mbpermits.html.

1. To minimize the lethal take of migratory birds, you are required to continually apply non-lethal methods of harassment in conjunction with lethal control.
   [*Note: Explosive Pest Control Devices (EPCDs) are regulated by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). If you plan to use EPCDs, you require a Federal explosives permit, unless you are exempt under 27 CFR 555.141. Information and contacts may be found at http://www.atf.gov/explosives/how-to/become-an-fel.htm.*]

2. Shotguns used to take migratory birds can be no larger than 10-gauge and must be fired from the shoulder. You must use nontoxic shot listed in 50 CFR 20.21(j).

3. You may not use blinds, pits, or other means of concealment, decoys, duck calls, or other devices to lure or entice migratory birds into gun range.

4. You are not authorized to take, capture, harass, or disturb bald eagles or golden eagles, or species listed as threatened or endangered under the Endangered Species Act found in 50 CFR 17, without additional authorization.

   For a list of threatened and endangered species in your state, visit the U.S. Fish and Wildlife Service's Threatened and Endangered Species System (TESS) at: http://www.fws.gov/endangered.

5. If you encounter a migratory bird with a Federal band issued by the U.S. Geological Survey Bird Banding Laboratory, Laurel, MD, report the band number to 1-800-327-BAND or http://www.reportband.gov.

6. This permit does not authorize take or release of any migratory birds, nests, or eggs on Federal lands without additional prior written authorization from the applicable Federal agency, or on State lands or other public or private property without prior written permission or permits from the landowner or custodian.

7. Unless otherwise specified on the face of the permit, migratory birds, nests, or eggs taken under this permit must be:
   (a) turned over to the U.S. Department of Agriculture for official purposes, or
   (b) donated to a public educational or scientific institution as defined by 50 CFR 10, or
   (c) completely destroyed by burial or incineration, or
   (d) with prior approval from the permit issuing office, donated to persons authorized by permit or regulation to possess them.

8. A subpermittee is an individual to whom you have provided written authorization to conduct some or all of the permitted activities in your absence. Subpermittees must be at least 18 years of age. As the permittee, you are legally responsible for ensuring that your subpermittees are adequately trained and adhere to the terms of your permit. You are responsible for maintaining current records of who you have designated as a subpermittee, including copies of designation letters you have provided.

9. You and any subpermittees must carry a legible copy of this permit, *including these Standard Conditions*, and display it upon request whenever you are exercising its authority.

10. You must maintain records as required in 50 CFR 13.46 and 50 CFR 21.41. All records relating to the permitted activities must be kept at the location indicated in writing by you to the migratory bird permit issuing office.

11. Acceptance of this permit authorizes the U.S. Fish and Wildlife Service to inspect any wildlife held, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.

12. You may not conduct the activities authorized by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable law.

(DPRD - 12/3/2011)

E2. NPDES PESTICIDES GENERAL PERMIT

As of November 1, 2011, point source discharges from the applications of pesticides to waters of the State require National Pollutant Discharge Elimination System (NPDES) Permits, as required by the Clean Water Act. These discharges include applications of pesticides (including insecticides, herbicides, fungicides, rodenticides, and various other substances to control pests) to, over, or near waters of the State. HIDOH CWB is responsible for implementation of the NPDES pesticides permit program in the State of Hawai‘i.

The CWB’s amendments to HAR, Chapter 11-54 (Water Quality Standards) and 11-55 (Water Pollution Control), were adopted and became effective on October 21, 2012. These amendments added the new NPDES General Permit for discharges from the application of pesticides to State waters (HAR, Chapter 11-55, Appendix M). The CWB website (http://health.hawaii.gov/cwb/) website contains the final rules and instructions to submit the Appendix M Notice of Intent. Refer to the Base *Integrated Pest Management Plan* for more information on pesticides and this permit (Section 8.1.9).

E3. GUIDANCE FOR FEDERAL AGENCIES ON SUSTAINABLE PRACTICES FOR DESIGNED LANDSCAPES

Reference CD only

Includes:

- Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes (October 2009)
- Supporting the Health of Honey Bees and Other Pollinators (October 2014); Introduction only

E4. MARINE CORPS BASE HAWAII FISHING REGULATIONS

Summary of MCBH Fishing Regulations, which are detailed in Base Order P1710.1: Base Recreational Activities (Appendix E9, Reference CD).

Marine Corps Base Hawaii Fishing Regulations

Update per base order P1710.1

New base order P1710.1 is a revision to base order P5500.15V Chapter 11. Included in this revision is species specific take and size limits.

You Must Obey State and Federal Laws Regarding Fishing Prohibitions and Regulations on Marine Corps Base Hawaii

In Addition to State and Federal Laws, Marine Corps Base Hawaii Has Its Own Prohibitions and Regulations

Gear Restrictions:

You must attend all of your fishing gear at all times

You are not allowed to possess gill nets, lay nets or cross nets and throw nets must have a minimum stretched mesh size of more than two inches.

Do not have crab nets more than three feet in diameter and the use of more than three nets per person is prohibited.

You must accompany children under 13 years old if they are using or possessing a spear gun ("arbolete" type).

Spear guns must be registered with MPD (Base Security and Access Control Order).

You may have scoop nets for the capture of bait fish, but do not have nets exceeding three feet (including the handle).

Prohibitions:

Reef Fish - for use in personal aquariums

Due to the difficult enforcement of the prohibition of aquarium fish sales (among other associated problems), you may not collect marine animals for use in personal aquariums on MCBH.

Release of Aquatic Animals in MCBH Waters

Do not release any type of aquatic animal in MCBH waters because it may contribute to non-native animal invasions.

Taking or Damaging "Live Rock"

Do not take or damage any type of rock or coral that has marine animals living in or attached to it. Many animals depend on rocks or coral to survive.

'Opihi (Limpet) Picking

Do not take limpets (otherwise known as 'Opihi) on MCBH. In many areas of Hawai'i, the size and number of 'Opihi are declining, this is largely due to over-picking.

Wana (Sea Urchin)

Don't take Wana (sea urchin) on MCBH. The number of Wana on base are declining and the venom associated with their sting may be hazardous to your health.

Ula (Spiny Lobster) and Ula papa (Slipper Lobster)

Due to massive declines of lobster populations in the waters of O'ahu, fishing of these animals is prohibited on MCBH.

Catch Regulations:

Species	Min size	Max Number
Uhu* (all parrot fish)	12 inches	1 per day

***Uhu spear fishing is prohibited at night and violators will be prosecuted**

Ulua (all jacks / trevally)	10 inches	5 per day

Kumu (white-saddled goat fish)	10 inches	5 per day

Moano (many-barred goat fish)	7 inches	5 per day

Kala (unicorn fish)	14 inches	5 per day

Kole (yellow-eyed surgeon fish)	5 inches	5 per day

Manini (convict tang)	5 inches	10 per day

Tako (octopus)	1 pound or larger	2 per day

E5. RULES AND REGULATIONS FOR THE NU‘UPIA PONDS RECREATIONAL RUNNING TRAIL

Rules and regulations for the Nu‘upia Ponds Recreational Running Trail are found in Base Order P1710: Base Recreational Activities, Section 1003 Water Sports, 4.a(4), which discusses the Nu‘upia Ponds WMA (Appendix E9, Reference CD).

This endangered species habitat and Federally-protected wetland area includes eight interconnected ponds/wetlands, adjacent mudflats, and vegetated shoreline areas as depicted in the attached figure.

Authorized recreational activities allowed in the Nu‘upia Ponds WMA are foot traffic and bicycles along the Nu‘upia Ponds Recreational Running Trail. Individual runners, unit physical training, and special ‘run’ events are allowed along this designated run trail route. Runner use is further governed by restrictions contained in an EA and Section 7 ESA consultation agreement with USFWS that were required prior to opening this once restricted running trail. Additional restrictions include, but are not necessarily limited to: dogs or any other pets are prohibited on the trail, no unaccompanied children, no cadence chanting, no contractors without authorized official business in the area, and access by authorized runners during daylight hours only (6 am to 6 pm).

All water sports and fishing are strictly prohibited within the entire Nu‘upia Ponds WMA. Watercraft use for scientific monitoring or any other such non-consumptive, non-recreational purpose is subject to written permission from the CO after review by the Environmental Compliance and Protection Department and other appropriate staff.


NO Surfing
Fence
Pa'akai
Wai Puna
Kaluapuhi
Nu'upia 'Eha
Nu'upia 'Ekolu
Halekou
Nu'upia 'Elua
Heleloa
Nu'upia 'Ekahi
Nu'upia Hema
MCBC
PROHIBITED ACTIVITIES
• NO Dogs or Cats
• NO Fishing, netting, crabbing, hunting
• NO Walking, bicycling, running, or hiking, except on the authorized Nu`upia Ponds Recreational Running Trail
• NO Off-Highway Vehicles (OHVs), ATVs , POVs
• NO Kayaking or Surfing
• NO Military Training
• NO Commercial Activities
Nu`upia Ponds Wildlife Management Area Boundary
Authorized Nu`upia Ponds Running Trail
Gates/Barriers – NO Access
Off-Limits-Restricted Access:
For access, contact the Environmental Department Natural Resources staff

1

E6. SUMMARY OF HUNTING REGULATIONS FOR MARINE CORPS BASE HAWAII

A recreational bow hunting program for wild pigs at MCTAB was initiated in September 2014 per Base Order 1711. The O&T Directorate is charged with administrating this Order, with input from the Environmental Compliance and Protection Department, which is charged with managing the fish and wildlife programs aboard MCBH. The hunting program provides a recreational activity, and does not serve as a primary means for invasive species control. Nuisance, invasive, and feral animals, including pigs, will continue to be controlled at MCTAB. Hunting Regulations are outlined in Chapter 2 of the Order and summarized below. A copy of the Base Order is included in Appendix E10 (Reference CD).

Hunting Areas

Recreational bow hunting at MCBH is currently allowed at the MCTAB property in five defined hunting areas (HA1 – HA5). The hunting areas are co-located on Training Areas 2 and 3. No hunting is authorized in Training Area 1 or other areas of MCTAB. Hunters are only permitted to hunt in assigned areas. All hunting areas are inside areas bordered by the MCTAB fenceline, which are currently off-limits to the general public. Hunters will not have the potential to interact with individuals using the Bellows beach recreational areas (at Bellows AFS or MCTAB). No hunting is allowed in off-limit areas established to protect sensitive resources (i.e., wetlands or streams, coastal areas, cultural resources), or no-shoot areas designated for safety. Hunters shall park in designated locations associated with the assigned hunting area. No hunting will be allowed at any other MCBH property.

Hunting Method and Targeted Game

Archery equipment (long bows, recurved bows, compound bows) is the only form of hunting allowed. Feral pigs are the only allowed wildlife authorized to be hunted, with a bag limit of one pig per hunter per day. Harvested pigs must be removed from MCTAB.

Hunters

The hunting program is open to the general public, with sponsor, as well as DoD affiliated personnel. All members of the general public must pass a background check before being allowed on Base. Hunting parties are restricted to three hunters per party. Access, in terms of number of hunters, is limited to ensure a high-quality experience, to facilitate effective program management, and to ensure the safety and security of individuals and property.

Hunting Periods

Hunting will be scheduled on weekends or holidays when there is no training taking place at MCTAB. This is estimated to be one weekend and one holiday a month, year round. Training always takes precedence over hunting, and if any training activities are scheduled at MCTAB, no hunting will be allowed.

On hunting days, access is allowed from one half hour before sunrise to one half hour after sunset. Hunters are required to check-in and check-out with MCBH Range Control. Exceptions may be made, on a case-specific basis, to allow for late check-out.

Rules and Regulations

The hunting program is implemented under Base Order 1711: Hunting Regulations for Marine Corps Base Hawaii. All applicable Hawai‘i hunting regulations apply (HAR §13-123 *Rules Regulating Game Mammal Hunting*).

All hunters are required to have a valid Hawai‘i hunting license, which is obtained from Hawai‘i DLNR DOFAW and includes hunter education requirements. In addition, hunters must have a Base hunting permit

administered by MCBH, which requires passing a written test and an archery proficiency test every three years. The written test will cover Hawai‘i State hunting regulations, Base hunting regulations, and hunter ethics. Use of privately owned weapons is outlined in Base Regulations (Base Order 5532, Base Security and Access Control). Per Base Order 1711, it is unlawful to possess a loaded firearm in MCTAB, with the exception of law enforcement and nuisance animal control officials.

Safety and Security

Safety and security are primary concerns. All permitted hunters need to pass a background check. Hunters are issued a key and enter the hunting areas through a locked gate. Secure areas, including the Military Operations on Urban Terrain (MOUT) training facilities, are off limits. A 50 yard no-shoot zone has been established on the interior of the installation boundary in areas adjacent to residential areas and the golf course to protect life and property. Other than hunters and MCBH program enforcement (Conservation Law Enforcement Officer and O&T Directorate), no one is allowed in the hunting areas during active hunting periods. Similarly, no hunting is allowed if the areas are being used for training.

Resource Protection

Off-limit areas are delineated, and are designed to protect wetlands and streams, endangered waterbirds, and cultural resources.

E7. MEMO ON HAIKU STAIRS TRESPASSING

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
530 SOUTH KING STREET, ROOM 202
HONOLULU, HAWAII 96813-3065
TELEPHONE: (808) 768-5010 • FAX: (808) 768-5011

IKAIKA ANDERSON
Council Vice Chair
Councilmember, District 3
Email: ***ianderson@honolulu.gov***
Phone: ***808-768-5003***
Fax: ***808-768-1235***

Colonel Sean Killeen
Commanding Officer
Box 63002
Kaneohe Bay, HI 96863-3002 *Sent via Email*
February 8, 2016

Aloha Colonel Killeen:

I write today regarding the Haiku Stairs hike, which is located on government property that has been closed to general public for many years. Nonetheless, people continue to trespass onto this closed area and hike the Haiku Stairs on a regular basis. Area residents have noted that many of the vehicles driven by trespassing hikers have "base tag" decals on their windshields, and are dressed in military-like gear. I would like to ask for your assistance in reminding all personnel under your command, and the families of said personnel, that the Haiku Stairs is indeed closed, and that those who decide to proceed hiking are trespassing onto government property. It would also be helpful to advise folks that if they are caught trespassing, a citation for criminal trespassing will be issued by the Honolulu Police Department.

In the past, a criminal citation was not a certainty; warnings were frequently issued. However, due to continuing complaints from area residents the Honolulu Police Department (HPD) has committed to a zero tolerance approach to those caught trespassing on and around the Haiku Stairs area. It is unfortunate that the continued impact on the community has necessitated a zero tolerance approach and some individuals – especially those who have recently moved here – may not be fully aware of the potential consequences for something seemingly innocuous as hiking "off the beaten path". Understanding the severe consequences that a criminal charge can have on a servicemember's career, I want to ensure that every effort is made to educate our military community on this issue.

Thank you for your consideration, and the continued service of yourself and all members of our armed forces. If you have any questions, please contact me directly by phone at 808-768-5003 or by email at ianderson@honolulu.gov.

Malama Pono,

Ikaika Anderson
Council Vice Chair
Councilmember, District 3

E8. PET AND WILDLIFE REGULATIONS (BASE ORDER P5233.2)

Reference CD only

E9. BASE RECREATIONAL ACTIVITIES (BASE ORDER P1710.1)

Reference CD only

E10. HUNTING REGULATIONS FOR MARINE CORPS BASE HAWAII (BASE ORDER 1711)

Reference CD only

APPENDIX F
COURSE OF ACTION

This appendix contains information in support of Section 7: Course of Action.

F1. *Past Implementation Progress (Reference CD only)*

F2. Active and Programmed Management Actions

F3. *Funding Description (Reference CD only)*

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F2. ACTIVE AND PROGRAMMED MANAGEMENT ACTIONS

This appendix summarizes information related to active and programmed management actions in this INRMP Update. It includes the following tables:

Table F2-1. MCBH INRMP Active and Programmed Project Funding Table (2017 – 2021)

Table F2-2. MCBH INRMP Update - COA Five Year Implementation Plan (2017 – 2021)

Routine management actions are conducted at regular intervals.

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Table F2-1. MCBH INRMP Active and Programmed Project Funding Table (2017 – 2021)

		Obj	FY17 $K	FY18 $K	FY19 $K	FY20 $K	FY21 $K	FY17-21 Total
COA 7.0: INRMP Program Management and Implementation								
Natural Resources Labor	HI3CONNROPB46064600	7.0.1	557	562	567	572	577	2835
Equipment/Supplies Natural Resources Program Support	HI3CONONOPB46164651	7.0.1	35	35	35	35		140
Training & Associated Travel (Natural Resources Core Staff)	HI2CONNTOPB45394208 / HI2CONNTOPB46144652	7.0.1	27	7	7	7	7	55
Update MCBH INRMP (Tech. Support)	HI3CONIPC2245594211 / HI3CONONC2245604212	7.0.1				150		150
COA 7.1: Wildlife Management								
Endangered Hawaiian Hoary Bat Survey	HI2CONESC2244034200	7.1.1						0
Inventory and Study the State Endangered Hawaiian Owl	HI2CONESC2245654215	7.1.1	100					100
Endangered Waterbirds Study – Nu‘upia Ponds and MCTAB	HI2CONESC2245584210	7.1.1	200					200
Flyway-Flight Pattern Analysis of Migratory and Endangered Birds – MCBH Kaneohe Bay	HI2CONONC2245754220	7.1.1		200				200
Endangered Species Observation Towers – Nu‘upia Ponds WMA	HI2CONESC1044684205	7.1.2	442					442
Construct Water Crossing Points to Improve Access within Nu‘upia Ponds	HI2CONESOPB45844221	7.1.2		10				10
Repair/Replace Nu‘upia Ponds Footbridge	HI2CONESC1045854222	7.1.2					450	450
Seabird Relocation Study	HI2015C22CN4255	7.1.2						0
Repair/Replace Artificial Nesting Platforms for Migratory Birds in Ulupa‘u Crater	HI2CONONC1045674217	7.1.2			305			305
Wildlife and Predator Control Services	HI2CONESOPB46134650	7.1.2	64	65	66	68	68	331
COA 7.2: Wetland Management								
Wetland Inventory and Delineation – Nu‘upia Ponds and MCTAB	HI3CONWLC2245614213	7.2.1			200			200
Wetland Restoration Plan – MCBH Kaneohe Bay and MCTAB	HI2CONWLC2245694303	7.2.2						0
Nu‘upia Hema and Salvage Yard Wetland Restoration Environmental Assessment	HI3COMPLC2244734304	7.2.2		75				75
Nu‘upia Hema Wetland Restoration	HI2CONWLC1044744305	7.2.2			750			750

Table F2-1. MCBH INRMP Active and Programmed Project Funding Table (2017 – 2021)

		Obj	FY17 $K	FY18 $K	FY19 $K	FY20 $K	FY21 $K	FY17-21 Total
Salvage Yard Wetland Restoration	HI2CONWLC1044754306	7.2.2			750			750
Repair / Replace Aeration System and Install Waterline in Klipper Golf Course Ponds	HI2CONESC1045664216	7.2.2		70				70
COA 7.3: Watershed Management								
No current STEP projects.								0
COA 7.4: Coastal and Marine Resources Management								
Shoreline Erosion Repair – Pu‘uloa RTF	HI3COMPLC2244054202	7.4.2				2000		0
COA 7.5: Landscape Maintenance and Vegetation Management								
GIS – Vegetation Feature Class	HI3CONONC2245184307	7.5.1	200					200
Invasive Vegetation Inventory and Management Plan	HI2CONISC2244044201	7.5.1	200					200
MCBH Base Landscaping	HI2CONEVOPB48104231	7.5.2		175			200	375
Invasive Vegetation Control: H3-Kane‘ohe Bay	HI2CONISC2245684218	7.5.2	75		50		50	175
Invasive Vegetation Control: Nu‘upia Ponds and Base Wetlands	HI2CONISOPB45694219	7.5.2	40	30	30	30	30	160
Integrated Wildland Fire Management Plan	HI3CONFRC2243654204	7.5.2	205					205
Maintenance and Repair of KBRTF Water Cannons Supporting Migratory Bird Conservation	HI3CONONC2245324206	7.5.2	10	10	10	10	10	50
COA 7.6: Natural Resources-based Outdoor Recreation, Outreach, and Public Access Management								
Outreach Coordinator	HI3CONESC2245624214	7.6.2	85	85				170
COA 7.7: Resource Information Management								
No current STEP projects.								0
TOTALS:			**2240**	**1324**	**2770**	**2872**	**1392**	**10598**

NOTES:
*****Labor Costs reflect fully-burdened rates of core Natural Resources staff and a portion of the fully-burdened rates of other Environmental Staff contributing to Natural Resources Program
**Training/Travel Costs reflect only those of core Natural Resources staff
In-house costs for projects are usually 10-15% of contract costs.
Project costs are either based on government estimates provided by the Navy or other entity, or estimates based on history doing these types of projects at MCBH.

Table F2-2. MCBH INRMP Update - COA Five Year Implementation Plan (2017 – 2021)

Obj	Management Action	Type	FY Execution	STEP Number
COA 7.0: INRMP Program Management and Implementation				
7.0.1	Natural Resources Labor	STEP – in progress	Recurring	HI3CONNROPB46064600
7.0.1	Equipment/Supplies Natural Resources Program Support	STEP – in progress	Recurring	HI3CONONOPB46164651
7.0.1	Training & Associated Travel (Natural Resources Core Staff)	STEP – in progress	Recurring	HI2CONNTOPB45394208 HI2CONNTOPB46144652
7.0.1	Update MCBH INRMP (Tech. Support)	STEP – programmed	2020	HI3CONIPC2245594211 HI3CONONC2245604212
7.0.2	Ensure Relevant Operational Materials Adhere to the Most Recent Guidance on Natural Resources Management		Recurring	N/A
7.0.2	Develop Biosecurity Plan	STEP – in planning		
7.0.3	Evaluate Agency Policies, Plans, and Activities for Relevance and Impact to Management		Recurring	N/A
7.0.3	Support Interagency Cooperative Management to Benefit MCBH Natural Resources		Recurring	N/A
7.0.3	Facilitate Natural Resource Management Data Sharing		Recurring	N/A
COA 7.1: Wildlife Management				
Routine Management Actions				
7.1.1	Bird Surveys	Routine	Recurring	N/A
7.1.1	Wedge-tailed Shearwater Monitoring	Routine	Recurring	N/A
7.1.1	Avian Botulism Monitoring	Routine	Recurring	N/A
Projects				
7.1.1	Endangered Hawaiian Hoary Bat Survey	STEP – programmed	2016	HI2CONESC2244034200
7.1.1	Inventory and Study the State Endangered Hawaiian Owl	STEP – programmed	2017	HI2CONESC2245654215
7.1.1	Endangered Waterbirds Study – Nu‘upia Ponds and MCTAB	STEP – programmed	2017	HI2CONESC2245584210
7.1.1	Flyway-Flight Pattern Analysis of Migratory and Endangered Birds – MCBH Kaneohe Bay	STEP – programmed	2018	HI2CONONC2245754220

Table F2-2. MCBH INRMP Update - COA Five Year Implementation Plan (2017 – 2021)

Obj	Management Action	Type	FY Execution	STEP Number
7.1.1	Non-Native Invertebrate and Vertebrate Pest Species Management Study	STEP – in planning		
7.1.1	Terrestrial Invertebrates Survey and Recommendations for Management – MCBH Kaneohe Bay and MCTAB	STEP – in planning		
Routine Management Actions				
7.1.2	Activity Analysis	Routine		N/A
7.1.2	Feral and Nuisance Animal Control	Routine (STEP)	Recurring	HI2CONESOPB46134650
7.1.2	Invertebrate Pest Control	Routine		N/A
7.1.2	BASH/Depredation Permit	Routine		N/A
7.1.2	Injured Bird Treatment (oiled, botulism)	Routine		N/A
Projects				
7.1.2	Replace Existing Fence – Paʻakai Pond	STEP – in planning		
7.1.2	Endangered Species Observation Towers – Nuʻupia Ponds WMA	STEP – programmed	2017	HI2CONESC1044684205
7.1.2	Construct Water Crossing Points to Improve Access within Nuʻupia Ponds	STEP – programmed	2018	HI2CONESOPB45844221
7.1.2	Repair/Replace Nuʻupia Ponds Footbridge	STEP – programmed	2021	HI2CONESC1045854222
7.1.2	Seabird Relocation Study	STEP – in progress	2016	HI2015C22CN4255
7.1.2	Repair/Replace Artificial Nesting Platforms for Migratory Birds in Ulupaʻu Crater	STEP – programmed	2019	HI2CONONC1045674217
COA 7.2: Wetland Management				
Projects				
7.2.1	Wetland Inventory and Delineation – Nuʻupia Ponds and MCTAB	STEP – programmed	2019	HI3CONWLC2245614213
7.2.2	Wetland Restoration Plan – MCBH Kaneohe Bay and MCTAB	STEP – in progress	2015	HI2CONWLC2245694303
7.2.2	Nuʻupia Hema and Salvage Yard Wetland Restoration Environmental Assessment	STEP – programmed	2018	HI3COMPLC2244734304
7.2.2	Nuʻupia Hema Wetland Restoration	STEP – programmed	2019	HI2CONWLC1044744305
7.2.2	Salvage Yard Wetland Restoration	STEP – programmed	2019	HI2CONWLC1044754306
7.2.2	Motor Pool, Hale Koa, and Puha ʻEkahi Wetland Restoration Design	STEP – in planning		

Table F2-2. MCBH INRMP Update - COA Five Year Implementation Plan (2017 – 2021)

Obj	Management Action	Type	FY Execution	STEP Number
7.2.2	Motor Pool Wetland Restoration Environmental Assessment	STEP – in planning		
7.2.2	Motor Pool Wetland Restoration	STEP – in planning		
7.2.2	Repair/Replace Aeration System and Install Waterline in Klipper Golf Course Ponds	STEP – programmed	2018	HI2CONESC1045664216
7.2.2	Control California Grass Using Salt Water in Percolation Ditch	STEP – in planning		
COA 7.3: Watershed Management				
Routine Management Actions				
7.3.1	Monitoring of General Erosion Conditions and Hot Spots	Routine	Recurring	N/A
Projects				
7.3.1	Water Quality and Ecosystem Health Monitoring of Nu‘upia Ponds	STEP – in planning		
7.3.1	Assess Natural Resources Status of Waikane Valley	STEP – in planning		
Routine Management Actions				
7.3.2	Regular Monitoring and Cleaning of the Mōkapu Central Drainage Channel (MCDC)	Routine	Recurring	N/A
Projects				
7.3.2	Design/Study for Developing Solutions for Managing Stream Debris in Waimānalo Stream (MCTAB) and the MCDC (Kaneohe Bay)	STEP – in planning		
7.3.2	Sediment Dredging – Nu‘upia ‘Ekahi	STEP – in planning		
7.3.2	Control of Surface Runoff and Erosion	STEP – in planning		
COA 7.4: Coastal and Marine Resources Management				
Routine Management Actions				
7.4.1	Marine Protected Species Monitoring	Routine	Recurring	N/A
7.4.1	Monitoring of Military and Recreational Exercises	Routine	Recurring	N/A
Projects				
7.4.1	Coastal and Marine Resource Survey – MCBH Kaneohe Bay	STEP – in planning		

Table F2-2. MCBH INRMP Update - COA Five Year Implementation Plan (2017 – 2021)

Obj	Management Action	Type	FY Execution	STEP Number
7.4.1	Biological Study of Nu'upia Ponds	STEP – in planning		
7.4.1	Shoreline Assessments to Address Erosion	STEP – in planning		
7.4.1	Assess Seaplane Ramps	STEP – in planning		
7.4.1	Monitor for Sea Level Rise	STEP – in planning		
7.4.1	Develop Climate Change Vulnerability Assessments	STEP – in planning		
Routine Management Actions				
7.4.2	Marine Resources Protection Initiatives	Routine	Recurring	N/A
7.4.2	Recreational Activity Control	Routine	Recurring	N/A
7.4.2	Marine Debris Removal	Routine	Recurring	N/A
7.4.2	Marine Protected Species Management and Response	Routine	Recurring	N/A
7.4.2	Coral Reef Mitigation	Routine		N/A
Projects				
7.4.2	Pu'uloa RTF Shoreline Erosion Repair Project Environmental Assessment	STEP – in progress	2016	HI3CONONC2245554209
7.4.2	Shoreline Erosion Repair – Pu'uloa RTF	STEP – programmed		HI3COMPLC2244054202
7.4.2	Sand Dune Stabilization – North Beach	STEP – in planning		
7.4.2	Shoreline and Sand Stabilization – MCTAB	STEP – in planning		
COA 7.5: Landscape Maintenance and Vegetation Management				
Projects				
7.5.1	GIS – Vegetation Feature Class	STEP – programmed	2017	HI3CONONC2245184307
7.5.1	Invasive Vegetation Inventory and Management Plan	STEP – programmed	2017	HI2CONISC2244044201
Routine Management Actions				
7.5.2	Landscape Beautification	Routine	Recurring	N/A
7.5.2	Tree Maintenance Workshop	Routine	Recurring	N/A
7.5.2	Clear Roads and Trails to Provide Access	Routine	Recurring	N/A

Table F2-2. MCBH INRMP Update - COA Five Year Implementation Plan (2017 – 2021)

Obj	Management Action	Type	FY Execution	STEP Number
7.5.2	Plant Trees at KBRTF	Routine	Recurring	N/A
7.5.2	Operation of Wireless Controlled Water Cannons the Protect Red-footed Booby Colony	Routine	Recurring	N/A
7.5.2	Invasive Vegetation Control Activities (Mud Ops, Weed Warriors, Sea Grape, Fountain Grass, Fireweed, Devilweed, Specialized Eqpmnt)	Routine	Recurring	N/A
7.5.2	Harvest of Invasive Plants	Routine	Recurring	N/A
Projects				
7.5.2	MCBH Base Landscaping	STEP – programmed	2018/2021	HI2CONEVOPB48104231
7.5.2	Invasive Vegetation Control: H3-Kane‘ohe Bay	STEP – programmed	2017/2019/2021	HI2CONISC2245684218
7.5.2	Invasive Vegetation Control: Nu‘upia Ponds and Base Wetlands	STEP – programmed	Recurring	HI2CONISOPB45694219
7.5.2	Invasive Tree Replacement: Pu‘uloa RTF	STEP – in planning		
7.5.2	Integrated Wildland Fire Management Plan	STEP – in progress	2016	HI3CONFRC2243654204
7.5.2	Maintenance and Repair of KBRTF Water Cannons Supporting Migratory Bird Conservation	STEP – programmed	Recurring	HI3CONONC2245324206
7.5.2	KBRTF Fire Suppression System	STEP – in planning		
COA 7.6: Natural Resources-based Outdoor Recreation, Outreach, and Public Access Management				
Projects				
7.6.1	Recreational Use Assessment: Beaches of MCBH Kaneohe Bay	STEP – in planning		
7.6.1	Recreational Fishing Survey	STEP – in planning		
Routine Management Actions (Outdoor Recreation)				
7.6.2	Nu‘upia Ponds Recreational Running Trail	Routine	Recurring	N/A
7.6.2	Review/Update Base Fishing Regulations	Routine	Recurring	N/A
7.6.2	MCTAB Recreational Hunting	Routine	Recurring	N/A
Routine Management Actions (Outreach)				
7.6.2	Informational Sessions	Routine	Recurring	N/A

Table F2-2. MCBH INRMP Update - COA Five Year Implementation Plan (2017 – 2021)

Obj	Management Action	Type	FY Execution	STEP Number
7.6.2	Planned Base or Community Events	Routine	Recurring	N/A
7.6.2	Educational Materials (Print Material, Signs/Exhibits, Videos, Website)	Routine	Recurring	N/A
Projects (Outreach)				
7.6.2	Outreach Coordinator	STEP – programmed	2017-2018	HI3CONESC2245624214
7.6.2	Environmental Learning Center	STEP – in planning		
7.6.2	Nu‘upia Ponds Recreational Running Trail Signage	STEP – in planning		
7.6.2	MCTAB TA-1 Educational Material	STEP – in planning		
Routine Management Actions (Public Access)				
7.6.2	Support for Scientific Research	Routine	Recurring	N/A
7.6.2	Support for Educational Tours and Service Projects	Routine	Recurring	N/A
COA 7.7: Resource Information Management				
Routine Management Actions				
7.7.1	Archival Data Maintenance	Routine	As required	N/A
7.7.1	Natural Resources Data Maintenance	Routine	As required	N/A
7.7.1	Spatial GIS Data Maintenance	Routine	As required	N/A
7.7.1	Manage GIS Data According to Latest DoD Standards	Routine	As required	N/A
Projects				
7.7.1	Historical Natural Resources Information Archiving	STEP – in planning		
Routine Management Actions				
7.7.2	Natural Resources Database Management	Routine	As required	N/A
7.7.2	Spatial GIS Data Management	Routine	As required	N/A
7.7.2	Digital Data Exchange	Routine	As required	N/A
7.7.2	Project Documentation and Closeout	Routine	As required	N/A

APPENDIX G
DOCUMENTATION OF PUBLIC OUTREACH, ENGAGEMENT, AND INVOLVEMENT

This appendix documents stakeholder involvement and public outreach in the implementation of the MCBH INRMP.

G1. Recurring Natural Resources Service Projects

G2. *MCBH INRMP-Related Public Access and Outreach History (Reference CD only)*

G3. Examples of Public Outreach

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G1. RECURRING NATURAL RESOURCES SERVICE PROJECTS

Table G1-1 identifies recurring natural resources related service projects that require coordination by or with Environmental Department staff. A detailed description of recurring projects is included in Section 9.

It is noteworthy that the Sierra Club Hawaii Chapter regularly partners with MCBH. Their members routinely participate in Weed Warrior events along with Base volunteers. Notably, Daniel Anderson and Deborah Blair have been regular attendees representing the Sierra Club for the last 10-15 years. This partnership enhances the environment while strengthening community bonds with the Base.

A Base-wide cleanup, "Malama i ka Aina", consisting of teams of volunteers at Kaneohe Bay had been hosted annually in May. The Natural Resources section would get approximately ten Marine volunteers for 2-3 days to use as deemed necessary. The event has been cancelled; the last cleanup was held November 18-20, 2014.

Table G1-1.Recurring Natural Resources Service Projects

RECURRING EVENT	TIMEFRAME	ACTIVITY
January		
State Biannual Waterbird Count	2nd week of month	Count waterbirds/shorebirds in MCBH Kaneohe Bay wetlands
Humpback Whale Ocean Count	Jan/Feb/Mar: Last Saturday of month	Coordinate with NOAA Fisheries/Humpback Whale Sanctuary
Fountain Grass Survey	2nd/3rd week of month every other year	Survey and control efforts conducted at MCTAB include Natural Resources staff, HIARNG, OISC, Bellows AFS
Chronological Summary	1st week of month	Summary of events by month for previous calendar year
INRMP Annual Review	Whenever regulators are available. Send out meeting request and information packet in Nov/Dec	Review by DLNR, USFWS, NOAA Fisheries, EPA of the Natural Resources Program INRMP implementation progress
February		
Mud-Ops	Feb: Whenever AAVs are available	Preparing Nu'upia Ponds mudflats for stilt nesting season utilizing AAVs to break-up pickleweed
Swamp Romp	1st or 2nd Saturday of month	Conducted by CLB-3/MCCS. Begin coordination in Nov/Dec of previous calendar year
Humpback Whale Ocean Count	Last Saturday of month	Coordinate with NOAA Fisheries/Humpback Whale Sanctuary
Sierra Club Service Projects	Feb/Mar/Apr/Jun/Aug/Oct/Dec: 2nd Saturday of month	Conduct environmental service project with Sierra Club, Marines and community volunteers
March		
Humpback Whale Ocean Count	Last Saturday of month	Coordinate with NOAA Fisheries/Humpback Whale Sanctuary
April		
Sierra Club Service Projects	2nd Saturday of month	Conduct environmental service project with Sierra Club, Marines, community volunteers
Earth Day	3rd or 4th Saturday of month	Event held at Risley Field.

RECURRING EVENT	TIMEFRAME	ACTIVITY
May		
None		
June		
Sierra Club Service Projects	2nd Saturday of month	Conduct environmental service project with Sierra Club, Marines, community volunteers
July		
None		
August		
Sierra Club Service Projects	2nd Saturday of month	Conduct environmental service project with Sierra Club, Marines, community volunteers
State Biannual Waterbird Count	2nd or 3rd week of month	Count waterbirds/shorebirds in MCBH Kaneohe Bay wetlands
September		
Shearwater Burrow Count	1st week of month	Count occupied shearwater burrows located along Fort Hase shoreline, Nu'upia Ponds WMA; Natural Resources staff, OISC, DLNR/DOFAW
October		
Sierra Club Service Projects	2nd Saturday of month	Conduct environmental service project with Sierra Club, Marines, community volunteers
November		
Shearwater Fallout Season	Nov-Dec	Notify Airfield ops/squadrons. Provide informational flyer. Information is disseminated in October, before young shearwaters begin to fledge.
December		
Sierra Club Service Projects	2nd Saturday of month	Conduct environmental service project with Sierra Club, Marines, community volunteers
Audubon Christmas Bird Count	~15 Dec	Count all birds around the Base, including Booby Colony

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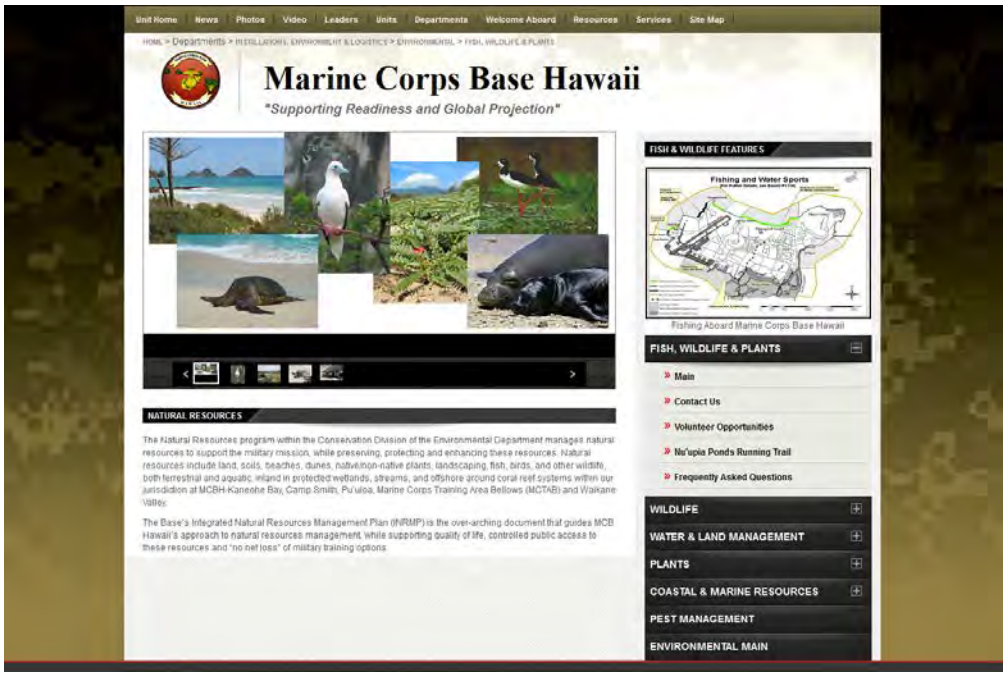
G3. EXAMPLES OF PUBLIC OUTREACH

This appendix contains recent examples of public outreach relating to the MCBH natural resources management program. The MCBH natural resources management program is made visible through a website, as well as publications, signs, interpretive exhibits, handouts, and articles. Pamphlets on coral reefs, marine animals, harmful organisms, off-roading, and other topics are under development.

The MCBH Environmental Compliance and Protection Department website provides up to date information on compliance, pollution protection, conservation, installation restoration, and education and outreach.



http://www.mcbhawaii.marines.mil/Departments/Installations,EnvironmentLogistics/Environmental.aspx

Until October 2015, when the Command stopped publishing the *Hawaii Marine* newspaper, a section titled "Environmental Corner" provided a forum for educating on MCBH natural resources, as well as occasional feature stories. The newspaper also listed volunteer, Base, and community events, and often included opportunities to participate in natural resources related service projects.

HAWAII MARINE FEBRUARY 27, 2015 • A-5

ENVIRONMENTAL CORNER

Endangered 'Hawaiian Coot' on Mokapu Peninsula

Did you know there are five endangered birds protected by Marine Corps Base Hawaii on the Mokapu Peninsula? This week we'll discover one of them; the Hawaiian coot, also known as the 'alae ke`oke`o (in Hawaiian).

The Kaneohe Klipper Golf Course ponds on the peninsula are prime locations to find the 'alae ke`oke`o. This large 15-inch waterbird is fiercely territorial and capable of adapting to various wetland habitats like drainage ditches and golf club ponds.

This waterbird is a dark gray color with a white bill and a large patch on the top of its head. The patch is usually white and varies from bluish white to yellow to dark blood red. Male and female coots look alike with white undertail feathers seen while swimming or during their courtship displays. They're usually silent but have been heard uttering chicken-like "keck-keck" and "keek" notes. It is currently listed as an endangered species and its population ranges from 2,000 to 4,000 individuals. Most live on Oahu, Kauai and Maui.

Courtesy photo from U.S. Fish and Wildlife Service

MCB Hawaii protects these and other wildlife and their habitat by removing invasive weeds in the ponds. Every other month volunteers work alongside natural resources managers to improve wildlife habitats during Weed Warrior service projects.

Contact Environmental Compliance and Protection Department natural resources managers at 257-7000 or 216-7135 for more information to get involved.

Signs and handouts are used to inform individuals about MCBH natural resources, measures for protection and what activities violate Base Orders and County, State and Federal laws.

Common fish of the Nu'upia Ponds

The Nu'upia Ponds support at least 16 different species of native fish who find sanctuary here. Fish tagging studies verify that they swim elsewhere and are caught outside of the ponds- in open fishing areas, making these ponds an important nursery. **Fishing is strictly prohibited** in these ponds which helps replenish depleted, near-shore fish populations. Fishing is regulated around the state by both Federal and State laws.

'Ama'ama, striped mullet (*Mugil cephalus*)

- 'Ama'ama were a favorite fish to raise in fishponds by the ancient Hawaiians
- They would enter through the *mākāhā* (gates) as *pua 'oma* ("baby" 'ama'ama) and would be referred to as 'amá'ama when they reached about 20 cm
- The large adult stage are called 'anae, which is about 30 cm fork length

Awa, milkfish (*Chanos chanos*)

- This *'ono* (delicious) fish has white meat that looks almost milky when cooked into a soup
- Awa was a favorite fish to raise in fishponds, and still can be found in the ponds today!

Kākū, Great Barracuda (*Sphyraena barracuda*)

- Kākū are the predators of *loko i'a*
- These aggressive fish have a large appetite and can reach lengths of 6 ft.!
- They prey on most fish that are found in and around fishponds, and occasionally attacked the pond keepers
- Attracted to silvery flashes in the water, it is recommended to not wear any jewelry or anything flashy while in the ocean in order to reduce the likelihood of getting bit by this giant

Awa 'aua, awa awa, Hawaiian Ladyfish (*Elops hawaiensis*)

- These fish became particularly *momona*, or fat, when raised in fishponds as opposed to those found out in open waters
- This fish is also sometimes referred to as the giant herring and can be found in large schools

'Ō'io, Short jaw Bonefish (*Albula glossondonta*)

- 'Ō'io are a prized sport fish today, and it takes a lot of experience to catch these tasty fish
- The ancient Hawaiians were able to raise 'ō'io and capture the fish right in the fishponds
- One of the favorite ways to enjoy this fish is to make *lomi* out of it, or cut up into small pieces, "massaged" by hand and served raw

Ulua, Giant Trevally (*Caranx ignobilis*)

- With being capable of reaching weight up to 190 lbs., this fish is what fisherman dream of!
- There are many different species of ulua found around Hawai'i, all belonging to the jack, or trevally family
- An ulua is referred to as a *pāpio* in the juvenile stage, once the fish is about 10 lbs. it is considered an ulua
- A male sweetheart is often referred to as an ulua in Hawaiian poetry, which is an example of *kaona*, or a hidden, double meaning

Hua 'Ōlelo (Hawaiian words):

- I'a- fish
- Loko i'a- fishpond
- Mākāhā- Sluice gate, as of a fishpond
- Kuapā- wall of a fishpond
- 'Ono- delicious
- Momona- fat or sweet
- Lomi- a type of fish dish created by hand, the fish is "massaged", cut into small pieces and served raw
- Kaona- a word with a hidden, double meaning in Hawaiian poetry

Mahalo to Keoki Stender www.marinelifephotography.com for the photos. For more information contact the Base Environmental Department 257-7000, 216-7135

Predators & Threats to Hawai'i

Animals **non-native & invasive** to the Hawaiian Islands pose serious threats to the native ecosystem. The term **non-native species** refers to a species transported or established outside its native range by the activities of humans, whether done so intentionally or not. **Invasive species**, which are non-native, are species that significantly disrupt the community structure or proper function of an ecosystem.

Free Roaming Cats (*Felis catus*)

Free roaming cats, whether feral or domestic, pose a serious threat health hazard to humans. They are prolific and efficient predators of birds and other wildlife- even if well fed .

Neuter and release of cats is PROHIBITED on MCB Hawaii. Per Base Order P5500.15B, the release or abandonment of domesticated animals is prohibited

- Since there was no natural evolution of cats in Hawai'i there is no natural predator to control the populations
- There are many diseases that can be transmitted to humans and wildlife by cats
- If you own a cat, or dog, for your safety and the well being of your pet, you must keep it indoors or on a leash at all times

Small Indian Mongoose (*Herpestes javanicus*)

The Indian Mongoose is a small, weasel like animal with a long, brownish body & tail, short legs and a pointed muzzle.

- Introduced in 1883 as a bio control for rats, however, this was unsuccessful as the rats are active during the night and the mongoose is active during the day
- Pose a serious threat to native fauna; they prey on birds, baby sea turtles, eggs, and other various animals
- Are vectors for disease, such as leptospirosis, which can be fatal to humans

Rats (*Rattus rattus, Rattus exulans, Rattus norvegicus*)

- The first rat species introduced in the islands was the Polynesian Rat, *Rattus exulans*, which was brought aboard canoes from the first Polynesian settlers to Hawai'i about 1600 years ago
- Two other species of rats later made their way into Hawai'i aboard European ships are roof rats (*Rattus rattus*) and the Norway rat (*Rattus norvegicus*)
- Besides being a pest to humans as well as a threat to human health, these species have a large impact on the native ecosystem as both predators and competitors
- Rats threaten not only water birds, but all forest birds as well by preying on chicks, eggs and even adult birds, amongst many other species

Tropical Fire Ant (*Solenopsis geminata*)

- Thought to have been established in the 1870s
- Colonies are large, with tens to hundreds of thousands of workers
- Average size is 3-5mm in length, equivalent to the length of a half a grain of rice
- Nests are usually in the form of a large exposed soil mound but can form smaller nests on paved areas
- Mating takes place 300 to 800 feet in the air
- Workers have powerful stings; if you mistakenly stand on a nest, workers will slowly cover your feet and lower legs and then sting you
- Fire ants prefer food with high protein content, but will feed on almost anything, plant or animal

Brown Tree Snake (*Boiga irregularis*)

Native to the Solomon Islands, New Guinea, Australia and Indonesia this snake has the potential to become a serious threat to the Hawaiian Islands.

- Between 1981 and 1998 nine brown tree snakes have been observed at airfields on O'ahu
- The secretive and nocturnal qualities of this snake make it difficult to detect
- Their diets consist of birds, lizards, small mammals, eggs and small household pets
- Accidental introduction of this snake on Guam has wrecked havoc on not only the native flora and fauna but economically as well
- Brown tree snakes are also mildly venomous to humans, can reach lengths of 10 ft. and weight up to 5 lbs.
- It is critically important that if you see ANY snake, keep an eye on it and **report its location to the Military Police immediately!**

Feral Pig (*Sus scrofa*)

- Descendant of the small Asiatic domestic pigs introduced by Polynesians in the early colonization period (400AD) and the larger European pigs first introduced by Captain James Cook in 1778
- Found on all main islands except Lāna'i
- Responsible for great ecological damage by rooting and trampling native vegetation and spreading invasive plant species
- Native forest bird habitat and numbers have been significantly reduced as a result of the feral pig's introduction

Yellow Crazy Ant (*Anoplolepis gracilipes*)

- Named for their erratic behavior and also known as the "long-legged ant," this ant is one of the largest species of invasive ants, capable of forming super colonies
- Subdues their prey with formic acid, which irritates the eyes and feet of birds causing their eyes to swell shut and their feet to break out with painful sores
- Nests occasionally hosting hundreds of queens and thousands of workers

For more information please contact the Base Environmental Department, 257-7000, 216-7135

APPENDIX H
DOCUMENTATION OF INRMP REVIEW AND CONCURRENCE

This appendix documents review and concurrence for MCBH's INRMP.

H1. *MCBH Review and Concurrence (Reference CD only)*

FONSI from 2001 MCBH INRMP/EA

Copies of Public Notices for 2001 MCBH INRMP/EA

MCBH EIRB Concurrence Letter

H2. *Agency Correspondence and Concurrence with MCBH INRMP Update (2016) (Reference CD only)*

H3. *Agency Review Comments on MCBH INRMP Update (2016) (Reference CD only)*

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APPENDIX I
GLOSSARY

Adaptive management: "…a willingness to approach all management decisions as experiments to be tested. Rather than prescribe a management scenario, the manager working in an adaptive fashion tests possible solutions to problems in a scientific, experimental way, complete with controls. …under the adaptive management scenario, a final, prescriptive solution to a problem is never accepted, and the door is always left open to new ideas, new data, and revision of plans when better approaches are possible." (Taken from The U.S. DoD and The Nature Conservancy, A Handbook for Natural Resources Managers, Conserving Biodiversity on Military Lands, Leslie et al. 1996).

Alien species: with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem. (*Executive Order 13112, Invasive Species* (February 3, 1999)).

Avian Botulism: a paralytic disease of waterbirds caused by ingestion of a toxin produced by a naturally occurring bacteria in soil. The toxin is only produced by the bacteria under certain environmental conditions.

Best Management Practices (BMPs): methods, measures, or practices to prevent or reduce water pollution, including, but not limited to: (1) structural and nonstructural controls; (2) operation and maintenance procedures, and (3) other requirements and scheduling and distribution of activities. (UFP for a Watershed Approach to Federal Land and Resource Management, 65 FR 202 of Oct 18 2000, p. 62571).

Biosecurity: a strategic and integrated approach that encompasses policy and regulatory framework for analyzing and managing relevant risks to human, animal and plant life and health, and associated risks to the environment.

Bird Aircraft Strike Hazard (BASH): the potential of bird strike hazard to aircraft existing due to both resident and migratory bird species. The BASH program establishes procedures to minimize aircraft exposure to potentially hazardous bird strikes at and around MCBH. No single solution exists to the BASH problem, and a variety of techniques and organizations must be involved in the control program.

Candidate Species: any species that is undergoing a status review that USFWS or NMFS has announced in a Federal Register notice. Thus, any species being considered by the Secretary (of the Department of Commerce or Interior) for listing under the ESA as an endangered or a threatened species, but not yet the subject of a proposed rule (see 50 CFR 424.02). NMFS' candidate species also qualify as species of concern. "Candidate species" specifically refers to:

- species that are the subject of a petition to list and for which we have determined that listing may be warranted, pursuant to section 4(b)(3)(A), and
- species that are not the subject of a petition but for which we have announced the initiation of a status review in the Federal Register.

Categorical Exclusion (CATEX): Per 40 CFR 1508.4 and Section 12201.3 of MCO P5090.2A, actions that the Department of Navy has found to have no significant effect individually or cumulatively on the human environment and therefore do not require an Environmental Assessment (EA) or Environmental Impact Statement (EIS) are documented as such through a CATEX (i.e., a decision memorandum retained in the project file as evidence that some systematic environmental review was followed to reach this conclusion).

Compliant INRMP: An INRMP that has been both approved in writing, and reviewed, within the past five years, as to operation and effect, by authorized officials of DoD, DOI, and each appropriate State fish and wildlife agency (Sikes Act MOU, 2013).

Conservation Measures: methods, measures, or practices to prevent or reduce potential adverse impacts to natural resources. Conservation measures often focus on native species, particularly threatened or endangered species.

Critical habitat: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation (ESA Sec 3(5)(A); 50 CFR Section 424.02). Section 4(a)(3)(B)(i) of the ESA allows exemptions to critical habitat designation if a military installation's INRMP is providing adequate conservation measures and species benefit as determined by USFWS or NOAA.

Cumulative effect: the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. (40 CFR §1508.7).

Ecological Assessment: Monitoring and evaluating the condition of ecological resources to discover the current and changing conditions. Ecological assessments utilize surveys and existing inventories in order to assist in understanding the structure and function of ecosystems in order to develop informed management actions.

Ecosystem-based management: a goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural processes; is cognizant of nature's timeframes; recognizes social and economic viability within functioning ecosystems; is adaptable to complex and changing requirements; and is realized through effective partnerships among private, local, State, tribal, and Federal interests. Ecosystem-based management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole. (DoDI 4715.03).

Endangered species: a species of fauna or flora that has been listed by the USFWS or NMFS for special protection and management under the Endangered Species Act. (MCO 5090.2A, Section 11105.15).

Endemic species: a species that is native by virtue of having evolved in a particular geographic location and found only in that location.

Enhancement: an activity increasing one or more natural or artificial ecosystem functions.

Erosion: the removal of the surface soil layers by wind, water or ice. The two processes involved are the detachment of individual soil particles and the subsequent transport by wind, water or ice.

Established program: a natural resource management program at MCBH, as described in the Existing Environment and Course of Action sections, whose components have been operating for at least two and up to twenty years or longer.

Geographic Information System (GIS): a computerized system of organizing and analyzing any spatial array of data and information.

Hydrological function: function performed in the context of a watershed or wetland, whose components may include, depending the context: groundwater infiltration (penetration of rainfall and surface water into soil), groundwater recharge (elevating the water table), regulation of water flow including floodwater regulation, and maintenance of estuarine water quality (the physicochemical milieu).

INRMP Revision: Any change to an INRMP that, if implemented, may result in a significant environmental impact, including those not anticipated by the parties to the INRMP when the INRMP was last approved and/or reviewed as to operation and effect. All such revisions require approval by all parties to the INRMP, and will require a new or supplemental NEPA analysis (Sikes Act MOU, 2013).

INRMP Update: Any change to an INRMP that, if implemented, is not expected to result in consequences materially different from those in the existing INRMP and analyzed in an existing NEPA document. Such changes will not result in a significant environmental impact, and installations are not required to invite the public to review or to comment on the decision to continue implementing the updated INRMP (Sikes Act MOU, 2013).

Indigenous species: a species that is native in a given region by virtue of having spread through the region on its own, but whose site of evolutionary origin is unspecified.

Indo-Pacific Region: a biogeographic region of the Earth's seas, comprising the tropical waters of the Indian Ocean, the western and central Pacific Ocean, and the seas connecting the two in the general area of Indonesia.

Introduced species: a non-native species that has been become established into a natural ecosystem outside its natural range.

Invasive species: an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. (*Executive Order 13112, Invasive Species* (February 3, 1999)).

Littoral zone: the shore zone from the high water mark to a depth where light is barely sufficient for rooted aquatic plants to grow.

Live Rock: any rock or coral to which marine life is visibly attached or affixed.

Migratory: traveling from one place to another at regular times of year, often over long distances.

Native species: one that occurs naturally in a particular region, ecosystem and/or habitat without direct or indirect human actions. (*Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds* (60 FR 40837 of August 10, 1995)); with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem. (*Executive Order 13112, Invasive Species* (February 3, 1999)).

Nonpoint source pollution: pollution that comes from many diffuse sources that is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and underground sources of drinking water. Pollutants include: excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas; oil, grease, and toxic chemicals from urban runoff; sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks; and bacteria and nutrients from livestock, pet wastes, and faulty septic systems. (USEPA website).

Noxious Weeds: plant species identified by Federal or State Agencies as requiring control or eradication.

Outdoor recreation: includes any program, activity, or opportunity dependent on the natural environment, including picnicking, bird watching, hiking, fishing, and wildlife enjoyment. Per MCO P5090.2A, it does not include activity-based outdoor recreation such as in "developed or constructed facilities such as golf courses, tennis courts, riding stables, lodging facilities, boat launching ramps, and marinas…".

Polynesian-introduced species: one that was introduced by the earliest Polynesian settlers either intentionally or unintentionally, and is now naturalized. Treated as "de facto" natives for management purposes.

Pyrophytic: characteristic of plants that have adapted to tolerate fire

Restoration: management actions returning an area from a disturbed or altered condition with lesser functions to a previous condition with greater functions.

Review for operation and effect: A comprehensive, joint review by the parties to the INRMP, conducted no less often than every five years, to determine whether the plan needs an update or revision to continue to address adequately Sikes Act purposes and requirements (Sikes Act MOU, 2013).

SharePoint: web application platform in the Microsoft Office server suite that combines various functions which are traditionally separate applications: intranet, extranet, content management, document management, personal cloud, enterprise social networking, enterprise search, business intelligence, workflow management, web content management, and an enterprise application store. Used by MCBH to manage files and file sharing.

Species of concern: used by Federal agencies to describe species for which there is concern or great uncertainty about the status and might be in need of concentrated conservation actions. Species of concern status does not carry any procedural or substantive protections under the Endangered Species Act. However, Federal agencies do maintain a list of species of concern and fund grants to states and management agencies to support projects to conserve these species.

Species of greatest conservation need: used by the State of Hawai'i to describe species whose population are rare, declining or vulnerable to decline and might be in need of concentrated conservation actions. Species of greatest conservation concern status does not carry any procedural or substantive protections under the Endangered Species Act, but projects to conserve these species are eligible for Federal funds to support projects to conserve these species. http://dlnr.hawaii.gov/wildlife/hswap/cwcs/hawaii/species/

STEP, Status Tool for Environmental Program: web-based application that facilitates and supports project management and tracking of environmental program requirements.

Stony coral: marine corals which generate a hard skeleton and includes all reef corals.

Sustainable landscape management practices: standards set by the latest Executive Orders, Marine Corps Orders, and related regulations regarding sustainable landscape management including: preferential use of regionally native plants, pollution prevention practices through minimization of fertilizer/pesticide use, recycling landscape trimmings, and control of invasive plant species.

Threatened species: any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, as defined in the Endangered Species Act.

Vulnerability assessment: climate change vulnerability assessments typically determine (1) the sensitivity of a species or system to changes in the climate, (2) the level of exposure to change, and (3) the adaptive capacity of the species or system, in the context of existing threats.

Water quality: a set of parameters that describes the physical, chemical and biological condition of a water body.

Watershed: an area where rain and other water drains to a common location such as a river, lake, or wetland. A "watershed" is one of the functional units of ecosystem-level concern most useful for land use and resource managers. (USEPA 1997).

Watershed approach: a framework to guide watershed management that: (1) uses watershed assessments to determine existing and reference conditions; (2) incorporates assessment results into resource management planning; and (3) fosters collaboration with all landowners in the watershed. (UFP for a Watershed Approach to Federal Land and Resource Management, 65 FR 65266 of Oct 18 2000).

Watershed assessment: an analysis and interpretation of the physical and landscape characteristics of a watershed using scientific principles to describe watershed conditions as they affect water quality and aquatic resources. (UFP for a Watershed Approach to Federal Land and Resource Management, 65 FR 65266 of Oct 18 2000).

Watershed condition: the state of the watershed based on physical and biogeochemical characteristics and processes (e.g., hydrologic, geomorphic, landscape, topographic, vegetative cover, and aquatic habitat, water flow characteristics and processes (e.g., chemical, physical, and biological) as it affects water quality and water resources (UFP for a Watershed Approach to Federal Land and Resource Management, 65 FR 62566 of Oct 18 2000).

Wetlands: those areas that have a predominance of hydric soils, that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Jurisdictional wetlands are those that have been formally delineated in accordance with U.S. Army Corps of Engineers wetland delineation procedures.

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APPENDIX J
REFERENCES

This appendix contains citations for references included in this 2016 MCBH INRMP Update. In addition, the Environmental Department maintains a bibliographic database to support the MCBH natural resources management program (COA 7.7).

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