Environmental Assessment

Construction of an Urban Close Air Support Range and an Aviation Bulls-Eye Range
at
Pohakuloa Training Area, Hawaii

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ENVIRONMENTAL ASSESSMENT
FOR THE CONSTRUCTION OF AN URBAN CLOSE AIR SUPPORT RANGE AND AN AVIATION BULLS-EYE RANGE AT POHAKULOA TRAINING AREA, HAWAII

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Submitted by:

BRIAN ANNICHIARICO
Colonel, US Marine Corps
Commanding Officer
Marine Corps Base Hawaii

Reviewed by:

ROBERT EASTWOOD
Director of Public Works
US Army Garrison, Hawaii

Approved by:

DANIEL W. WHITNEY
Colonel, US Army
Commanding

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Acronyms and Abbreviations

ac	acre(s)
A-G-I Village	Air Ground Integration Village
AGL	Above Ground Level
BAX	Battle Area Complex
CAA	Clean Air Act
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FOB	Forward Operating Base
ft	foot/feet
FW	Fixed Wing
HE	High Explosive
ha	hectare(s)
kt	knot(s)
MBTA	Migratory Bird Treaty Act
MCBH	Marine Corps Base Hawaii
m	meter(s)
mi	mile(s)
MOUT	Military Operations on Urban Terrain
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLAA	Not Likely to Adversely Affect
OP	Observation Point
PM_{10} and $_{2.5}$	Particulate Matter 10 microns or 2.5 mircons
PPE	Personal Protective Equipment
PTA	Pohakuloa Training Area
ROD	Record of Decision
ROE	Rules of Engagement
RW	Rotary Wing
SHPD	State Historic Preservation District
SOP	Standard Operating Procedure
TSP	Total Suspended Particulate Matter
UCAS	Urban Close Air Support
USAG-HI	United States Army Garrison, Hawaii
USARHAW	United States Army Hawaii
USMC	United States Marine Corps
UXO	Unexploded Ordnance
VOG	Volcanic Smog

1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

The United States Marine Corps (USMC) continuously strives to provide realistic training opportunities that simulate current and future battle environments to prepare units for combat duty. Pohakuloa Training Area (PTA), on the island of Hawaii (Figure 1), is a primary training area for USMC forces based in Hawaii. As such, the USMC has provided funding for the construction, installation, and maintenance of two new ranges at PTA: an Urban Close Air Support Range (UCAS) and an Aviation Bulls-Eye Range. These ranges will enhance training opportunities for Marine aviators of both rotary and fixed wing who train at PTA. The Army will provide the necessary space.at PTA, as they have in the past, in order to enable the USMC to meet their training requirements.

The Army's 25th Infantry Division and the USMC are primary users of PTA. USMC forces based in Hawaii have come to rely upon PTA to fulfill a large portion of their Mission Essential Task List training requirements. In addition to the 3rd Marine Regiment based at MCB Hawaii Kaneohe Bay, PTA also supports the training of Marine Forces afloat as they transit the area enroute to the Far East.

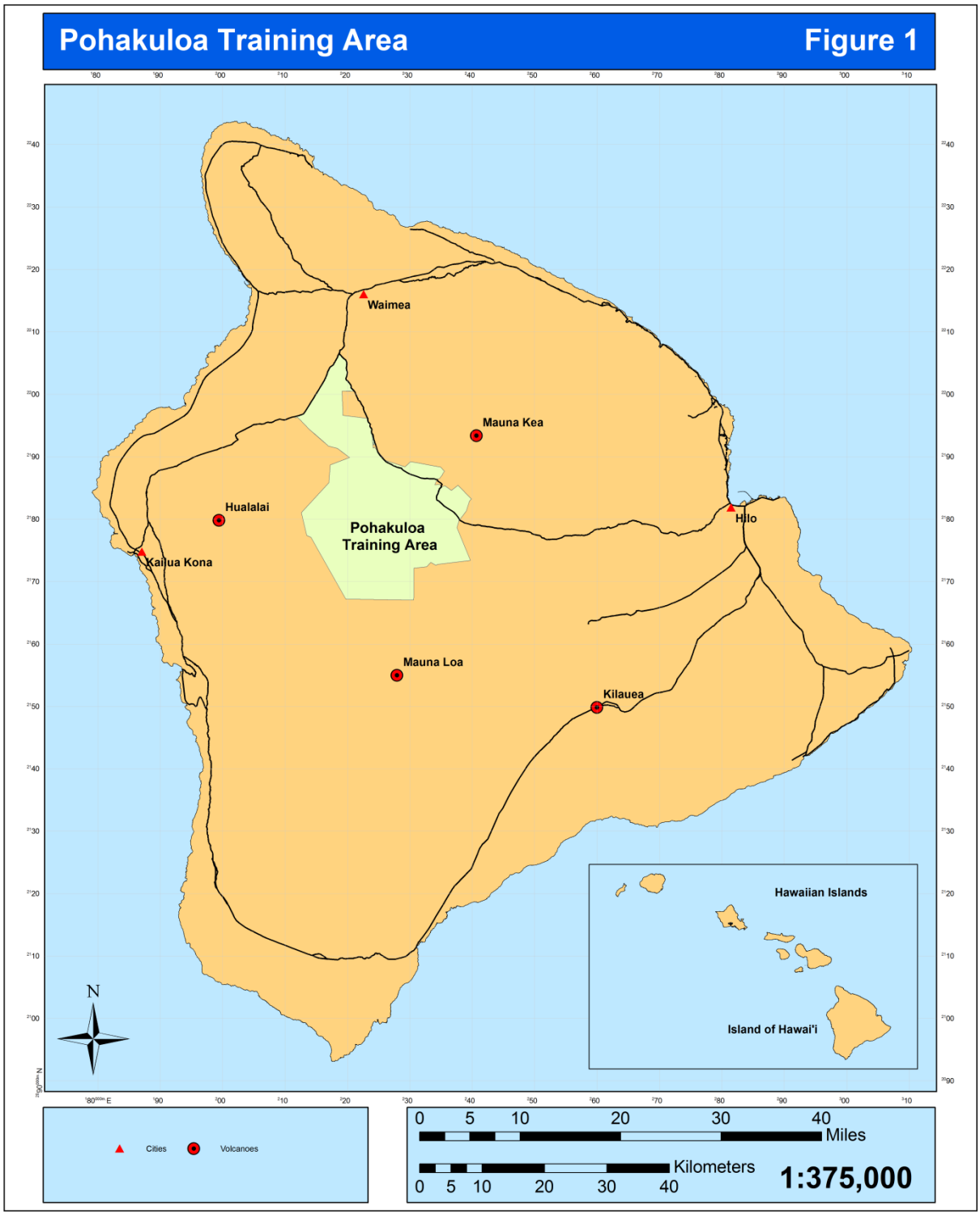
PTA is the largest live-fire range and training installation in Hawaii and supports full-scale combined arms live-fire and field training exercises from squad to brigade level. PTA is approximately 132,800 acres, with a centrally located Impact Area. The Impact Area is approximately 51,000 acres in size and is used for helicopter door gunnery, fixed wing bombing, gunnery and artillery fire. The impact area is off-limits to unauthorized personnel due to the presence of unexploded ordnance (UXO).

The preparation of this Environmental Assessment (EA) is funded through the USMC in compliance with the National Environmental Policy Act (NEPA) of 1969. The USMC will be funding, in its entirety, the construction, installation, and future maintenance of these ranges once completed while the Army will continue to own the land.

1.2 Purpose and Need

Training requirements, both present and future, are driven by events taking place on the battlefields around the world. Recent conflicts have seen an increase in strategic battles in urban environments. Increased urbanization and the capabilities to fight under the concealment of city blocks, offers great advantage to the enemy.

The purpose of the proposed action is to provide comprehensive and realistic training facilities for air action by fixed wing (FW) and rotary wing (RW) aircraft against hostile targets in an urban environment that are in close proximity to friendly forces in order to improve USMC training and readiness in Hawaii. This requires detailed planning, coordination and training for effective and safe execution. This training is essential to aviators who have a small margin of error under increasingly complex command directives and rules of engagement (ROE). Training efficiency and realism will be significantly increased by co-locating these ranges at one location while allowing the requisite integration of training objectives.


Pohakuloa Training Area
Figure 1
Waimea
Mauna Kea
Hualalai
Pohakuloa
Training Area
Hilo
Kailua Kona
Mauna Loa
Kilauea
Hawaiian Islands
Island of Hawai'i
N
Cities
Volcanoes
0 5 10 20 30 40
Miles
Kilometers
0 5 10 20 30 40
1:375,000

There is no UCAS capability in the Hawaiian Islands and as such Marine aviators are not able to fully meet new training requirements. UCAS is one of the most difficult aviation missions to accomplish because of the potential for collateral damage and fratricide. Being able to practice UCAS missions before aviators are exposed to combat will better prepare them for target acquisition, target discrimination, and reduce collateral damage and fratricide.

The nearest Marine UCAS/Bulls-Eye facility is located at Marine Corps Air Station Yuma, Arizona. Small elements are sent to Yuma to train but not everyone in the squadron has the opportunity to practice UCAS. An entire attack squadron will never be fully trained in UCAS operations without a Hawaiian Islands UCAS range. The cost associated with sending island-based Marines to Arizona for training exercises is extremely expensive (millions of dollars per training event), primarily due to the moving of aircraft.

1.2.1 Scope of this EA and the Decision to be Made

This EA evaluates the proposed establishment of two new ranges and several dedicated observation points (OPs) within the southern reaches of the Impact Area at PTA. This EA will be used to determine whether or not a Finding of No Significant Impact (FONSI) is appropriate or whether a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) is required. The direct, indirect, and cumulative effects of the proposed actions and alternatives, including the no action alternative, are considered and discussed herein.

1.2.2 Issues Analysis

Issues evaluated in this EA include: air quality, geology and soils, biological resources, cultural resources, wildfire, water resources, visual resources, noise, airspace, human health and safety, land use and recreation, and socioeconomics and environmental justice.

1.2.3 Other Environmental Analysis Relevant to the Action

In 2007, the US Navy was the project proponent of an EA titled "Construction of a Mock Airfield at Pohakuloa Training Area, Hawaii". The EA concluded that the proposed action would not have any unmitigable, significant direct, indirect, or cumulative adverse impacts on the environment. The proposed actions described within this EA are located directly adjacent to the Mock Airfield site and occupy the same lava flow and habitat types as the proposed action**.**

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This chapter describes the proposed actions, alternatives considered, and alternatives eliminated from detailed analysis.

2.1 Alternative 1: Proposed Action

Under the proposed actions, the UCAS Range, Aviation Bulls-Eye Range, and several dedicated OPs will be installed and used within the southern portion of the PTA impact area, within the vicinity of the of Hilo-Kona Road and adjacent to the Mock Airfield (Figure 2).

Urban Close Air Support - Installation of the UCAS Range, in the form of an urban village, is proposed in order to train USMC aviators. The built-up village will consist of 185 sea/land shipping containers arranged over a 10 ac site. The containers will be arranged, and in some instances stacked, in order to create cube houses, row houses, warehouses and apartments (Table 1) that will replicate a small urban environment. Eventually, a series of hardwired and remotely controlled, programmable targets, such as Stationary Infantry Targets (SIT), Stationary Armor Targets (SAT), and full-sized steel replicas of armored vehicles may be installed.

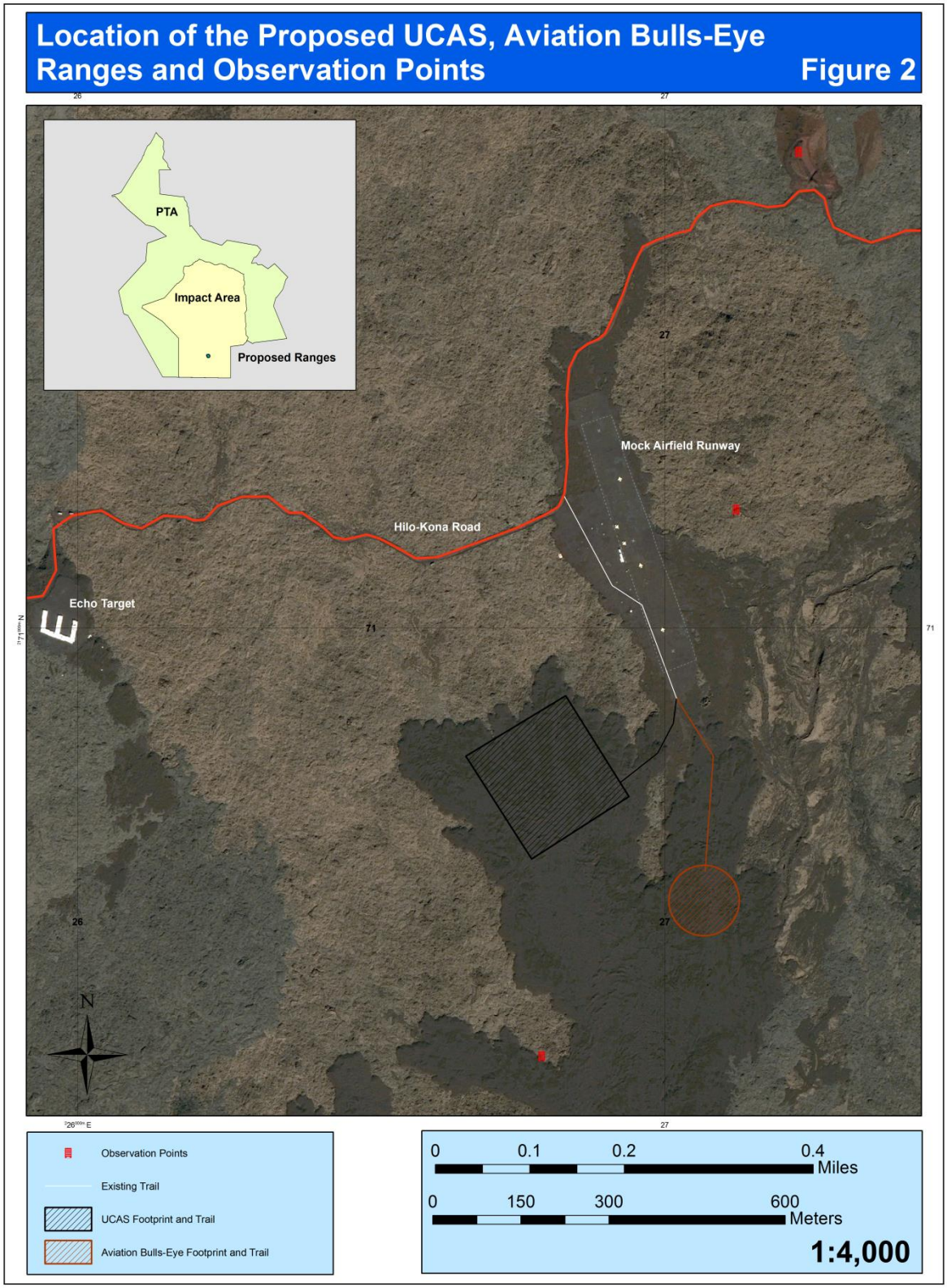
Table 1: Types and numbers of building to be constructed

Building Type/Shape	Number	Dimensions	Containers Required	Stories
Cube Houses	18	16Wx20Lx16H	72 – 8x8x20	2
Row Houses	6	16Wx40Lx8H	12 – 8x8x40	1
Warehouses	4	16Wx40Lx16H	16 – 8x8x40	2
Apartments	2	24Wx40Lx24H	18 – 8x8x40	3
T – Shape	3	40Wx48Lx16H	18 – 8x8x40	2
L – Shape	4	28Wx20Lx16H	16 – 8x8x20	2
U – Shape	2	36Wx40Lx24H	12 – 8x8x40 6 – 8x8x20	3
H – Shape	1	36Wx40Lx24H	12 – 8x8x40 3 – 8x8x20	3
Totals	**40**		**185**[1]	

[1] 8x8x40ft= 88 40ft containers 8x8x20ft=97 20ft containers

The containers will be held together with corner brackets and welded to each other for stability. Various colors that attempt to match the terrain may be used to paint the buildings. Windows and door openings will be painted on the majority of the containers but several will have cut out areas for placing target silhouettes. Access to the UCAS Range will be via a small service trail created by compacting the original a'a lava. The trail will be approximately 0.12 mi long and 16-20 ft wide (190 m long and 5-6 m wide).

Aviation Bulls-Eye - This range will be located to the south and east of the UCAS Range. This range consists of a series of concentric circles visible from the air and ground that allows both an air or ground


Location of the Proposed UCAS, Aviation Bulls-Eye Ranges and Observation Points
Figure 2
PTA
Impact Area
Proposed Ranges
Mock Airfield Runway
Hilo-Kona Road
Echo Target
26
27
71
N
Observation Points
Existing Trail
UCAS Footprint and Trail
Aviation Bulls-Eye Footprint and Trail
0 0.1 0.2 0.4 Miles
0 150 300 600 Meters
1:4,000

observer to judge the accuracy of aviation delivered ordnance. The scoring of helicopter-delivered fire is required for the training of both attack and utility helicopter pilots and crews. Painted automobile tires will be brought in to create the series of concentric circles at various distances from the center target. The footprint of this range (excluding the access trail) will be no larger than 2.8 ac. This range will also be serviced via a small trail approximately 0.20 mi long and 16 -20 ft wide (300 m long and 5-6 m wide). The trail will be created by compacting the a'a lava. Training at both ranges will be conducted using only inert munitions. The proposed location for both ranges is on a young barren a'a lava flow (Figure 3). The sites will be prepared using a bulldozer, grader and roller.

Figure 3: A'a lava flow at the UCAS location looking north towards Mauna Kea

Observation Points (OPs) - Three OPs will be located in proximity to the UCAS and Aviation Bull-Eye Ranges to view training iterations and aid in scoring. The OPs will consist of sand bags stacked in such a way so that they offer protection to the observer while maintaining a good line of site to the ranges during training exercises. Depending on the training scenario different OPs may be used. The first is located atop a previously disturbed pu'u (cinder cone) approximately 0.62 mi (1000 m) away from the ranges. This pu'u has been used as a source of construction material for the past several decades and provides good line of site to the UCAS Range. The second site is located approximately 0.37mi (600 m) away and is located upon a naturally raised portion of pahoehoe lava northeast of the mock runway. This OP offers an unobstructed line of site to the Bulls-Eye Range. The third OP is located to the south of both ranges approximately 0.20 mi (320 m) away from the nearest point of the UCAS Range. This site is located upon a'a lava directly adjacent to a pahoehoe lava flow. This OP will provide observers with a view of the southern reaches of both ranges. No new trails will be constructed in order to access these OPs. Travel to these sites will be by foot. The establishment of the OPs is integral for the use of the ranges.

Once completed, the ranges will be used to train both fixed wing and rotary wing aviators. The establishment of these ranges will result in approximately 11% more rotary wing aircraft using the southern portion of the PTA Impact Area. Typical rotary wing attack altitudes will range from 200-2,000 ft Above Ground Level (AGL) at speeds ranging from 60-120 kts, while fixed wing attack altitudes will typically occur from 10,000 ft AGL at speeds ranging from 380-550 kts. The ordnance used includes: 7.62, .50 cal, 20 mm, 25 mm, 30 mm, MK76, BDU 32, LGTR, concrete dumb bombs, ATM-114 inert Hellfire and 2.75in rockets. This is the same ordnance that is used at the Silent E and the Mock Airfield. All ordnance is inert (no High Explosive rounds or HE). All classes of fixed wing and rotary wing aircraft from all branches of the service will potentially train using the new ranges. Fixed wing training events will typically involve the FA-18 Hornet and to a lesser extent the AV-8B Harrier, the F-15 Eagle, F-16 Fighter Falcon, F-22 Raptor, and F-35 Lightning. Rotary wing training events will most likely include the use of the UH-1 Iroquois, AH-1 Cobra, OH-58 Kiowa, AH-64 Apache and to a lesser extent the CH-53 Sea Stallion, UH-60 Blackhawk, and CH-47 Chinook for door gunnery.

The USMC anticipates using the ranges once every other month for 7 days, with 5 UH-1 and 7 AH-1, while Lava Viper exercises (2-3 times per year) will involve both FW and RW for 10-14 days. A Lava Viper Exercise may include 12 FA-18, AV-8B or F-35s and up to 18 UH-1s and AH-1s. Navy use is expected to be twice a year with FA-18s for a 3 day period. The US Army use is expected to include 6 to 8 OH-58/AH-64s per quarter for a 10 day period (D. Geltmacher pers. comm. 2013).

2.2 Alternative 2: No Action

Under the no action alternative, the UCAS Range, Aviation Bulls-Eye Range, and the OPs will not be constructed at PTA.

2.3 Alternatives Considered and Eliminated

PTA is the only training facility in Hawaii that can support the establishment of UCAS and Aviation Bulls-Eye Ranges. USMC installations on Oahu lack the necessary ground and air space. Door gunnery is also prohibited on Oahu as is the use of tracers and rockets. Once constructed and operational at PTA, the UCAS and Aviation Bulls-Eye ranges will allow Marine aviators to fulfill their training requirements without having to leave the islands. Other non-Marine units will also benefit from the establishment of these ranges as they have similar training requirements.

A location south of Range 11 in the northern portion of the impact area was considered as an alternative to the proposed location but was eliminated from further consideration because it would encroach upon other training in the area. The alternative site is too close to other newly constructed ranges (Battle Area Complex, A-G-I Village) and the surface danger zones (SDZs) from other ranges would preclude the use of the UCAS and Aviation Bulls-Eye Ranges when adjacent ranges are in use. Because of potential encroachment this alternative would not meet the purpose and need of improving USMC training in Hawaii. Additionally, the area around Range 11 is predominately pahoehoe lava which would mean crushing and hauling thousands of tons of aggregate in order to provide a stable platform upon which to place the containers. The area in question is also close to those areas that might be affected by the presence of spent Depleted Uranium (DU) rounds. The area in the south is well outside of the DU Radiological Control Areas (RCA).

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The focus of this section is to identify the environmental resources that could potentially be affected if the proposed action or alternatives were implemented. Only those environmental resources that would potentially be affected by the proposed action, or are of issues of concern, are included in this section and analyzed. The scoping process of this EA identified the following potentially impacted environmental resources: air quality, geology and soils, biological resources, cultural resources, wildfire, water resources, visual resources, noise, airspace, human health and safety, land use and recreation, and socioeconomics and environmental justice. Table 2 summarizes the potential impacts of proposed action.

This section also identifies and details the direct and indirect effects that would occur upon implementation of the proposed action and alternatives. Anticipated adverse effects are presented for each resource described. If no effects are identified for a particular resource area, that is also mentioned. The cumulative impacts are looked at in detail in the next chapter.

Table 2: Summary of potential impacts

Environmental Components	Preferred Location	No Action Do Not Build
Air Quality	●	○
Geology and Soils	●	○
Biological Resources	●	○
Cultural Resources	○	○
Wildfire	○	○
Water Resources	○	○
Visual Resources	●	○
Noise Quality	●	○
Airspace	○	○
Human Health and Safety	○	○
Land Use and Recreation	○	○
Socioeconomics and Env. Justice	○	○

Legend
○ = No impact
◊ = Significant impact
● = Less than significant impact

3.1 Air Quality

3.1.1 Affected Environment

The U.S. Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ozone, carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide, nitrogen oxides and lead. Hawaii has also set a state ambient air standard for hydrogen sulfide.

In addition to monitoring the ambient air for criteria pollutants, the State of Hawaii also participates in the national $PM_{2.5}$ speciation monitoring program. This program is designed to establish a relationship between particle concentrations and adverse health effects that would provide valuable information in characterizing aerosols, determining the effectiveness of control strategies, and understanding the effects of particle pollution on atmospheric and regional haze (State of Hawaii Annual Summary 2011 Air Quality Data).

The State of Hawaii has 6 monitoring stations located throughout the island of Hawaii to measure air quality impacts from the volcano and geothermal energy production. In addition to the state run program, the U.S. Army has also initiated a program to monitor training related impacts and how these affect the quality of the air at PTA. For the year 29 January 2006 – 30 January 2007 the Army established and installed monitoring stations at remote locations around the installation and measured 24-hour concentrations of total suspended particulate matter (TSP) and particulate matter ten 10 micrometers or less (PM_{10}). Measurements were in accordance with the US Environmental Protection Agency's (EPA) every 6^{th} day monitoring schedule.

The results at all stations indicated levels of airborne particulate matter well below EPA's 24-hour PM_{10} thresholds. Annual PM_{10} averages across all sites at PTA were approximately one half of those reported at the eight State of Hawaii Department of Health (DOH) monitoring sites in 2006. Air quality at PTA is considered among the best in the state. During training, maximum 24-hour concentrations at PTA sites were comparable to the results from the DOH sites (J.W. Morrow 2010)

3.1.2 Environmental Consequences

Proposed Action

Both ranges will require the affected footprints to be leveled with bulldozers, graders and rollers. During construction the equipment will generate engine exhaust emissions and fugitive dust. These activities will be short-lived and affect only the local surroundings. The majority of generated dust will be of a larger size class which will preclude it from moving very far from the existing footprint via the air column. The surrounding terrain's surface roughness will prevent particles from moving very far over the surface. Those particles that fall into the smaller size classes will have minimal impact on the surrounding barren lava and sparse shrub lands.

The predominate winds during intense storms are usually out of the south east which will carry any airborne small sized particles back into the Impact Area and not off the installation. In the rare instance that the wind direction has the potential to move dust off the installation and onto adjacent property, the surrounding terrain is also predominately barren lava and sparsely vegetated shrub land. There is no human habitation on lands adjacent to PTA. In the event that construction generated fugitive dust appears to be causing localized air quality concerns, water may be applied in order to minimize the impact and spread of dust.

No Action Alternative

For the purpose of this analysis, no additional impacts to air quality are expected under the No Action Alternative

3.2 Geology and Soils

3.2.1 Affected Environment

The action area for both the UCAS Range and the Aviation Bulls-Eye Range lie entirely within the Mauna Loa Kau Basalt lava flow which originated between 750 to 1,500 Years Before Present (YBP) (Figure 4) (Wolfe and Morris 1996). Other nearby flows are of the same origin (Mauna Loa southwest-rift zone) but are slightly older, ranging from 1,500 years to 5,000 years.

Soils in this area are virtually non-existent due to the recent origin of the lava flows, and the lack of precipitation. Between 750 to 1,500 years is very little time for soils to develop in such a dry environment which lack rapid weathering and decomposition. The majority of the action area consists of a'a lava flows with little or no soil cover (Figure 5).

The OPs will be situated on a variety of substrates including pahoehoe and a'a lava, as well as an unnamed pu'u. The pu'u is composed of cinder.

3.2.2 Environmental Consequences

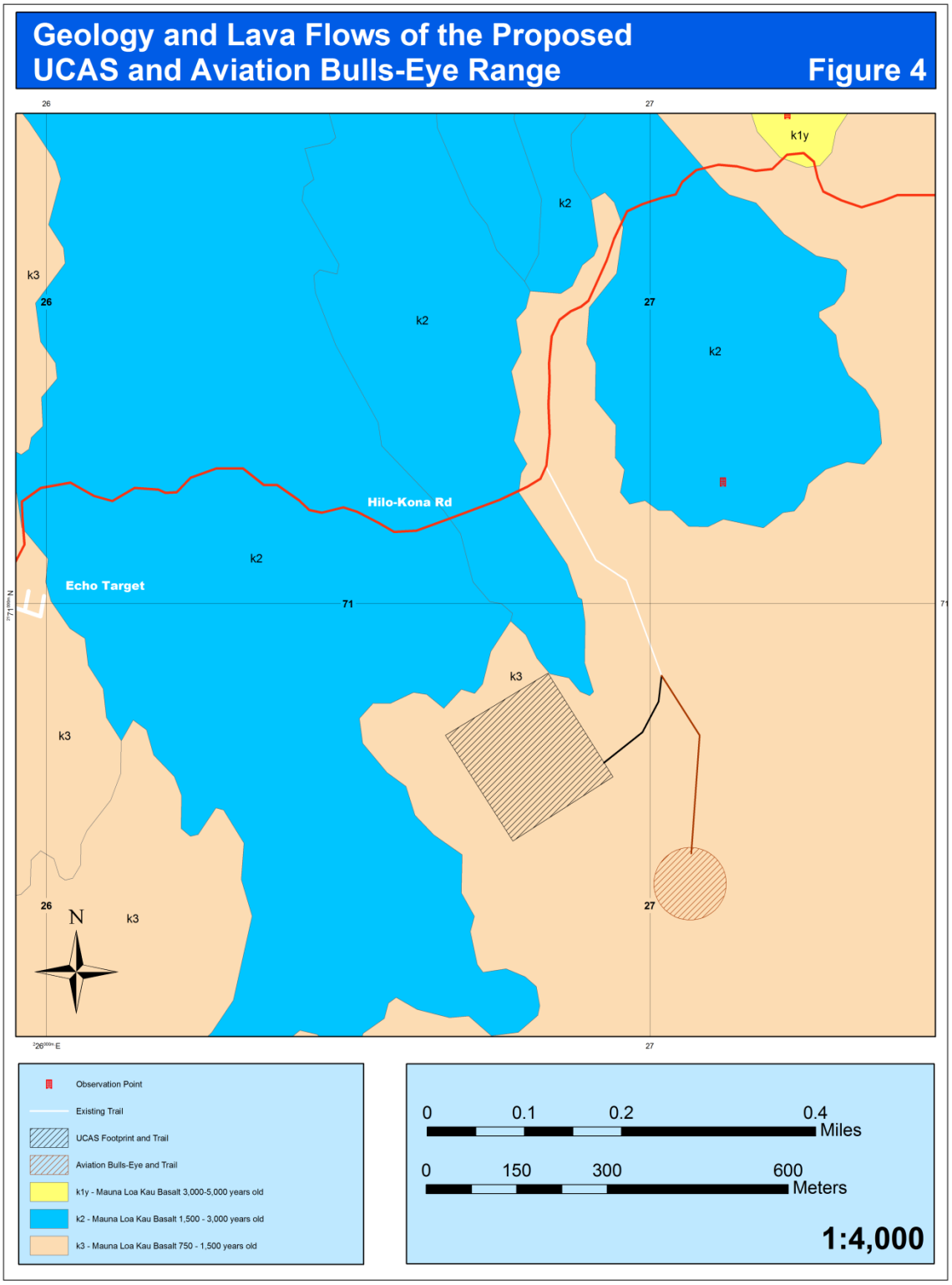
Proposed Action

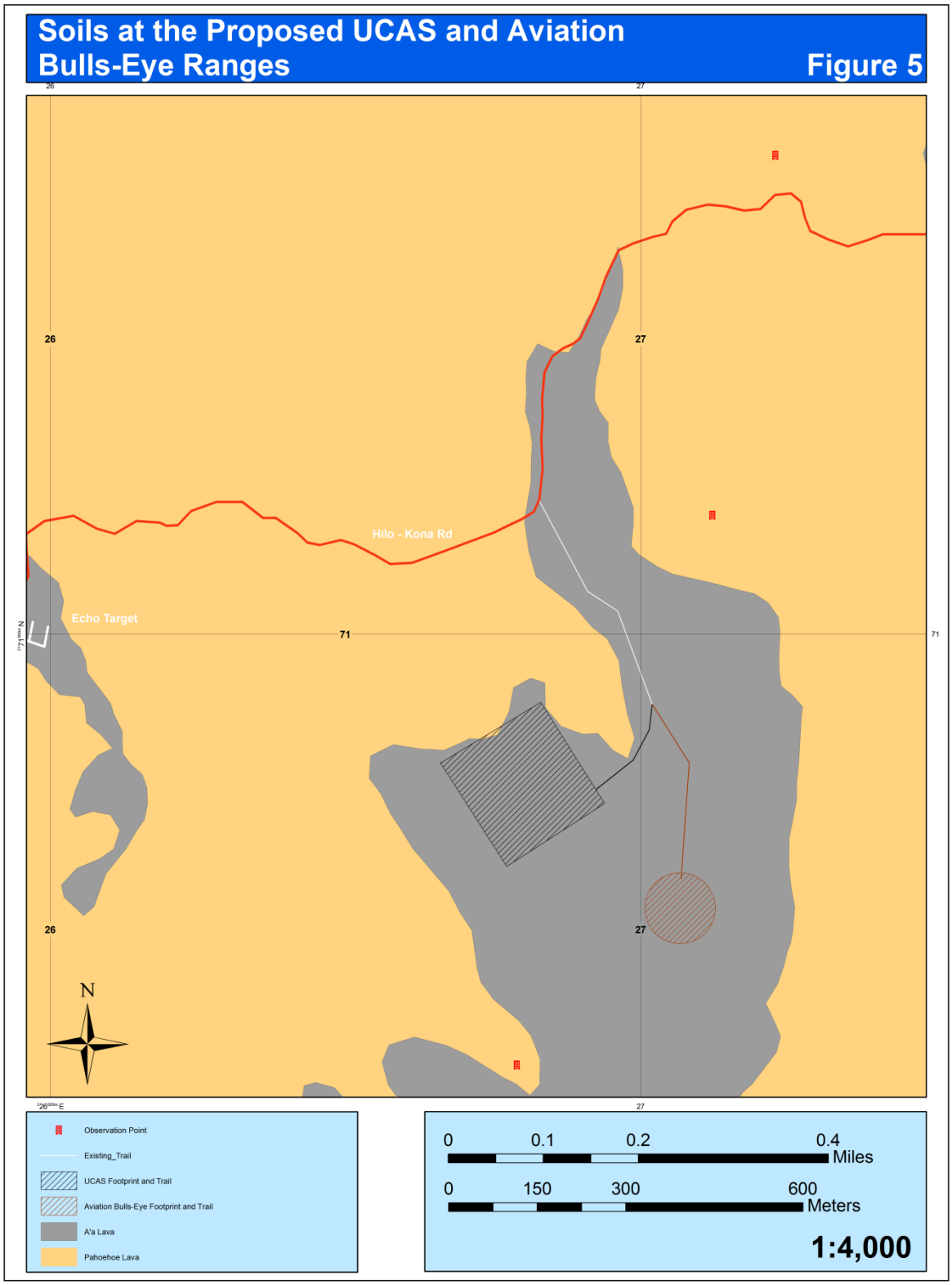
The a'a lava within the proposed action area will be crushed and leveled with bulldozers, graders and rollers. Impacts to the ground surface will be negligible because the site is composed of a'a lava with little to no soil development. The potential for wind erosion affecting the surface during construction and when the ranges are complete will depend on speed, duration and direction of the winds. During construction strong winds from the southeast will carry any fugitive dust further into the Impact Area where they will likely fall out over time and space. Once constructed, the UCAS Range and its built up area will generate variability in the near surface winds as the containers will break up and channel winds in new directions. This will likely reduce the amount of airborne soil or small a'a particles, thus reducing the amount of material leaving the site. During training, airborne particulate matter may become elevated above the height of the buildings and carried off-site. Again, because the prevailing direction of strong winds come from the southeast this material will be moved further into the Impact Area where it will fall out over time and space.

The footprints of the OPs will not have any impact on the soil and geology of the area. Sand bags will be brought in to provide protection to the observer. The observers will be required to walk to the various locations in order to observe training.

No Action Alternative

For the purpose of this analysis, no additional impacts to geology and soils are expected from the No Action Alternative.


Geology and Lava Flows of the Proposed
UCAS and Aviation Bulls-Eye Range
Figure 4
k1y
k2
k3
Hilo-Kona Rd
Echo Target
26
27
71
N
Observation Point
Existing Trail
UCAS Footprint and Trail
Aviation Bulls-Eye and Trail
k1y - Mauna Loa Kau Basalt 3,000-5,000 years old
k2 - Mauna Loa Kau Basalt 1,500 - 3,000 years old
k3 - Mauna Loa Kau Basalt 750 - 1,500 years old
0 0.1 0.2 0.4 Miles
0 150 300 600 Meters
1:4,000


Soils at the Proposed UCAS and Aviation Bulls-Eye Ranges
Figure 5
Hilo - Kona Rd
Echo Target
26
27
71
N
Observation Point
Existing_Trail
UCAS Footprint and Trail
Aviation Bulls-Eye Footprint and Trail
A'a Lava
Pahoehoe Lava
0 0.1 0.2 0.4
Miles
0 150 300 600
Meters
1:4,000

3.3 Biological Resources

3.3.1 Affected Environment

PTA is located in a subalpine tropical dryland ecosystem. Rainfall is low, soils are poorly developed and substrates are porous. The average annual precipitation is 15 inches based on 29 years of data collected at Bradshaw Army Airfield (Shaw and Castillo 1997). The vast majority of the installation is above the thermal inversion layer and is therefore not influenced by the tradewind-orographic rainfall regime. On trade wind days when the inversion is well defined, the clouds develop below the inversion and rarely above, resulting in PTA being dry and sunny. This inversion layer is usually situated between 5,000 and 7,000ft. The vast majority of the precipitation at PTA falls within the winter months (November – March). The climate at PTA can be described as cool-tropical characterized by an average temperature of around 55^{o} Fahrenheit. Under the widely used Köppen climate classification system the climate at PTA is described as semi-arid steppe. PTA experiences greater diurnal temperature changes than seasonal fluctuations.

According to the classification system developed by Shaw and Castillo (1997) there exist some 23 plant communities at PTA, along with barren areas of a'a and pahoehoe lava. Several more highly disturbed communities exist within the Keamuku Maneuver Area. Barren lava covers a great deal of the installation, although these communities are slowly becoming colonized with various non-native invasive weed species. Where vegetation does exist, it varies from sparse and scattered to relatively dense. Approximately 38% of the plants found at PTA are endemic or indigenous to the Hawaiian Islands.

Twenty federally-listed species (15 endangered plants, 1 threatened plant, 3 endangered birds, and 1 endangered mammal) are present and/or potentially use habitat on the installation. Federally-listed plants at PTA include *Asplenium peruvianum* var. *insulare*, *Haplostachys haplostachya*, *Isodendrion hosakae*, *Kadua coriacea*, *Melanthera venosa*, *Neraudia ovata*, *Portulaca sclerocarpa*, *Schiedea pubescens*, *Silene hawaiiensis*, *Silene lanceolata*, *Solanum incompletum*, *Spermolepis hawaiiensis*, *Stenogyne angustifolia* var. *angustifolia*, *Tetramolopium arenarium* ssp. *arenarium* var. *arenarium*, *Vigna o-wahuensis*, and *Zanthoxylum hawaiiense*.

The Hawaiian Goose or Nene (*Branta sandvicensis*) is an endangered bird that is known to frequent several areas of the installation during certain times of the year. The most frequent sightings of the Hawaiian Goose at PTA are in the vicinity of the Range 01 Complex which is located approximately 4 miles northeast of the proposed action area. The endangered Hawaiian Hawk and the endangered Hawaiian Petrel have been observed transiting the installation and may occasionally use habitat at PTA.

The single native mammal known to PTA is the endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). Most sightings of this species have been in the western portion of the installation where the vegetation is more diverse and denser compared with most other areas of PTA.

Vegetation

The proposed action area is situated entirely within barren lava (Figure 6). The UCAS Range would create approximately 10 acres of new ground disturbance. A portion of the entrance into the range will be along the Mock Airfield (i.e. the existing trail on the maps). The Aviation Bulls-Eye Range footprint will alter approximately 2.8 acres plus the trail. The surrounding pahoehoe lava flow has been classified as *Styphelia-Dodonaea* Shrubland. This particular plant community occupies large areas in the southern and eastern parts of the installation. Dominant plants within this community include *Leptecophylla tameiameiae* (pukiawe), *Dodonaea viscosa* (a'ali'i) and *Vaccinium reticulatum* ('ohelo). Other native plant species that can be readily found in the vicinity the proposed ranges include *Dubautia ciliolata* (kupaoa), *Deschampsia neubigena* (hairgrass), *Coprosma ernodeoides* (kukaenene) and *Tetramolopium humile* (pamakani). A vegetation survey of the area revealed that there are no threatened or endangered plants within the footprint of the two proposed ranges, nor within the immediate surrounding areas.

All three OPs are described as lying within the *Styphelia-Dodonaea* Shrubland plant community. The first OP location atop the pu'u is vegetation free as it has been previously disturbed. A small cluster of *L. tameiameiae* exists along the northern flank of the pu'u. The second OP is located upon a naturally raised portion of pahoehoe lava surrounded by commonly found vegetation within the *Styphelia-Dodonaea* Shrubland plant community. The third OP is located south of the ranges atop of an a'a flow adjacent to a pahoehoe flow.

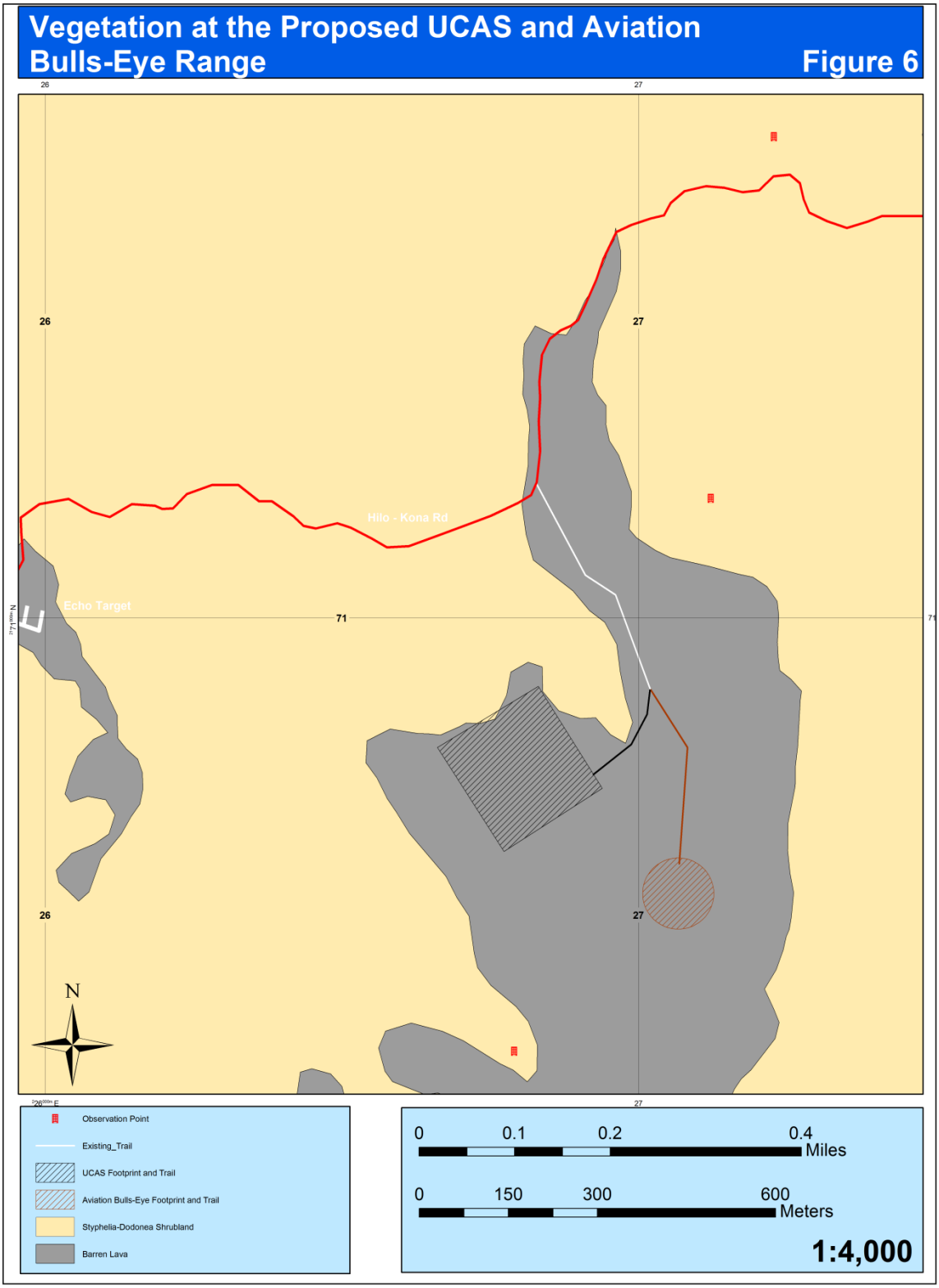
Wildlife

Five types of biological surveys were conducted by the PTA Natural Resources Office (NRO) in order to determine the extent of potential impacts that construction and operation of these new ranges will have on the native flora and fauna (see Appendix B). Surveys included:

1. Avifauna;
2. Botanical;
3. Hawaiian Hoary Bat;
4. Invasive Ants;
5. Hawaiian Petrel and the Band-Rumped Storm Petrel.

The action area as defined by the NRO is the area of greatest extent potentially impacted by UCAS operations. This area was based on a reasonable noise level threshold of concern for disturbance of bird species and as such extends beyond the action area/footprints outlined by the proposed new ranges.

The area under consideration for development is part of an avian flyway and may occasionally be used as a rest point for birds on their way to better and more productive habitat. Two birds in particular may be using the *Styphelia-Dodonaea* Shrubland as both a resting spot or even as a nesting area. The endangered Hawaiian Petrel (*Pteodroma sandwichensis*) and the candidate species Band-Rumped Storm Petrel (*Oceanodroma castro*), have been known to occasionally frequent the pahoehoe lava flows that occur around the action area.


Vegetation at the Proposed UCAS and Aviation Bulls-Eye Range
Figure 6
26
27
Hilo - Kona Rd
Echo Target
71
N
Observation Point
Existing_Trail
UCAS Footprint and Trail
Aviation Bulls-Eye Footprint and Trail
Styphelia-Dodonea Shrubland
Barren Lava
0 0.1 0.2 0.4
Miles
0 150 300 600
Meters
1:4,000

Subfossil evidence indicates that the endangered Hawaiian Petrel was once common on all of the main Hawaiian Islands. Distribution is now limited to Maui, Hawaii and Kauai. The population of the species is thought to be around 19,000 birds with a breeding population somewhere between 4,500 and 5,000 pairs. One hundred to 150 pairs are thought to be breeding on the Island of Hawaii.

Hawaiian Petrel colonies are usually located at high elevation xeric habitats or wet, dense forest. Nests are located in burrows, crevices, or cracks in lava tubes. Suitable habitat at PTA has been defined as open pahoehoe lava with lava tubes and blisters suitable for nesting sites. The *Styphelia-Dodonaea* Shrubland that exists in the vicinity of the action area is considered potential habitat. Studies attempting to detect the Hawaiian Petrel at PTA have determined that there is no colonial activity and extremely low levels of bird movement through the area.

Subfossil evidence suggests that the Band-Rumped Storm Petrel previously inhabited the main Hawaiian Islands. Populations are still extant on the islands of Maui, Hawaii and Kauai. Very little is known of the breeding biology of the Band-Rumped Storm Petrel, but individuals are assumed to nest in burrows or natural cavities at high elevation, inland habitats and are faithful to those nesting sites, often returning to the same site each year.

Similar to the Hawaiian Petrel, island wide movement patterns and potential flyways for the Band-Rumped Storm Petrel are poorly understood. There is consistent seasonal activity and documented flight patterns on the southeast flank of Mauna Loa. The species have been documented using habitat in the saddle region of Hawaii Island. At PTA, the species has been recorded on several occasions using Training Areas 21 and 23. It has been suggested that the species uses the saddle region as a flyway to nesting habitat on the northwest rift zone on Mauna Loa, within the Hawaii Volcanoes National Park.

No Hawaiian Petrels were recorded during field surveys using automated recording units. Several Band-Rumped Storm Petrel calls were recorded indicating that the surrounding pahoehoe lava flows could be potential habitat for petrel burrows. Avian surveys also observed and recorded two Migratory Bird Treaty Act (MBTA) protected species using the action area as defined by the NRO; Apapane (*Himatione sanguinea*) and Omao (*Myadestes obscurus*). It was also determined that the surrounding *Styphellia-Dodonaea* shrubland is potential foraging habitat for the bat.

3.3.2 Environmental Consequences

Proposed Action

Several factors are considered when examining whether an action would have a significant impact on biological resources if implemented. These include:

- cause the “Take” of a threatened and endangered species;
- result in a Jeopardy biological opinion;
- reduce the population of a sensitive species, or a species with a regional and local significance;

• alter or destroy high to moderate grade habitat that would prevent biological communities in the area prior to the project from reestablishing;

• introduce or increase the prevalence of undesirable nonnative species, or;

•cause the long term loss of a local habitat.

Even under this exhaustive list of criteria, no significant impacts to biological resources are expected from the proposed action.

Vegetation

The construction activity that will take place within the combined footprints of the two proposed ranges will have no effect on the local flora. No threatened or endangered plants were found within the proposed areas or in the immediate surrounding vicinity.

Special consideration will be given to the following non-native species, both during and after construction:

Pennisetum setaceum (fountain grass), an invasive, non-native perennial grass species, may increase its presence along the trails leading to the proposed action area or within the action area itself. In order to mitigate the transfer of seeds into the area, vehicles will be washed before entering the construction area. The scarcity of fountain grass within the vicinity of the Mock Airfield is a testament to the slow nature of establishment of this grass on this young a'a flow even after the substrate has been disturbed;

Senecio madagascariensis (fireweed) is a native of Madagascar and South Africa that became established in Hawaii in the early 1980's. Today this weed is widespread on the island of Hawai'i, infesting vast acreages of pasture, rangeland and roadsides. The ability of this species to establish itself and thrive in the action area will be difficult due to the lack of soil and rainfall. It will likely be restricted to the already established roads and trails leading to the ranges. The State of Hawaii is now attempting to control this species biologically.

The placement and subsequent use of sandbags at the OP locations will have very little or no impact on the existing vegetation. The OP location atop the pu'u is vegetation free and highly disturbed. The second OP location upon the raised portion of pahoehoe is situated amongst common native vegetation. The eventual placement of sand bags may impact a plant or two at most. The most southern OP location is atop a'a lava where no plants exist. The walk to each of the locations is not likely to impact the vegetation due to sparse vegetation coverage. Wildlife will also be unaffected by the placement of sandbags.

Wildlife

The NRO concluded that the potential direct and indirect effects resulting from UCAS operations are either insignificant or discountable and both the Hawaiian Petrel and the Dark-Rumped Storm Petrel are not likely to be adversely affected. Likewise, impacts to the Apapane and Omao in the form of noise

disturbance, wind generated from helicopter rotorwash and direct impact with aircraft are considered negligible. The lack of vegetation in and around the potential range locations likely limits foraging opportunities for bats and as such the construction and subsequent use of the ranges will have no appreciable effect on the bats that may use the area. In addition, no ants were found within the proposed construction footprints for the ranges (Appendix B).

No Action Alternative

For the purpose of this analysis, no additional impacts are expected to the biological resources from the No Action Alternative

3.4 Cultural Resources

3.4.1 Affected Environment

There are approximately 550 sensitive archaeological sites at PTA. Sites such as lava tubes, ahu/cairns, ranching features, volcanic glass quarries, excavated pits, c-shapes, trails and rock shelters are scattered widely across the entire installation. These sites comprise a portion of the larger cultural landscape that includes the sacred mountain Mauna Kea. The PTA region once supported traditional activities such as bird hunting for feathers and meat and quarrying volcanic glass. A network of trails connecting communities around the island is also present within the region.

The proposed action lies entirely within a very young a'a lava flow. The nearest known culturally sensitive areas are located to the east and west of this site several miles away. Neither of these sites will be impacted during construction nor when the ranges are in use.

3.4.2 Environmental Consequences

Proposed Action

A survey of the Area of Potential Affect (APE) led by a USMC government archaeologist was conducted from 20 - 24 May 2013. No archaeological sites (including trails) or deposits were observed during the survey and no archaeological resources were found. (Appendix A). The use of the ranges once the containers are installed will have no impact on any of the culturally sensitive areas as they are too far from the site to be impacted.

No Action Alternative

For the purpose of this analysis, no impacts are associated with cultural resources under the No Action Alternative.

3.5 Wildland Fire

3.5.1 Affected Environment

Wildland fire is one of the most serious threats to PTA flora and fauna. Wildland fire threatens sensitive ecosystems, cultural sites, and training resources. Extended periods of drought-like conditions and strong winds that frequent PTA leave the installation extremely vulnerable to wildland fire. The

proposed action area is located entirely within a barren lava flow. Consequently, wildland fire is improbable in this location. The plant community directly adjacent to this barren flow is the *Styphelia-Dodonaea* Shrubland and it is considered sparsely vegetated. A fire within this plant community is not likely to spread far or move very fast. In the unlikely event of a wildland fire, prevailing winds out of the southeast will likely push any wildfires further into the Impact Area.

3.5.2 Environmental Consequences

The likelihood of a fire within the proposed action area once training commences is extremely remote. Fire requires fuel and the action area is completely devoid of plant life. A few *L. tameiameiae* plants (<5) are sparsely scattered across the flow. Survey work within the *Styphelia-Dodonaea* Shrubland plant community revealed no evidence of recent or past fires (D. Faucette, unpublished data 2013). In the unlikely event that a fire is started within this community it would likely burn itself out fairly quickly as there is not enough fuel on the ground to sustain a fire.

No Action Alternative

For the purpose of this analysis, no impacts are associated with wildland fire under the No Action Alternative.

3.6 Water Resources

3.6.1 Affected Environment

There are no streams, gulches or other water bodies within the action area due to the low rainfall, porous soils and the permeability of the volcanic substrates. Ground water levels are thought to lie approximately 2000 ft below the surface and will not be impacted by the proposed action. Runoff from the project is not likely to occur at the site after construction as the substrate will continue to remain extremely permeable and absorb all precipitation.

3.6.2 Environmental Consequences

Proposed Action

With no streams, gulches or other water bodies present the proposed action will have no significant impact on water resources. Rain events will result in water running off the roofs of the containers that will make up the urban village but that will not result in any noticeable runoff. The porous nature of the surrounding terrain will be able to accommodate any additional runoff from the building roofs. The Mock Airfield shows absolutely no evidence of any stormwater runoff since its establishment several years ago (D. Faucette unpublished data 2013).

As the proposed action involves ground disturbance in excess of an acre a National Pollutant Discharge Elimination System (NPDES) permit will be obtained from the Hawaii Department of Health, Clean Water Branch prior to the start of construction.

No Action Alternative

For the purpose of this analysis, no impacts are associated with water resources under the No Action Alternative.

3.7 Visual Resources

3.7.1 Affected Environment

The proposed action area lies on a north facing, mid-to-lower-slope of Mauna Loa at around 7,700 ft (2,330 m) elevation. The expansive viewshed of the northern slopes of Mauna Loa, when viewed from the Saddle Road (recently renamed Daniel K. Inouye Highway), can be characterized as one of various colors which reflect the variety of different flows and the vegetation that may or may not be present on those flows. The observation and appreciation of the view will likely be by those passing through the saddle region on their way to other on-island destinations, hunters, recreational users and visitors to the Mauna Kea State Park.

3.7.2 Environmental Consequences

Proposed Action

The location and placement of the proposed action will add another man-made feature on the viewshed for those passing through the saddle region. Currently three other man-made features can be seen when looking south from the cross-island road (DKI Highway). The Mauna Loa Observatory is located high up the side of the mountain at approximately 11,000 ft elevation, while the Silent E and the Mock Airfield are visible in the vicinity in which the new ranges are to be located. Hawaii is an island of great scenic beauty with magnificent landforms, expansive vistas, dramatic coastlines and forests. The view in question is not recognized in the Hawaii County General Plan as being of special significance (County of Hawaii 2005). On many days this view is severely degraded due to the presence of clouds and volcanic smog (VOG) in the atmosphere.

No Action Alternative

For the purpose of this analysis, no impacts are associated with visual resources under the No Action Alternative.

3.8 Noise

3.8.1 Affected Environment

Noise from the construction and use of the ranges has the potential to impact wildlife and affect people living in nearby communities. Rotary wing aircraft visits to the southern portion of the installation are expected to increase by 11% once the proposed action is completed. Recent surveys in the area determined that there is some use of the area by both native and non-native fauna. The Hawaiian Petrel as well as the Dark-Rumped Storm Petrel are believed to be using the saddle region as a flyway to nesting habitat on the northeast rift zone of Mauna Loa, within the Hawaii Volcanoes National Park. Other MBTA birds both native and non-native may also use the area on occasion. The proposed action

area is located in a remote area of the PTA Impact Area well away from the nearest human community and the occasional traffic using the Saddle Road (DKI Highway).

3.8.2 Environmental Consequences

Proposed Action

The initial construction of the ranges will likely cause an increase in noise in the immediate area. The remote location of the proposed action will preclude this activity from being heard by anyone outside of the immediate vicinity. The noise impacts on the native and non-native fauna will be short term and minimal as the area is not considered quality habitat. Use of the area by wildlife is considered rare.

Once the containers are installed and the ranges are activated there will be an increase in noise from the aircraft transiting from the northern portion of the installation to the action area and the firing of ordnance. The remote location of the range, the unpopulated region surrounding PTA and the use of inert ordnance will likely mean that the activities will go virtually unnoticed by the nearest communities. The nearest human habitations to this range project is Waikii Ranch (18 mi), Kona (25 mi), Waikoloa (26 mi) and Waimea (28 mi).

During these events the noise has the potential to impact the native and non-native fauna that may be using the area. As the aircraft transit down range, fauna that may be along the flight path and are disturbed by the noise will likely exhibit avoidance behavior and flee the immediate area. Birds may flush from nests when sound levels are high, but generally they return to their nests within minutes after the disturbance abates. The literature supports that many bird species live, breed and raise young in areas within loud noisy habitats (Peshut and Schnell 2011). Studies also indicate that birds habituate to loud noises. This is certainly evident at PTA where rotary wing traffic is a fairly regular occurrence.

No Action Alternative

For the purpose of this analysis, no impacts are associated with noise quality under the No Action Alternative.

3.9 Airspace

3.9.1 Affected Environment

The airspace over PTA area is managed under the Special Use Airspace program as a Restricted Airspace that is controlled by PTA through the Federal Aviation Administration. Only prior coordinated/approved operations (Military or Civilian) are permitted during it activation.

3.9.2 Environmental Consequences

Proposed Action

The proposed action will not change nor alter the current restrictions on the airspace. The activities planned once the ranges are completed fall within the intended use of the airspace that controls PTA.

No Action Alternative

For the purpose of this analysis, no impacts are associated with airspace under the No Action Alternative.

3.10 Human Health and Safety

3.10.1 Affected Environment

Human health and safety issues at PTA as well as the rest of US Army Hawaii land include such things as hazardous materials, contaminated sites, noise and worker safety. Specific health and safety hazards include ammunition, lead, asbestos, PCB contamination, electromagnetic fields, petroleum, oils, and lubricants, underground storage tanks, pesticides and herbicides, and wildland fires.

The proposed action area is completely confined within the boundaries of the PTA Impact Area. The presence of UXO is a threat to all personnel who will be working on the range.

3.10.2 Environmental Consequences

Proposed Action

Noise will be generated both during and after construction. During construction workers will wear the necessary PPE as they would for any construction-related activity. The action area is within the impact area and UXOs may be encountered. In these instances, trained EOD personnel will either remove the UXO from the site and dispose of it somewhere else or dispose of it on site.

The use of the range will result in more visits to the Impact Area by personnel when doing repairs or upgrades. All ammunition will be inert so there will be no additional UXO in the Impact Area; just more debris.

No Action Alternative

For the purpose of this analysis, no impacts are associated with human health and safety under the No Action Alternative.

3.11 Land Use and Recreation

3.11.1 Affected Environment

PTA is made up of a cantonment, training areas and ranges, along with a centrally located Impact Area. The proposed action lies entirely within the PTA Impact Area.

Recreational opportunities at PTA are limited to hunting only. Archery mammal and shotgun bird hunting are the only two forms of hunting permitted on PTA. Mammal hunting takes place year round when it does not conflict with training. Training areas are made available at the discretion of Range Control and the PTA Commander. Bird hunting takes place in the winter months.

3.11.2 Environmental Consequences

Proposed Action

The proposed action will not change the current land use nor will it affect the recreational opportunities after completion. The work will take place entirely within the Impact Area and as such public access is strictly prohibited.

No Action Alternative

For the purpose of this analysis, no impacts are associated with land use and recreation under the No Action Alternative.

3.12 Socioeconomics and Environmental Justice

3.12.1 Affected Environment

Socioeconomics encompass a broad range of impacts on such things as demographics, economic activity and social issues. More specifically, such things as employment, housing and income as well as access to services such as schools and emergency services are taken into consideration.

3.12.2 Environmental Consequences

Proposed Action

Implementation of the proposed action will have a positive economic impact on island employment as a result of the temporary construction job created and materials and supplies purchased from local vendors. Implementation will not affect children due to the absence of schools in the area and the lack of permanent family housing facilities at PTA.

No Action Alternative

For the purpose of this analysis, no impacts are associated with socioeconomics and environmental justice under the No Action Alternative.

4.0 CUMULATIVE IMPACTS

In 1979 the Council on Environmental Quality (CEQ) defined a cumulative impact (effect) as 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 undertake such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (40 CFR 1508.7). This section discusses other projects on PTA and in Hawaii that may contribute to cumulative effects when combined with the anticipated effects discussed in this EA.

4.1 Past, Present and Reasonably Foreseeable Future Projects

Table 3 lists various projects that may result in incremental impacts on several resource areas from the proposed action. The projects in the table were identified based on recent, ongoing and or reasonably forseeable actions taking place on or near PTA. The table outlines each project, the location, the project proponent, a brief description of the project and a year of completion.

Table 3: Past, present and reasonably foreseeable future projects

Project Name	Project Location	Project Sponsor	Project Description	Timeframe
Construct Mock Airfield	PTA, Hawaii	Navy	Construction of a mock airfield in the southern portion of the PTA Impact Area. The airfield provides realistic targets to support carrier air wing with close air support and strike warfare training.	Completed 2009
Military Training Facilities on PTA	PTA, Hawaii	Marine Corps	Development of training facilities at PTA including a Military Operations in Urban Terrain (MOUT), Convoy Live-Fire range, enhancement of three forward operating bases and a live-fire grenade/shoot house.	Completed 2010
Battle Area Complex (BAX)	PTA, Hawaii	Army	Construction for company gunnery training and qualification requirements to support both mounted and dismounted live-fire operations.	Completed 1012
Deepening of the Kawaihae Harbor	Kawaihae Harbor, Hawaii Island	Hawaii State	Deepened harbor on the west side of Hawaii Island in order to accommodate growing demand for cargo to support the economy.	Completed

Table 3: (con't)

Hydrologic Evaluation and Exploratory Drilling Program	Humu'ula Saddle Region, Hawaii	University of Hawaii	Investigation of the subsurface geology and hydrology of the western Humu'ula Saddle Region.	In progress
High Altitude Mountainous Environmental Training (HAMET)	Mauna Kea and Mauna Loa	Army	High altitude helicopter training. using various LZ located upon State land on both Mauna Kea and Mauna Loa.	2011
HI-SEAS/PISCES Mars Habitat Project	Mauna Loa	University of Hawai'i Cornell University and Pacific International Space Center for Exploration Systems	The construction of a portable, self-contained "habitat" that will simulate one that might be constructed on Mars. This 5 year experiment will occur at the 8,000ft on Mauna Loa.	2013
Infantry Platoon Battle Course (IPBC)	PTA, Hawaii	Army	Construction and operation of a live fire Infantry Platoon Battle Course on the west side of PTA.	2016
BAAF Runway Realignment	PTA Cantonment Area, Hawaii	Marine Corps	Proposed realignment and extension of the BAAF runway, including construction of supporting infrastructure.	2018
Basing of the MV-22 and H-1 Aircraft in Support of 3rd Marine Expeditionary Force Elements in Hawaii	Oahu and Hawaii	Navy	The Navy signed a Record Of Decision (ROD) for the basing and operation of MV-22 Tiltrotor Osprey aircraft and H-1 helicopters in support of the 3rd Marine Expeditionary Force elements stationed in Hawaii.	2014
Ammunition Storage Facility	PTA Range Area, Hawai'i	Army	Proposed construction of three concrete oval-arched, primary ammunition igloos at PTA to be sited adjacent to the existing facilities.	2022
PTA Quarry Operations	PTA	Army, FHWA	Ongoing aggregate crushing for PTA training ranges and roads as well as for the new Saddle Road.	Ongoing

Table 3: (con't)

Saddle Road Realignment	Hilo/Kona, Hawaii	FHWA,HDOT, Army	Construction intended to straighten, repave and separate military training from motorists.	2013
Rotary Wing Apron and Aircraft Maintenance Facility	PTA, Cantonment, BAAF, Hawaii	Marine Corps and Army	Proposed construction at BAAF to enhance PTA's aviation operations and maintenance requirements.	2018
Helicopter Landing Zones	PTA	Army	High altitude helicopter training on PTA.	2014

The projects outlined in Table 3 can be broadly categorized as cantonment-related projects, range-related projects, and off-site nonmilitary projects.

Cantonment projects are capital improvement projects that are or have taken place within the cantonment area of PTA. The installation was established over 50 years ago and for the most part has seen very little capital improvement. Improvements are being made in order to replace worn out infrastructure or provide new facilities to meet the needs of today's fighting forces.

Range improvement projects are focused on past, present and future range construction and improvement projects on PTA. These projects are established in order to provide and meet the essential training needs of today's fighting forces.

Nonmilitary projects are those taking place off the installation but can be seen as contributing to the cumulative impacts at PTA. The proposal to install a biosphere habitat facility high up on the slope of Mauna Loa is one such example.

4.2 Cumulative Impacts by Resource

4.2.1 Air Quality

The cumulative impacts of the proposed action on air quality over time and space are not expected to materialize due to the small construction footprints involved, the remote location of the proposed activities and the lack of pre-existing disturbance. The most likely activity that would possibly react in a synergistic manner during the construction phase would be the coupling of construction activities with extremely strong wind events. Construction related fugitive dust could be carried by strong winds across large distances to interact with other areas generating dust or a fire in the impact area due to training. But as mentioned previously, winds would most likely be blowing out of the south east and push the air borne material further into the Impact Area.

4.2.2 Geology and Soils

The establishment and future use of these new ranges are not likely to result in any soil-related cumulative impacts over time or space. The soils throughout the region are negligible and after the initial construction the finer sized particles will fall into the spaces between the new surface and/or onto the surrounding, undisturbed lava flows.

4.2.3 Biological Resources

Based on the survey work completed, the PTA NRO has determined that the creation and future use of the UCAS and Aviation Bull-Eye Ranges is not likely to adversely affect both the Hawaiian Petrel and the Band-Rumped Storm Petrel, nor will the action have an appreciable effect on the Hawaiian Hoary Bat, botanical resources, and avifauna protected under the MBTA. The area is also unlikely to see an influx of nonnative vegetation whose introduction will cause the long term loss or degredation of the surround shrubland plant community. The Mock Airfield which is located directly adjacent to the proposed ranges is virtually weed free since being established 4 years ago.

4.2.4 Cultural Resources

No cumulative impacts to cultural resources are likely to occur both during construction or when the ranges are in use. The site is located on a very young a'a lava flow. Several surveys have yet to reveal any evidence of cultural use on this particular flow. Other sites are far removed from this location and will not be impacted.

4.2.5 Wildland Fire

The establishment of these ranges in not expected to increase the installations exposure to wildland fire, both in the immediate, or in the long term. There is the potential for weeds to become established after the proposed action is completed. However, the lack of rainfall and a suitable substrate to grow in will prohibit this from manifesting itself such that it becomes problematic from a fuel and potential fire standpoint. Periodic weed management will likely be incorporated in the final management plan/SOP that will guide the use of these ranges in the future.

4.2.6 Water Resources

The extremely permeable nature of the substrate even after the new construction will easily allow rain to infiltrate without creating any stormwater runoff. Even with the Mock Airfield only several hundred meters away no cumulative impacts are expected with the addition of the proposed ranges.

4.2.7 Visual Resources

Several other man-made features on the slopes of Mauna Loa are currently visible for those within the saddle region. The proposed action will add another feature to the viewshed. The cumulative impact will be slight as the feature when viewed from the road will appear small. The distance from the DKI Highway to the proposed action area is approximately 10 mi (16 km). These features when considered as a whole, occupy a very small portion of the total area visible. Atmospheric conditions either in the form of vog or clouds also reduce the potential times when the structures will be visible.

The impact created by the establishment of these ranges can be partially mitigated by painting the containers with colors that will blend with the surrounding terrain. This action will reduce their visibility and possible glare during certain times of the day. The buildings will also be set back from the edge of the a'a flow they are to be located on in order to maintain a natural berm that will help to obstruct the front face of the most northern containers.

4.2.8 Noise

It is expected that Marine aviators will likely use the ranges every second month for about a week and a half at a time. Other branches of the service will likely add another two weeks of use per year. The proposed action will generate more rotary wing trips down range which will have a noise impact on the native fauna. The cumulative impacts to the native wildlife should be minimal. The flight paths down to the action area will not change. The literature supports that many bird species, live, breed and raise young in areas with sound levels well over 80 dB (Peshut and Schnell 2011). Birds may depart from the immediate area along a flight line but generally return within minutes after the disturbance abates. Most native wildlife seems fairly at ease with the general level of noise down range.

The additional air traffic may result in complaints from the public as the aircraft transit up to PTA on their way to the installation. In order to combat this problem pilots are asked to avoid flying in airspace that will most likely generate complaints from the public as well as fly at a highest altitude practical. In some instances where pilot safety becomes an issue pilots are asked to consider using reduced power settings, consistent with safe operations. The use of the range will not likely generate any noise that can be heard in nearly communities. The range should be far enough away such that the noise generated is not transmitted beyond the boundaries of PTA.

4.2.9 Airspace

No cumulative impacts will be created with the addition of the proposed action. All training related activities will be coordinated through range control in order to de-conflict airspace and activities on the ground so that safe and effective training is achieved and maintained.

4.2.10 Human Health and Safety

Cumulative impacts related to human health and safety are not expected to materialize with the establishment of these new ranges. The only accumulation will be in the amount of debris in the impact area.

4.2.11 Land Use and Recreation

Construction of the proposed ranges is not likely to change the land use classifications nor alter the recreational opportunities available at PTA. The proposed ranges are located entirely within the PTA Impact Area and access is strictly prohibited.

4.2.12 Socioeconomics and Environmental Justice

Construction of the proposed ranges is not likely to result in any cumulative impacts to socioeconomics and environmental justice both in the near or long term.

5.0 MITIGATION

This section identifies potential mitigation measures to reduce the impact of the proposed actions.

Air Quality

Adherence to a well written construction SOP will help to minimize impacts to air quality in the immediate area. If strong winds are likely to generate fugitive dust during construction water should be applied. If the work is likely to impact others working or training on another range consideration should be given to temporarily halting construction until the winds subside or training is complete.

Biological Resources

Control or removal of *Pennisetum setaceum* plants around the vicinity of the new ranges and along the new trails will be undertaken. Most likely, weed control will be written into the contract that will be awarded to those tasked with managing the ranges. New seedlings can be pulled out of the ground without much effort if they are discovered early. The goal will be to reduce the amount of pesticides being applied and used in the general vicinity of the range. Because *P. setaceum* is slow to establish and the environmental conditions within this part of the installation make establishment and expansion so difficult, keeping this weed under control should be manageable.

Visual Resources

The viewshed will be impacted with the construction and establishment of the containers. This impact can be partially mitigated by painting those containers that will be visible for those working or passing through the saddle region. Colors that attempt to match the surrounding terrain can be used.

6.0 CONCLUSIONS

Based upon the findings and work undertaken in the preparation of this EA, it is determined that the implementation of the proposed actions will not generate any significant adverse impacts on the environment at PTA. The proposed action does not constitute a major federal action having significant effects on the quality of the human environment, and therefore, does not require the completion of an EIS, as defined by 32 CFR 651. This EA supports a Finding of No Significant Impact (FONSI).

7.0 INDIVIDUALS AND AGENCIES CONTACTED

Evans, Steve – Botonist, Pohakuloa Training Area

Geltmacher, Dan – MCB Hawaii Range Manager, Kaneohe Bay

Hayselden, Steve – Airfield Manager, Pohakuloa Training Area

Lackey, Tiana – Technical Documentation Specialist, Pohakuloa Training Area

Misajon, Robert – Operations and Plans Officer, Pohakuloa Training Area

Peshut, Peter – Biologist, Pohakuloa Training Area

Rasmussen, Coral – Archaeologist MCB, Kaneohe Bay

Schnell, Lena – Wildlife Biologist, Pohakuloa Training Area

Taomia, Julie - Archaeologist, Pohakuloa Training Area

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Appendix A: Hawaii State Historic Preservation Division NHPA Section 106 Consultation

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON
PŌHAKULOA
PO BOX 4607
HILO, HAWAII 96720-0607

REPLY TO
ATTENTION OF

JUL 0 3 2013

Office of the Commander

Mr. William Aila
State Historic Preservation Officer
State Historic Preservation Office
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

Dear Mr. Aila:

As Commander of the US Army Garrison, Pōhakuloa (USAG-Pōhakuloa), I am writing to begin consultation under Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations (36 CFR Part 800) on a project proposed at the Pōhakuloa Training Area (PTA) within the ahupu'a'ā of Ka'ohe, district of Hāmākua, Hawai'i County, on the island of Hawai'i (TMK: (3) 4-4-016:001). Please see Enclosure 1 for a list of all consulting parties.

I have determined that this project constitutes an undertaking. The US Marine Corps proposes to install an Urban Close Air Support (UCAS) and Aviation Bulls-Eye Range with associated infrastructure within the designated impact area at PTA (Enclosures 2 and 3). The UCAS project will consist of a mock town of 35 buildings on 7.8 acres of 'a'ā lava known as the k3 lava flow). The buildings will be assembled from approximately 185 shipping containers on compacted pads (Enclosure 4). Site work is expected to include "lava softening" where large tracked dozers or sheepfoot rollers are used to crush the lava material. The site will be graded in a manner to minimize fill and use natural drainage flows to the maximum extent possible. Compaction requirements will be determined by a qualified geotechnical engineer.

Construction of the Aviation Bulls-Eye Range will include a 115 m diameter circle with scoring rings made of painted tires within this same k3 lava flow (Enclosure 5). A trail between 8 and 12 feet wide will be established to the Bulls-Eye Range between the existing mock target airfield and the proposed Aviation Bulls-Eye Range (see Enclosure 2). The tires will be delivered by helicopter.

Included in this project is an access trail to and from the existing mock target airfield; the access trail is located at the southwest end of the mock target airfield (see Enclosure 2). The Navy has built up this area over the years for Close Air Support. There are threat fighters, surface to air missile (SAM) sites, and a radar bombing target called the "Silent E" located west of the site. The Silent E was constructed out

of containers and has been in place and taking fire since 1994. It is regularly hit with rockets, ball ammunition (20-25mm) and laser guided training rounds (LGTRs).

The proposed project also includes establishing three observation points near the UCAS and Aviation Bulls-Eye Range that would allow observers to watch the training from a safe distance. No modifications will be necessary to the observation points. Point one is located on a road (Enclosure 6) and the other two are on high points in the lava (Enclosure 7 and 8). Observation Point 2 is on a naturally raised portion of pāhoehoe lava northeast of the mock target airfield. Observation Point 3 is located on the same k3 lava flow as the proposed UCAS and Aviation Bulls-Eye Range.

The Area of Potential Effect (APE) for the Urban Close Air Support and Aviation Bulls-Eye Range area has been determined to include only the project footprint, which includes the UCAS, the Bulls Eye, the associated trails and three observation points aboard PTA. The APE is approximately 12.8 acres in total area.

The proposed project to install a UCAS and Aviation Bulls-Eye Range is located within the designated impact area at PTA. This area was selected in coordination with the Army's archaeologist at PTA because it is highly unlikely that there are archaeological sites within the k3 lava flow which dates to between 750 and 1,500 years B.P..

Archaeological survey was conducted in 2007 for the Navy's mock target airfield projects, which is located northwest of the proposed UCAS and Aviation Bulls-Eye Range (Stein 2007). This project is located on the same lava flow (k3 lava flow). No archaeological sites were found during this survey. In addition, archaeological survey conducted during the week of 20 May 2013 by Coral Rasmussen, M.A, MCB Hawaii archaeologist, did not discover any archaeological sites, or deposits (Enclosure 9). There was scattered shrapnel and expended ordnance on the ʻaʻā lava field. No surface soils were present and the ground consists of barren ʻaʻā lava with moderately sized ʻaʻā clinkers.

The areas around the three observation points were also surveyed. The establishment of observation points does not require modifications to the area. No archaeological sites or deposits were present. At observation Point 1, a road was previously established. Observation Points 2 and 3 are located on high points in the lava field. The observers will either be dropped off by helicopter or walk in along an established route. This proposed route was also surveyed and no archaeological sites or deposits were present. No archaeological sites were observed in this area. Numerous bullets from .50 cal machine guns were visible on the lava surface, many of which left small divots in the lava. Numerous ʻaʻā clinkers were observed in the vicinity

of Observation Point 3. In addition, a wire fence was located just south of this observation point.

If iwi kūpuna or Native Hawaiian cultural deposits are encountered during the project, USAG-Pōhakuloa will implement our Inadvertent Discovery Plan (Enclosure 10).

I have determined that no historic properties will be affected by this project. Pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended and 36 CFR part 800.2(c), we are seeking your concurrence on this action. Should you require additional information about this project, the point of contact is Dr. Julie M. E. Taomia, PTA Archeologist, at telephone number (808) 969-1966.

Sincerely,

Eric P. Shwedo
Lieutenant Colonel, US Army
Commanding

Enclosures

Distribution List:

Mr. William Aila
State Historic Preservation Officer
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

Dr. Kanana‘opono Crabbe
Ka Pouhana, Chief Executive Director
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, HI 96813

Mr. Edward Ayau, Po’o
Hui Malama I Na Kupuna O Hawai'i Nei
622 Wainaku Avenue
Hilo, HI 96720

Kelley L. Uyeoka
183-1 Oko Street
Kailua, Hawai‘I 96734

Alii Sir William Roback, KGCK
Alii Nui, Heiau O Na Alii
2723 Kamelani Loop
Pukalani, Maui, Hawaii 96768

Ali‘I ‘Ai Moku Sir Joseph Spencer
Royal Order of Kamehameha
P.O. Box 1872
Kailua-Kona, HI 96745

Ali‘I ‘Ai Moku Sir Pua Ishibashi
Royal Order of Kamehameha
P.O. Box 821
Honoka‘a, HI 96727

Ali‘I Okana Sir Kalikolekua V. Kanaele
Royal Order of Kamehameha
HC3 Box 13124
Kea‘au, HI 96749

Ali‘I Sir Paul K. Neves
Royal Order of Kamehameha
318 Na Hale‘a Street
Hilo, HI 96720

Mr. Kimo Lee
ATTN: Ms. Kauanoe Hoomanawanui
Hawaii Island Burial Council
40 Pookela Street, Unit C-5
Hilo, HI 96720

Gene “Bucky” Leslie, President
Hawaii Island Council of Hawaiian Civic Clubs
75-5815 Mamalahoa Hwy
Holualoa, HI 96725

Mr. Maulili Dickson, President
Waimea Hawaiian Civic Club
65-1234 Puu Opelu Road
Kamuela, Hawai‘i 96743

Mr. Daniel Kawaiaea, Jr.
Superintendent
Pu‘ukohola Heiau National Historic Site
National Park Service
62-3601 Kawaihae Road
Kawaihae, HI 96743

Mr. Shane Nelsen
Office of Hawaiian Affairs
75-5706 Hanama Pl., Ste. 107
Kailua-Kona, HI 96740

Enclosure 1

Ms. Lukela Ruddle
Office of Hawaiian Affairs
162-A Baker Avenue
Hilo, HI 96720

Ms. Cindy Orlando
ATTH: Ms. Laura Carter Schuster
Branch Chief, Cultural Resources
Hawaii Volcanoes National Park
1 Crater Rim Drive
P.O. Box 52
Hawaii National Park, HI 96718

Ms. Kealoha Pisciotta
Mauna Kea Anaina Hou
P.O. Box 5864
Hilo, HI 96720

Mr. Rick Gmerkin
Ala Kahakai National Historic Trail
73-4786 Kanalani Street Number 14
Kailua-Kona, HI 96740

Ms. Paulette Ka'anohiokalani Kaleikini
Keaweamahi 'Ohana
89-107 Nanaikala Street
Wai'anae, HI 96792-3900

Mr. JR Keoneakapu Williams
'Ohana Kapu
85-1029 Mahi Aina St
Waianae, HI 96792

Mr. James Medeiros
'Ohana Medeiros
P.O. Box 166
Honaunau, HI 96726

‘Ohana Huihui
c/o Mana Kaleilani Caceres
91-225 Pilipiliula Place
Kapolei, HI 96707

‘Ohana Kaleikini
c/o Kala Waahila Kaleikini
89-107 Nanaikala Street
Wai'anae, HI 96792-3900

‘Ohana Kawainui
c/o Aliikaua Kawainui Kaleikini
89-107 Nanaikala Street
Wai'anae, HI 96792-3900

‘Ohana Keliinoi
c/o Kalahikiola Keliinoi
89-107 Nanaikala Street
Wai'anae, HI 96792-3900

11 June 2013

MEMORANDUM FOR RECORD

SUBJECT: Archaeological Survey of the Proposed Urban Close Air Support and Aviation Bulls-Eye Range, Pōhakuloa Training Area, [TMK (3) 4-4-016:001], Ka‘ohe Ahupua‘a, Hāmākua District, Hawai‘i Island.

1. The U.S. Marine Corps is proposing to construct an Urban Close Air Support and Aviation Bulls-Eye Range with associated infrastructure at Pōhakuloa Training Area (PTA) in the designated Impact Area, Island of Hawai‘i, Hawai‘i [Enclosures 1 and 2]. Urban Close Air Support and Aviation Bulls-Eye Range are one of two proposed alternatives being considered through the National Environmental Policy Act (NEPA) in the Environmental Assessment for the project.

2. The Urban Close Air Support (UCAS) and Aviation Bulls-Eye Range alternative is located on the southern side of the PTA Impact Area [Enclosure 3]. Construction of the UCAS will include crushing, leveling, grading and installation of shipping containers. A gravel road will need to be established so that the shipping containers can be driven to the location [see Enclosure 2]. The Aviation Bulls-Eye Range will include a 300 ft diameter circle with scoring rings made of painted tires or painted lava rock.

3. Elevations for the area range between 6,600 ft and 7,800 ft above mean sea level. The climate is classified as subalpine (Juvik and Juvik 1998:123) with a mean annual temperature range from -1 - 15°C or 30 - 60° F (NOAA Earth System Research Laboratory). Rainfall averages about 511 mm (20 inches) annually (Giambelluca et al. 2013; Juvik and Juvik 1998:57).

4. The topography of the Urban Close Air Support and Aviation Bulls-Eye Range area is relatively flat to gently rolling [Enclosure 4]. The proposed project area is located within the k3 lava flow, which originated between 750 to 1,500 years before present (YBP). This flow consists of moderately sized *‘a‘ā* clinkers. Soils are poorly developed and have been classified as lava flow associates that are gently sloping to steep, very well drained, and nearly barren lava flows (Shaw and Castillo 1997).

5. Vegetation within the Urban Close Air Support and Aviation Bulls-Eye Range area is limited, consisting of two small *pūkiawe* (*Styphelia tameiameiae*) growing in an otherwise barren *‘a‘ā* lava flow.

6. Ms. Coral Rasmussen (MCB Hawaii Cultural Resources Manager), Mr. Ralph Scott (MCB Hawaii Range and Training Area Specialist), Dave Faucette, SSgt Camilio Aragon (Marine Corps Training Liaison), and SSgt Steven M Smith, SSgt Randall J Walker, Sgt Geraldo Muro (MCB Hawaii explosive ordnance disposal (EOD) Support) commenced an archaeological field

survey at the Urban Close Air Support and Aviation Bulls-Eye Range area during the period between May 20 and 24, 2013.

7. The Area of Potential Effect (APE) for the Urban Close Air Support and Aviation Bulls-Eye Range area consists of the project footprint, which includes the UCAS, the Bulls Eye, and the associated trails and three observation points. This area is approximately 12.8 acres. A total of 12.8 acres was surveyed and required 3 field days. The UCAS required 18 transects 10 m apart. The Bulls Eye required 15 transects 10 m apart. The trails required 3 transects, 10 m apart. A 30 m area around each proposed observation point was also examined for archaeological sites. Since these areas were located on a hill, the side of the hill was examined in a circular pattern around the top in 10 m intervals. A total of 13 person days was needed to complete the survey.

8. The survey team departed from the Cantonment at 0715 hrs and returned at about 1400 hrs. The project was accessed via Red Leg Trail until it merged with the Hilo-Kona Rd, which led to the survey area. The survey area is approximately 21 miles from the Cantonment, and the commute was approximately 45 minutes. MCB Hawaii staff members were accompanied by EOD support provided by MCB Hawaii at a ratio of one EOD to four MCB Hawaii staff. Ordnance encountered during the survey include: the remainder of a rocket motor from an AGM 114C (Hellfire) Guided Missile, .50 cal ammunition, and a 25 LB practice bomb.

9. The survey team established transects spaced 10 m apart. Transects were oriented at 38 degrees magnetic north for the UCAS and 3 degrees magnetic north for the Bulls Eye. The trails followed the proposed route, which was oriented to avoid the older pahoehoe lava flow. Visibility during the survey was excellent since there were only two small shrubs within the project area.

10. No archaeological sites (including trails) or deposits were observed during the survey. Damage to the lava field from ordnance was observed. It included bomb craters [Enclosure 8] with shrapnel and *ʻaʻā* clinkers that had flipped over (apparent weathered patina on the base of the clinker) with metal fragments. There were numerous small metal fragments throughout the proposed project area [Enclosure 9]. Small crevices in the *ʻaʻā* were examined with a flashlight for evidence of cultural material: none was observed. Archaeological survey was conducted for the Mock Runway Project, located about 160 m northeast of the UCAS and 350 m north of the Aviation Bulls-Eye. The archaeological survey for the Mock Runway was located on the same k3 lava flow, which consists of barren *ʻaʻā* lava. No archaeological sites were discovered during the survey (Stine 2007).

Coral Rasmussen, M.A.
Cultural Resources Manager
Environmental Compliance and Protection Department
Marine Corps Base Hawaii

References:

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte

2013 Online Rainfall Atlas of Hawai‘i. *Bull. Amer. Meteor. Soc.* 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.

Juvik, Sonia P., and James O. Juvik

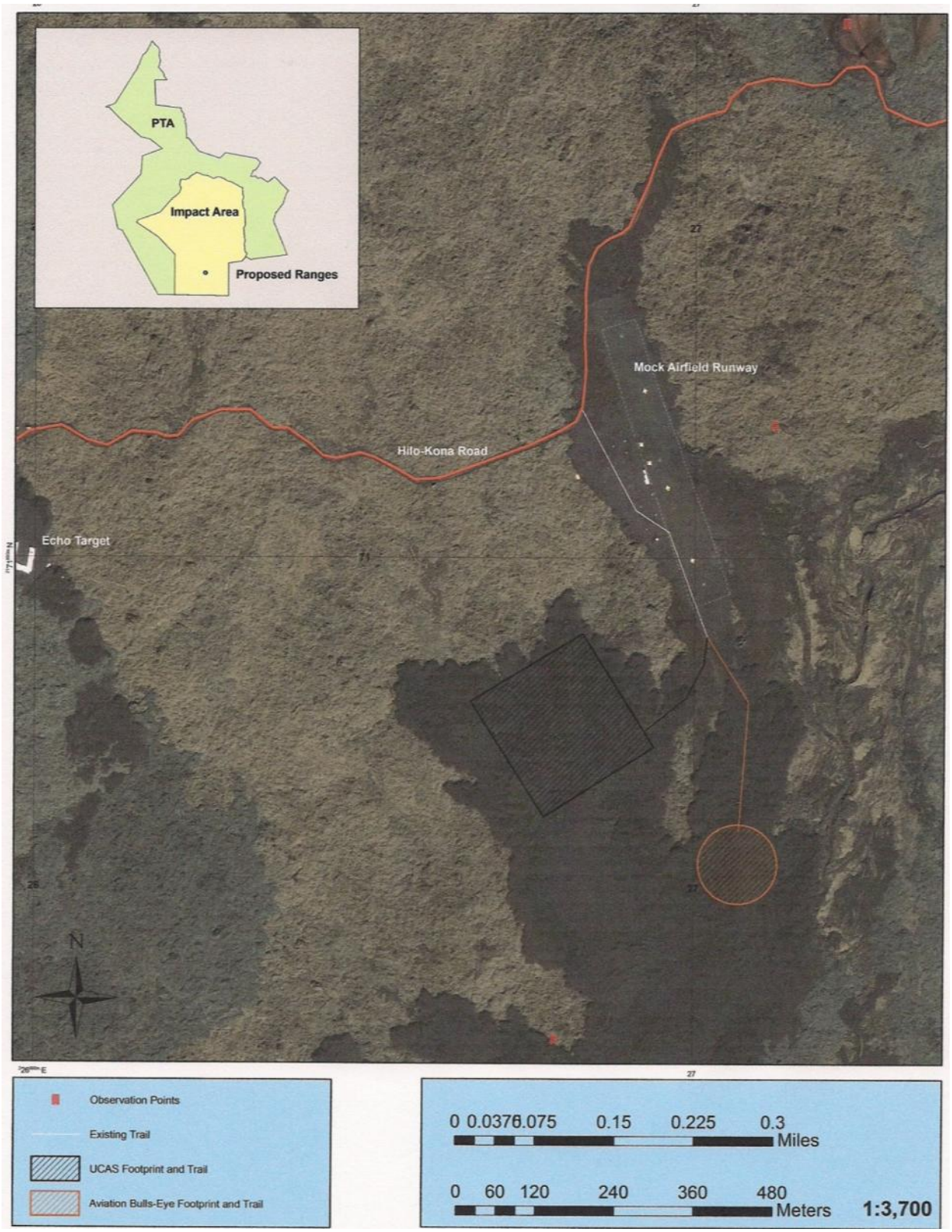
1991 *Atlas of Hawai‘i, Third Edition.* University of Hawai‘i Press, Honolulu.

National Oceanic & Atmospheric Administration (NOAA)

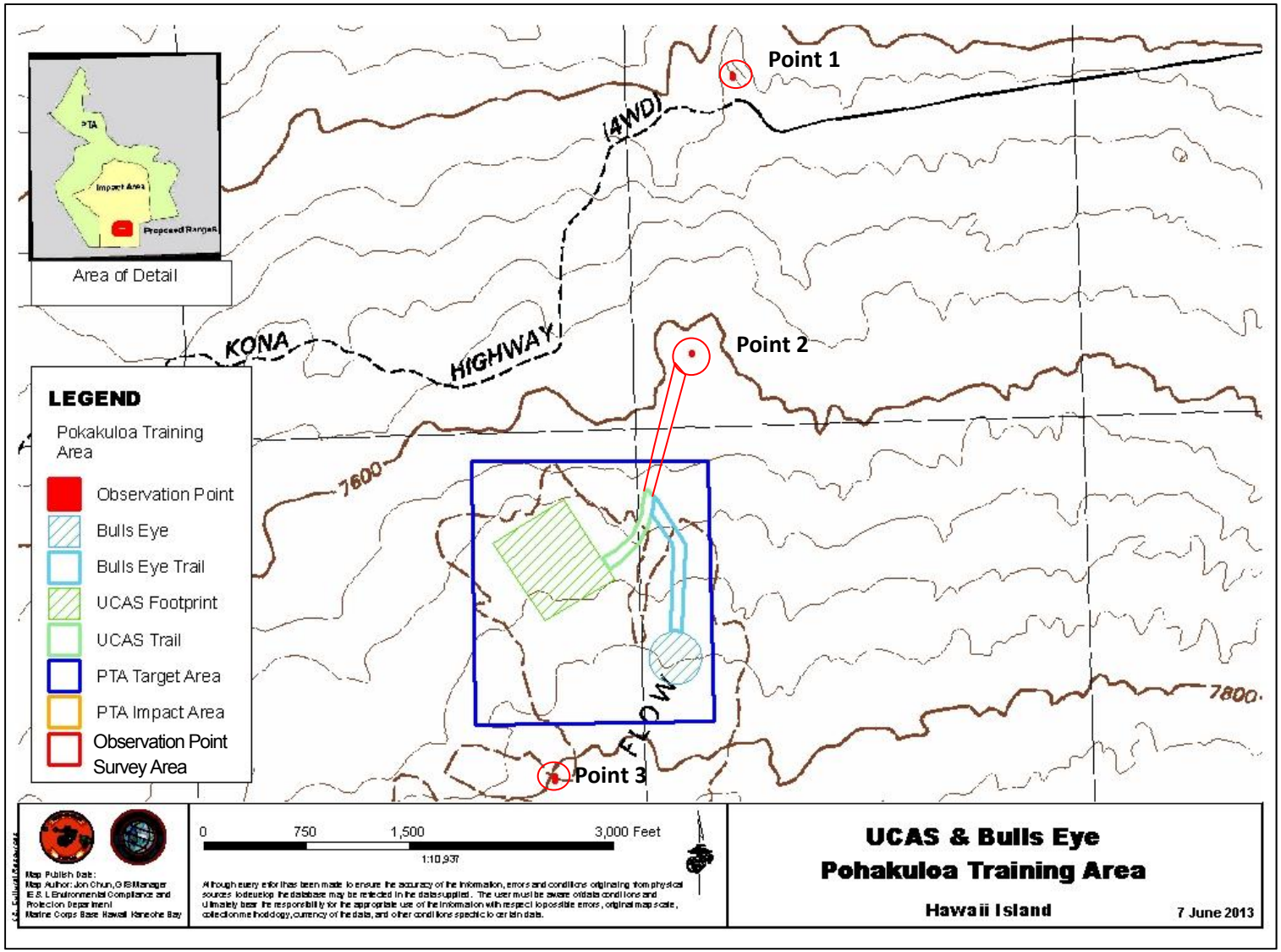
2013 Online Earth System Research Laboratory Global accessed on 11 June 2013 www.natesri.noaa.gov.

Stine, Cary

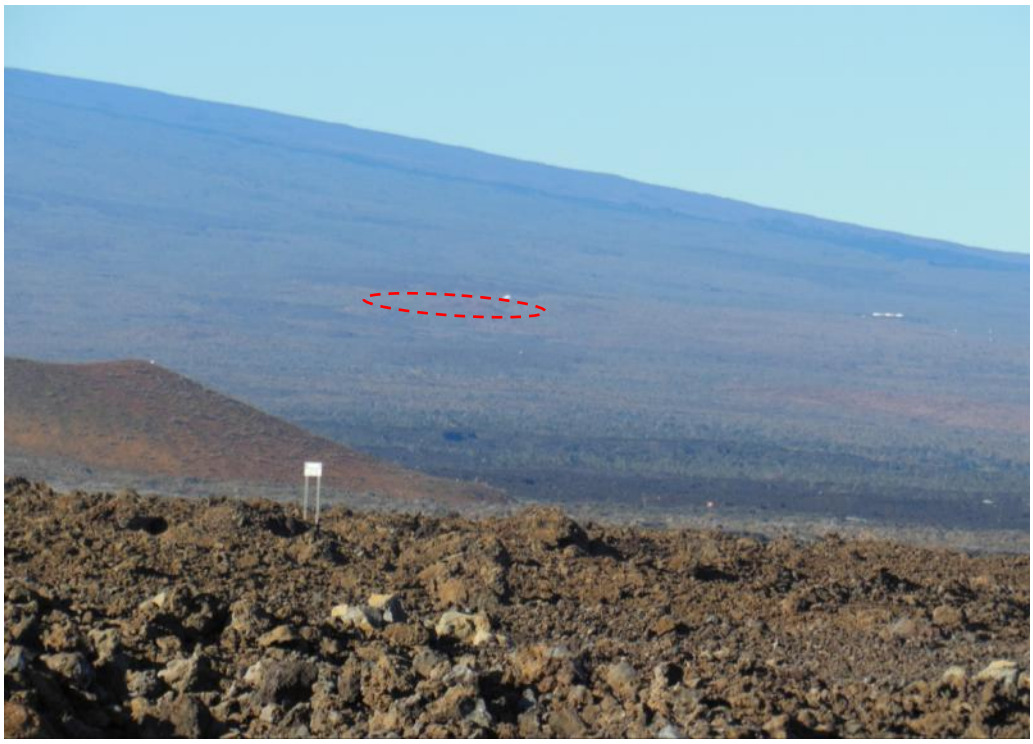
2007 Memorandum for Record: Archaeological Survey within the footprint of the proposed Mock Runway Pohakuloa Training Area, North Kona District, Hawai‘i Island, Hawaii. Prepared by Environmental Office, Pohakuloa Training Area, Hawaii.



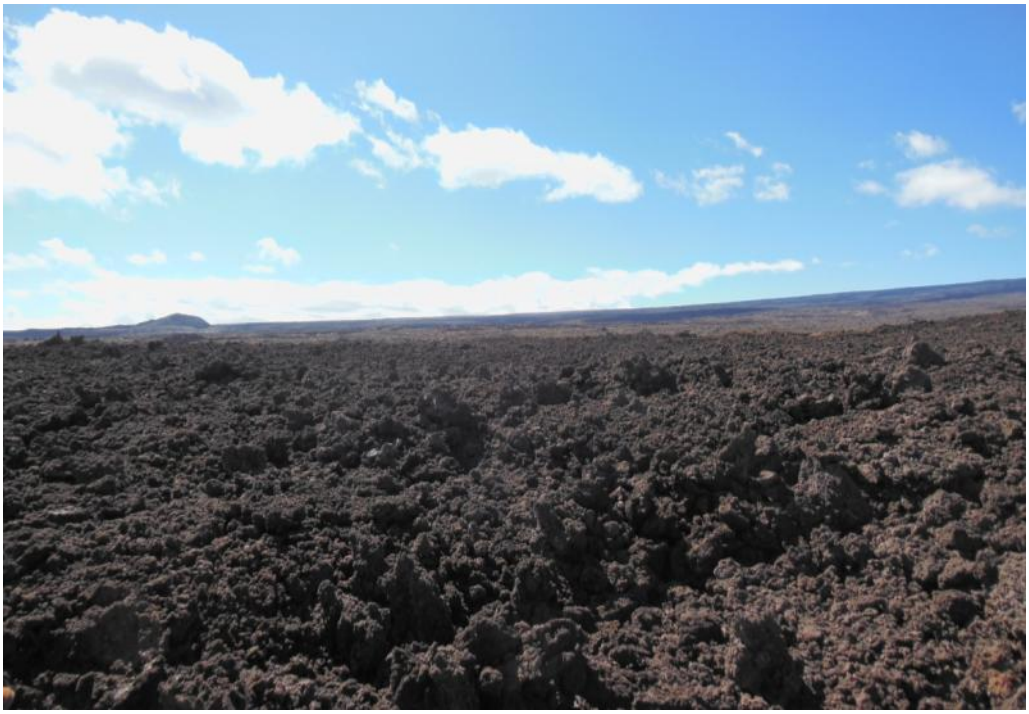
Enclosure 1. Locations of the proposed Urban Close Air Support and Aviation Bulls-Eye Range and Observation Point at Pōhakuloa Training Area.



Enclosure 2. Location of UCAS and Bulls Eye Training Area and Associated Observation Points, trails, and survey areas.



Enclosure 3. Approximate location of the proposed project area on the lower norther slope of Mauna Loa on the south side of PTA.



Enclosure 4. Proposed project area is located in the k3 lava flow, which is about 750 to 1,500 years old. The flow is made up of moderately sized *ʻaʻā* clinkers.

Enclosure 5. Observation point 1, located on a developed road on top of a *pu‘u* (volcanic cinder cone).

Enclosure 6. Observation point 2, on a naturally raised portion of pahoehoe lava northeast of the mock runway. No archaeological sites were observed in this area. No modifications to the lava will be necessary to establish the observation point.

Enclosure 7. Observation point 3, located on the *ʻaʻā* field south of the proposed UCAS and Bulls Eye.

Enclosure 8. Evidence of bomb craters include depressions in the lava where the *ʻaʻā* clinkers are turned over.

Enclosure 9. One of many pieces of shrapnel observed on the *ʻaʻā* lava flow.

INADVERTENT DISCOVERY PLAN
FOLLOWING GUIDELINES ESTABLISHED IN
NATIVE AMERICAN GRAVE PROTECTION AND REPATRIATION ACT

1**.** Any employee (or contractor in the employ) of the Garrison who knows or has reason to know that human remains or cultural items as defined under the Native American Grave Protection And Repatriation Act (NAGPRA) have been inadvertently discovered on land owned or controlled by the Garrison, shall provide immediate telephone notification of the discovery, with written back-up to the Garrison Commander and the Garrison Cultural Resources Manager.

2. The employee or contractor shall also immediately stop any activity in the area of the discovery and protect the human remains and cultural items unless prevented from doing for life/safety concerns.

3. Once contacted regarding an inadvertent discovery, the Garrison Cultural Resources Manager or their representative from the Cultural Resources staff will make an in-situ examination of the condition, antiquity and cultural affiliation of the human remains and cultural items based upon applicable professional standards to determine whether the remains and cultural items appear to be Native Hawaiian.

4. If the examination determines that the human remains or cultural items appear to be Native Hawaiian, the Garrison shall notify the State Historic Preservation Division, OHA, Hui Malama I Na Kupuna O Hawaii Nei and the appropriate Burial Council telephonically, via e-mail, or with written correspondence within 48 hours.

5. If, through consultation with the above parties, the Garrison Commander establishes the human remains and cultural items cannot be left in situ, their excavation and removal shall be undertaken by professional archaeologists employed by the Garrison within 15 working days from the initial contact between the Garrison and the Burial Council.

6. Prior to disposition of the human remains and cultural items, the Garrison shall publish a general notice of the proposed disposition in a newspaper of general circulation in the area in which the remains were recovered. The notice shall provide information as to the nature and cultural affiliation of the remains and cultural items and shall solicit further claims of ownership. The notice shall be published at least twice, at one-week intervals, and transfer shall not take place until 30 days after the second notice to allow for any additional claimants to come forward.

7. If re-internment is on land owned or controlled by the Garrison, the location of the re-internment shall only be reported to the claimant, the Garrison Commander, and the Cultural Resources Manager for the Garrison.

Enclosure 10

Appendix B: US Fish and Wildlife Service Section 7 Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
2013-I-0364
2012-F-0241

Eric P. Shwedo
Lieutenant Colonel, Special Forces
Commander, United States Army Garrison- Pohakuloa
Department of the Army
P.O. Box 4607
Hilo, Hawaii 96720-0607

AUG 0 9 2013

Subject: Informal Consultation for Urban Close Air Support, Pohakuloa Training Area, U.S. Army, Hawaii

Dear Colonel Shwedo:

Thank you for your letter dated July 9, 2013, requesting our concurrence with your determination that the Urban Close Air Support (UCAS) project at Pohakuloa Training Area (PTA), island of Hawaii, will not adversely affect the endangered Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*) or candidate band-rumped storm petrel (*Oceanodroma castro*). The findings and recommendations in this consultation are based on (1) your correspondence we received on July 11, 2013; and (2) other information available to us. A complete administrative record is on file in our office. This response is in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

Project Description - UCAS Range
Construction of a UCAS Range, in the form of a simulated urban village, is proposed at PTA to enhance Marine aviator training. The built-up village will be no larger than 10 ac (4 ha) and will be located in the southern portion of the central impact area at PTA. The UCAS Range will consist of an array of approximately 200 sea/land storage units stacked adjacent to and on top of each other and secured together to simulate buildings. Stationary infantry targets, stationary armored targets, and steel full-size replica targets of armored vehicles may eventually be added. Additionally, there may eventually be a series of targets that will include hard wired and remote radio controlled (target) systems that are programmable. There will also be an observation tower along Hilo-Kona Road and an access trail leading into the UCAS Range to facilitate future maintenance. The proposed UCAS Range location is on a young barren aa lava flow. Surface modification will include crushing, grading, and leveling with a bulldozer. No off-site material will be required with the exception of material used for concrete footings for stacked containers.

Project Description - Aviation Bulls-Eye Range
This range will be located to the south and east of the UCAS Range on the same young aa flow in the central impact area at PTA and will be serviced via a narrow vehicle trail. The surface area will be modified in the same manner as the UCAS Range footprint. No fill material will be required for this range. Painted tires will be used to create concentric circles at various distances from the center target. The Bulls-Eye Range footprint (excluding the access trail) will be no larger than 2.5 ac (1 ha) and will allow Marine aviation units to fine tune their bombing and airstrike warfare skills.

Training at both UCAS and Aviation Bulls-Eye Ranges will be conducted using inert munitions (i.e., no high explosives) and may include 7.62 mm, .50 cal, 20 mm, 25 mm, 30 mm, MK-76, BDU-32, laser guided training rounds, concrete dumb bombs, ATM-114 inert hellfire, and 2.75" inert rockets. This type of ordnance is already utilized on the nearby Silent E and Mock Runway training ranges of PTA. All classes of fixed wing and rotary wing aircraft from all services will potentially conduct UCAS training at PTA. Fixed wing aircraft will typically involve the FA-18 Hornet and will rarely include the AV-8B Harrier, F-15 Eagle, F-16 Fighting Falcon, F 22 Raptor, and F-35 Lightning. Common rotary wing aircraft used for UCAS training will include the UH-1 Iroquois, AH-1 Cobra, OH-58 Kiowa, and AH-64 Apache, with rare use of the CH-53E Super Stallion, UH-60 Black Hawk, and CH-47 Chinook for door gunnery. Typical fixed wing attack altitudes will exceed 10,000 ft (3,050 m) above ground level (AGL) and speeds will range from 380 to 550 knots. Typical rotary wing attack altitudes will range from 200 to 2,000 ft (60 to 610 m) AGL and speeds will range from 60 to 120 knots. Frequency of use is estimated by (1) U.S. Marine Corps: 6 times per year for 7 days with 5 UH-1 and 7 AH-1; (2) Lava Viper Exercises: 2 to 3 times per year for 10 to 14 days with 12 FA-18, AV-8B, or F-35 and 12 to 18 UH-1 and AH-1; (3) U.S. Navy: 2 times per year for 3 days with an unspecified number of FA-18; and (4) U.S. Army: 4 times per year for 10 days with 6 to 8 OH-58 and AH-64.

Surveys for ESA species
Surveys were conducted to determine the presence of federally-listed plant species and assess overall vegetation in the vicinity of the UCAS and Aviation Bulls-Eye Ranges on May 20 and 22, 2013. The botanical survey area comprised a buffer of 330 ft (100 m) from the perimeter of the ranges. A survey grid was overlaid to encompass the ranges, their buffer areas, and access trails, which included areas not proposed for construction to allow for flexibility in the final placement of the ranges. Survey area dimensions were based on impacts from construction only; rotorwash impacts are not applicable to the UCAS and Aviation Bulls-Eye Ranges since aircraft will not be landing on the ranges. No federally-listed or candidate plant species were located within the proposed action area.

Surveys were also conducted to determine avifauna presence and habitat use in the general vicinity of the UCAS and Aviation Bulls-Eye Ranges on May 20-22, 2013. No individuals or sign of ESA listed species was observed or detected. In addition, in June 2013 three Song Meter II units were deployed at the UCAS and Aviation Bulls-Eye Ranges to record all ambient sounds on four non-contiguous nights during an 8-night monitoring period. No confirmed Hawaiian petrel calls were recorded and band-rumped storm petrel calls were recorded at one location on two nights. The short intervals and attenuated signal strength between calls suggest the birds were transiting the area. If present, impacts to petrels could occur when the bulldozer transits

potential nesting habitat within the range footprints or access trails. Eggs, chicks, and/or adult petrels could be injured or killed if occupied burrows collapse under the bulldozer. However, constructing the UCAS and Aviation Bulls-Eye Ranges is not considered to be of concern for petrels because the ranges are located on relatively young aa lava and not pahoehoe lava with suitable openings for nesting.

Conservation Measures
The following measures identified in your letter will be implemented to avoid and minimize effects to Hawaiian and band-rumped storm petrels. These conservation measures are considered part of the project description. Any changes to, modifications of, or failure to implement these conservation measures may result in the need to reinitiate this consultation.

- The PTA Natural Resources Office will mark suitable petrel openings for avoidance by the bulldozer;
- Amber lights will be used where possible; and
- Bright lights will be shielded to prevent disorienting petrels.

Invasive Plants
On July 15, 2013, Dr. Peter Peshut (PTA NRO) stated over the phone to Dr. Langer (Service) that insipient plant control will also be conducted as part of this project. The bulldozer will be cleaned prior to use and the construction areas will be monitored post-construction to detect and eradicate any new invasive plants that may be brought to those areas as part of this project.

Other ESA listed species
This proposed action is a covered activity for Hawaiian geese (*Branta sandvicensis*) and Hawaiian hawk (*Buteo solitarius*) in the 2013 Biological Opinion (Service tracking number 2012-F-0241). In addition, the Service agrees with the Army's determination that this project will have no effect on the Hawaiian hoary bat (*Lasiurus cinereus semotus*).

Summary
We concur that the proposed project may affect, but is not likely to adversely affect, the Hawaiian petrel and band-rumped storm petrel. Unless the project description changes, new information reveals that the proposed project may affect listed species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to section 7 of the ESA is necessary.

If you have any questions or concerns regarding this consultation, please contact Dr. Tim Langer, Fish and Wildlife Biologist (phone: 808-792-9462, email: tim_langer@fws.gov).

Sincerely,

for Loyal Mehrhoff
Field Supervisor

cc: Dr. Peter Peshut, Program Manager, Pohakuloa Training Area Natural Resources Office

DEPARTMENT OF THE ARMY
HEADQUARTERS,
UNITED STATES ARMY GARRISON
PŌHAKULOA
PO BOX 4607
HILO, HAWAII 96720-0607

IMHW-PTA-PWE 09 July 2013

Loyal Mehrhoff, PhD, Field Supervisor
US Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Mona Boulevard, Room 3-122, Box 50088
Honolulu, HI 96850

Re: 1) Informal consultation concurrence request for determining Urban Close Air Support is not likely to adversely affect the Hawaiian Petrel at Pohakuloa Training Area, island of Hawaii;

2) Informal conference concurrence request for determining Urban Close Air Support is not likely to adversely affect the Band-Rumped Storm Petrel at Pohakuloa Training Area, island of Hawaii;

3) ESA-7(c) determination of no effect for Urban Close Air Support for the Hawaiian Hoary Bat, botanical resources, and avifauna protected under the Migratory Bird Treaty Act at Pohakuloa Training Area, island of Hawaii.

Dear Dr. Mehrhoff,

The US Army Garrison – Pohakuloa (Army) is requesting concurrence from the US Fish and Wildlife Service (US FWS) that proposed Urban Close Air Support (UCAS) at Pohakuloa Training Area (PTA), island of Hawaii, is **not likely to adversely affect** the endangered Hawaiian Petrel (*Pterodroma sandwichensis*) and the Band-Rumped Storm-Petrel (*Oceanodroma castro*), which is a candidate species for federal listing.

The Army has also determined that proposed UCAS at PTA, island of Hawaii, will have **no effect** on the endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), botanical resources, and avifauna protected under the Migratory Bird Treaty Act (MBTA). Note that the endangered Hawaiian Hawk (*Buteo solitarius*) and the endangered Hawaiian Goose (*Branta sandvicensis*) are not part of this determination. Effects to the Hawaiian Hawk and Hawaiian Goose from aviation training activities at PTA are covered under an existing take statement for the 2013 Biological Opinion (US FWS 2013). Therefore, all effects to these species from the action are covered under previous consultations. Although goose and hawk presence were not noted in the

action area, standard operating procedures require helicopter pilots to report air strikes and incidental take.

Biological surveys were conducted to determine the reasonable likelihood that potential impacts will occur to federally-listed threatened and endangered species as a result of UCAS operations. Five types of surveys were conducted: 1) Avifauna, 2) Botanical, 3) Hawaiian Hoary Bat, 4) Invasive Ants, and 5) Hawaiian Petrels and Band-Rumped Storm Petrels. The enclosed Memorandum For Record, *Biological Surveys for Urban Close Air Support Training at Pohakuloa Training Area, Island of Hawaii,* dated 09 July 2013, describes proposed UCAS operations, methods and results for the biological surveys, and discusses potential impacts to plants and animals protected by the Endangered Species Act (ESA) and the MBTA (Peshut et al. 2013).

The first part of this letter addresses potential effects to the Hawaiian Petrel and the Band-Rumped Storm Petrel from proposed UCAS operations. Species descriptions, current state-wide distributions, known populations at PTA, and potential presence and habitat within the action area are provided. Potential direct and indirect effects of the project actions to these species are summarized and support the Army's determination that UCAS operations will not likely adversely affect the Hawaiian Petrel and the Band-Rumped Storm Petrel.

The second part of this letter addresses potential effects to the Hawaiian Hoary Bat, botanical resources, and avifauna protected under the MBTA, from proposed UCAS operations. Based on findings from biological surveys conducted at the UCAS ranges, there is no reasonable likelihood that training operations will have a sustained detrimental effect on these species. Surveys results and conclusions are summarized herein.

The proposed training operations will include a UCAS Range and an Aviation Bulls-Eye Range, shown graphically in Figure 1, and further described in the enclosed Memorandum for Record (Peshut et al. 2013).

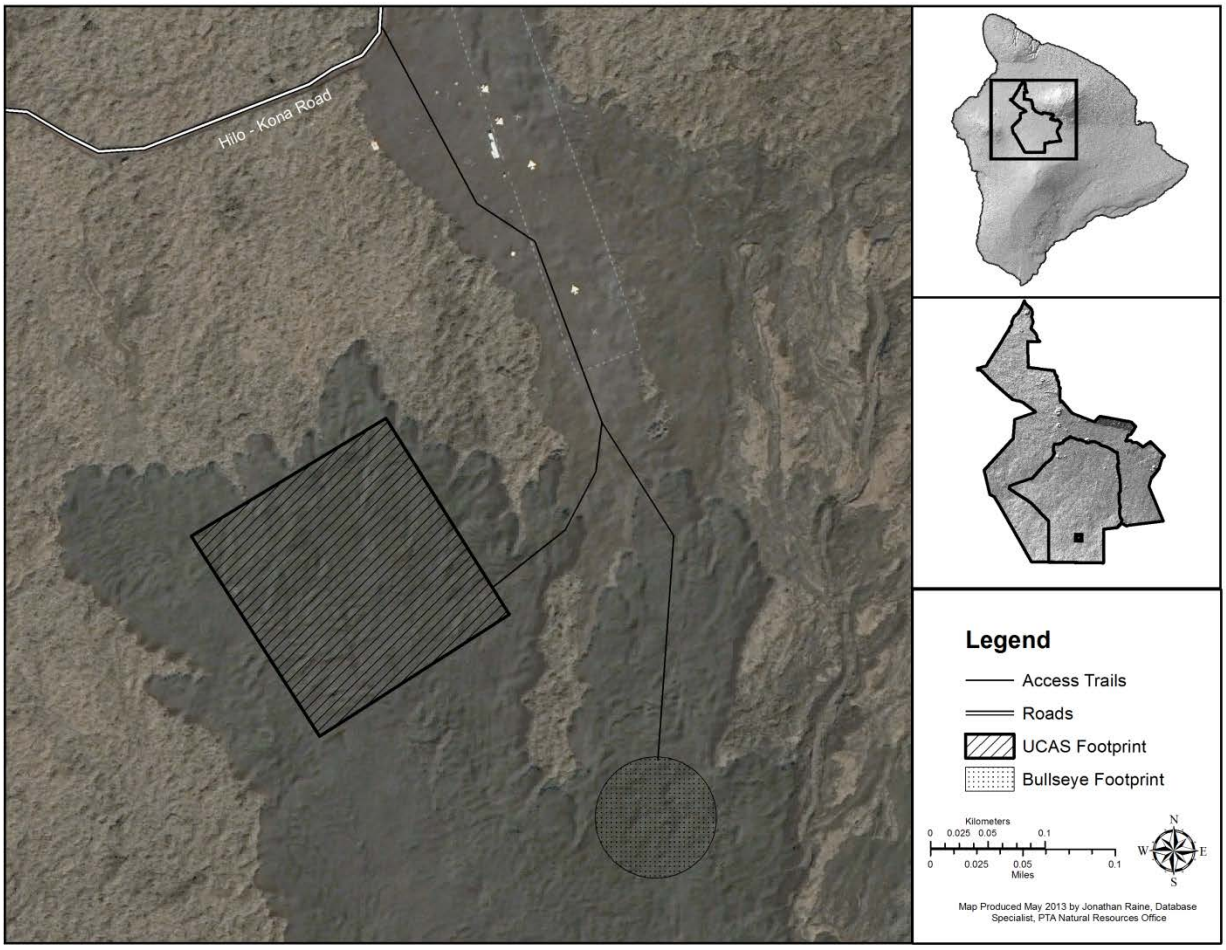


Figure 1. UCAS Action Area

1.0 Potential Effects to the Hawaiian Petrel in the UCAS Action Area

1.1 Species Background

Common name: Hawaiian Petrel
Scientific name: *Pterodroma sandwichensis*
Family: Procellariidae
Federal status: Endangered (March 1967)
Recovery Plan: US FWS (April 1983)

Description: The Hawaiian Petrel is a large, nocturnal gadfly petrel that is endemic to Hawaii. Adult males and females have dark grayish heads, wings, and tails, with a slightly more pale back. The forehead and under parts are white and the tail is black. Its bill is black and the legs and feet are mostly pink. Hawaiian Petrels often feed hundreds of miles from colonies, usually foraging with mixed-species feeding flocks,

typically over schools of predatory fishes (Mitchell et al. 2005). Hawaiian Petrels nest in colonies and form long-term pair bonds. Pairs return to the same nest site year after year, where females lay a single white egg. Adults feed on squid, fish, and crustaceans which are regurgitated to feed the chicks. As chicks mature, parental care diminishes and adults leave the nest about 2 to 3 weeks before the chicks (Mitchell et al. 2005).

Habitat: Hawaiian Petrel colonies are typically located at high elevation, xeric habitats or wet, dense forests. Nests are located in burrows, crevices, or cracks in lava tubes. The adults arrive and depart at night during the breeding season (March-October). Due to pressure from introduced predators and habitat degradation, modern Hawaiian petrel colonies in Hawaii typically occur above 8200 feet (2500 m) (Mitchell et al. 2005).

Suitable Hawaiian Petrel habitat at PTA has been defined as open pahoehoe lava with lava tubes and blisters suitable for nesting sites. Figure 2 shows potential petrel habitat within the action area. Approximately 64% of this area has been identified as potential habitat (i.e., pahoehoe) and 36% has been identified as unsuitable habitat (i.e., aa).

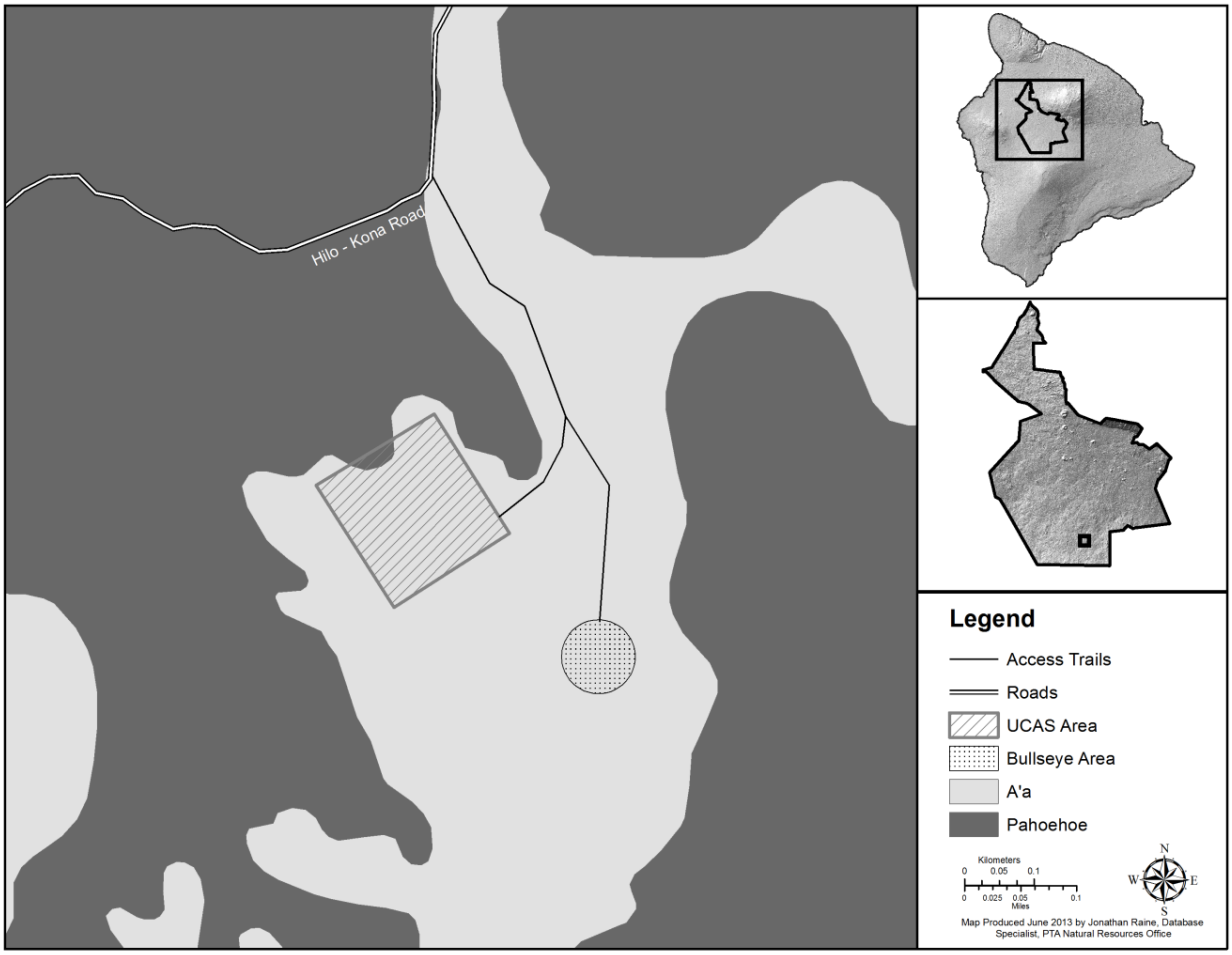


Figure 2. Potential Petrel Habitat within the UCAS Action Area

Distribution: Subfossil evidence indicates that Hawaiian Petrels were once common on all of the main Hawaiian Islands, but their distribution is now limited to Maui, Hawaii, and Kauai. Additional populations may exist on Molokai and Lanai, and off the shores of Kahoolawe and Niihau, but there is limited or no survey data for these areas. The pelagic distribution of petrels during the non-breeding season is largely unknown but they remain near the main Hawaiian Islands during the nesting season.

Across the Hawaiian Islands, the total number of Hawaiian Petrels is estimated to be 19,000 (95% CI = 11,000-34,000) with a breeding population between 4500 and 5000 pairs, although inaccessible nesting locations make accurate counts difficult (Spear et al. 1995). Pyle and Pyle (2009) estimate 150 pairs breed on Hawaii Island annually. Since only 85% of the adult population breeds in any given year, it is reasonable to assume the total Hawaii Island nesting population to be ~350 birds.

Extant breeding colonies are located in Hawaii Volcanoes National Park on Mauna Loa (Hu et al. 2001) and possibly on the windward side of Mauna Kea, but no colonies have been confirmed there to date (Day et al. 2003).

Movement Patterns: Island-wide movement patterns and potential flyways for the Hawaiian Petrel are poorly understood. Hawaiian Petrels access inland colonies from February to November with a small period of absence around March and April (Simons 1985). When traveling between the ocean and breeding colonies, bright lights can disorient and blind petrels, causing individuals to collide with objects and fall to the ground where they are susceptible to predators. On other islands with large seabird populations this “fallout” is highest in October when young petrels make their first seaward flight (Telfer 1987).

An island-wide seabird movement study detected no inland flights originating from the west coast (Kona), suggesting the majority of Hawaiian Petrels access Mauna Loa colonies from other directions (Day et al. 2003). Low numbers of seabirds (2.4 birds/hr) were recorded traversing inland at Kawaihae harbor (northwest of PTA); however, Day et al. (2003) speculate these birds likely nest in Kohala.

Known Population at PTA: Archaeological evidence suggests that the Hawaiian Petrel was once common at PTA (Banko 1980). Surveys for petrels at PTA have been on-going since 1992. No colonial activity has been detected and extremely low levels of movement activity have been observed (Cooper et al. 1996, Day et al. 2003). From 1992-1993 a year-long study adjacent to the UCAS action area did not aurally detect the Hawaiian Petrel. In 1995, 3 individuals were detected (2 aurally and 1 visually) flying over the eastern portion of PTA. From 1997-2009, aural surveys in TA 2 and TA 23 did not detect the Hawaiian Petrel.

Between 2008 and 2012, the PTA NRO deployed recording equipment annually to 18 survey locations in 2 study sites in Training Areas (TAs) 21 and 23 (Figure 3). In 2011, 2 to 5 Hawaiian Petrel calls were recorded in short succession on a single night in TA 23, 2.86 mi (4.6 km) from the UCAS Range. This was the only detection of this species in more than 5000 recorded hours in TA 23 (NRO unpublished data). In 2012, a Hawaiian Petrel was recorded on a single night in TA 21, 5.27 mi (8.5 km) from the Aviation Bulls-Eye Range. This was the only detection from more than 2000 recorded hours in TA 21 (NRO unpublished data). All detections in TA 21 and TA 23 were assessed to emanate from birds transiting the installation due to the short call-time duration on each recording.

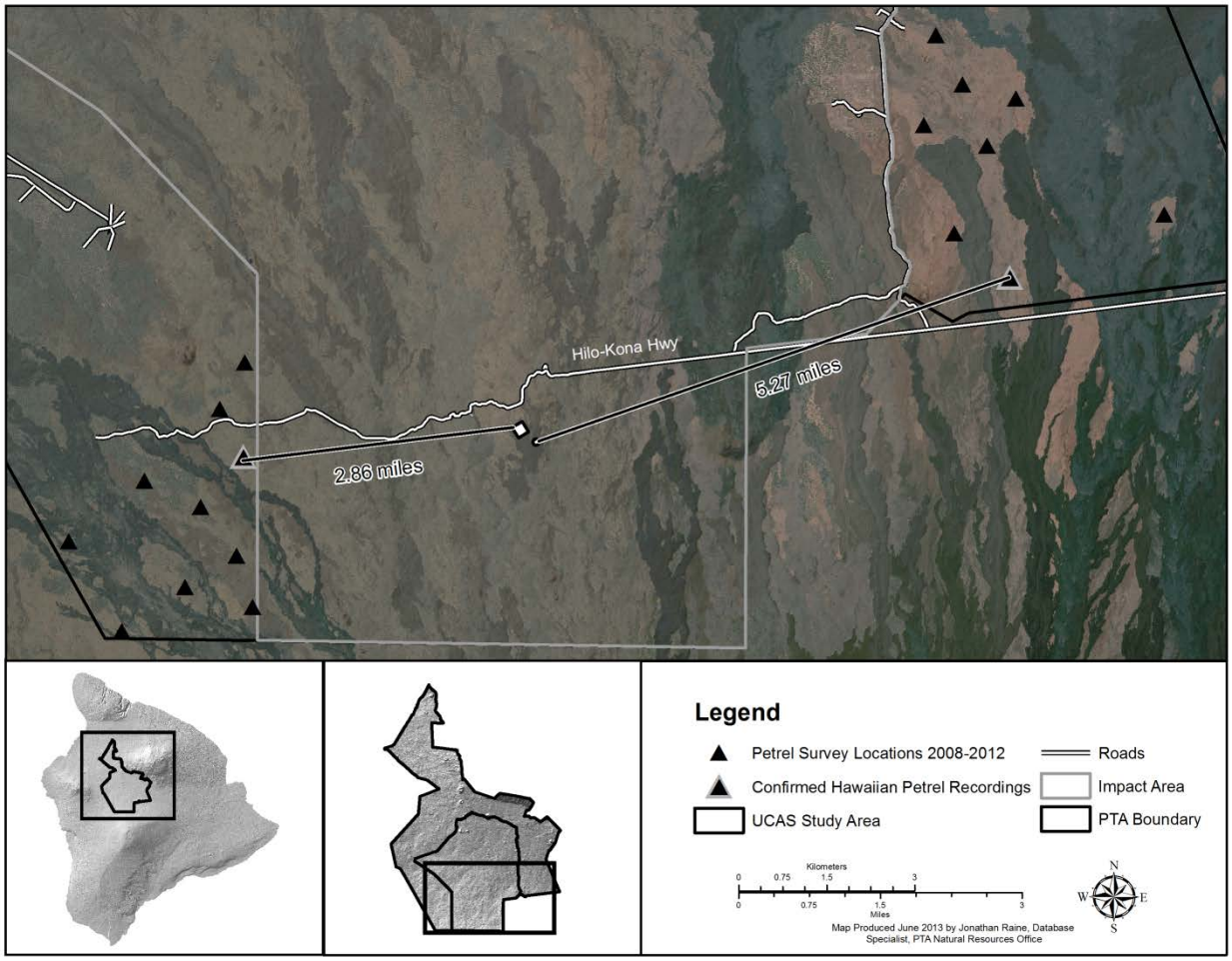


Figure 3. Hawaiian Petrel Survey Locations and Confirmed Recordings 2008-2012

In June 2013, Song Meter II (SM) units were deployed via helicopter at the UCAS and Aviation Bulls-Eye Ranges. The SM units were programmed to record all ambient sounds on 4 non-contiguous nights during an 8-night monitoring period. Three SM units were deployed within the action area (Figure 5). No confirmed Hawaiian Petrel calls were recorded.

1.2 Potential Effects of the Action on the Hawaiian Petrel: Direct, Indirect, and Cumulative

This section describes specific potential direct, indirect, and cumulative effects from military training actions within the action area on the Hawaiian Petrel and associated habitats.

1.2.1 Direct Effects

Potential effects to the Hawaiian Petrel from UCAS operations include injury or death from grading and leveling during construction, noise disturbance, airstrikes, and disorientation from artificial light sources. These effects were evaluated based on the expected presence of petrels within the action area during UCAS operations.

If present, impacts to the Hawaiian Petrel could occur when the bulldozer transits potential nesting habitat within the range footprints or access trails. Eggs, chicks, and/or adults could be injured or killed if occupied burrows collapse under the bulldozer. However, constructing the UCAS and Aviation Bulls-Eye Ranges is not considered to be of concern for petrels. Because the ranges are located on relatively young aa lava, grading and leveling will not impact potential nesting burrows. Although pahoehoe lava with suitable openings for nesting is present within the action area, no Hawaiian Petrels were detected during surveys, indicating no colonial activity within these areas. Additionally, no visual evidence (e.g., guano, feathers, footprints) indicating recent use was discovered within the suitable openings. Therefore, we conclude the area is unoccupied by nesting Hawaiian Petrels and there will be no impacts from traversing the range footprints or access trails with a bulldozer.

All classes of fixed wing and rotary wing aircraft from all services will potentially conduct UCAS at PTA. Action area delineation and petrel surveys were based on a noise contour of 80 dB for the CH-47 Chinook and CH-53E Super Stallion, the 2 loudest aircraft proposed for UCAS operations. The literature supports that many bird species live, breed, and raise young in areas with sound levels well over 80 dB (Peshut and Schnell 2011). Birds may flush from nests when sound levels are high (generally >80-100 dB), but generally return to their nests within minutes after the disturbance abates. Also, many studies indicate that birds habituate (display decreasing responses) to loud noises. Refer to the enclosed Memorandum For Record, *Biological Surveys for Urban Close Air Support Training at Pohakuloa Training Area, Island of Hawaii* (Peshut et al. 2013), for more details about noise impacts on birds as a result of military training.

Although it is recognized that exceptions are possible among individual species, the 80 dB contour was selected as the reasonable noise level threshold of concern for disturbance of bird species, based on a review of the literature. Given the expected low

density of petrels within the action area, noise ≥80 dB is not expected to affect an indeterminably small number of individuals.

In a radar survey of seabirds at PTA, Cooper et al. (1996) detected 5 seabirds (0.05 birds/hr), including 3 Hawaiian Petrels, on the eastern portion of the installation. This movement rate is 6-fold lower than the lowest seabird movement rate found in a similar study by Day et al. (2003) at coastal sites (0.3 birds/hr). Indeed, in 9 of the 14 sites sampled by Day et al. (2003), seabird movement rates were greater than 1.0 bird/hr, with a maximum rate of 25.8 birds/hr at Waipio Valley (northeast of PTA). From these data, we conclude relatively few birds transit PTA. Therefore, very few Hawaiian Petrels are likely to encounter noise at the proposed UCAS and Aviation Bulls-Eye Ranges.

Airstrikes as a result of UCAS operations are not considered to be of concern for Hawaiian Petrels. Most UCAS activities are scheduled for daylight hours when helicopters are visible as well as audible to petrels. Petrels that are transiting the saddle region are not expected to be in the vicinity of the action area during daylight hours. Transiting petrels during nighttime UCAS operations are expected to be minimal because petrel density in the flyway is expected to be low (Cooper et al. 1996). Hawaiian Petrels tend to fly close to the ground when at high elevations, especially within colonies (Swift and Burt-Toland 2009). Bird airstrikes are extremely rare for military aircraft overall, with only 2 airstrikes documented between 2001-2010 for all Army aircraft flights in the state of Hawaii (P. Mansoor, CW4, pers. comm., 2011). Moreover, helicopters are typically slow-moving at the elevations proposed for UCAS activities due to reduced aircraft performance (F. Tate, COL, pers. comm., 2011), which further reduces the likelihood of bird airstrikes.

Bright lights radiating into the night sky may disorient Hawaiian Petrels, especially point source lights in an otherwise dark landscape (Reed et al. 1985). This is a known phenomenon on Kauai, where bright security lights near the shore are managed to reduce impacts to the Hawaiian Petrel. On Kauai, point-source lights were shown to disorient and blind petrels causing collisions with obstructions. Injured petrels on the ground were then subject to predation from cats, dogs, and rodents.

In the remote location of the UCAS and Aviation Bulls-Eye Ranges, distance from the shoreline and the low intensity of illumination from military activities is not comparable to the conditions on Kauai. However, the rare Hawaiian Petrel that traverses the action area may become disoriented and grounded from artificial lighting in the action area. A red safety light is planned for use atop the observation tower adjacent to the UCAS Range. Additionally, exterior lighting associated with the observation tower will be minimal and restricted to illuminating areas for human life, health, and safety such as

stairwells and doorways. It is anticipated that 1-3 lights may be installed externally at the observation tower for human convenience and safety. These exterior lights will only be used when night training is scheduled. Moreover, no permanent exterior lighting is planned within the footprints for the UCAS and Aviation Bulls-Eye Ranges. Lighting within the action area is expected to be minimal because bright lights are counter to realistic training conditions. By using amber lights and shielding where possible, NRO considers the potential impacts to petrels from artificial light sources to be discountable within the UCAS action area.

1.2.2 Indirect Effects

No indirect effects were considered for the Hawaiian Petrel as a result of UCAS operations.

1.2.3 Cumulative Effects

There are no future State or public/private actions that are reasonably certain to occur within the action area. Therefore, there are no cumulative effects to Hawaiian Petrels as a result of UCAS operations.

1.3 Minimization Measures for Potential Effects to the Hawaiian Petrel

The Hawaiian Petrel was not observed transiting the action area and no petrel colonies were observed during the survey period. Results are considered conclusive with respect to Hawaiian Petrel colonies, and support the proposition that petrel occurrence in the saddle region flyway is infrequent. Open pahoehoe habitat near the UCAS and Aviation Bulls-Eye Ranges is sparse, providing limited suitable habitat for petrel colonies. Additionally, evidence suggests very few Hawaiian Petrels access Mauna Loa colonies via the west coast and the Saddle region (Cooper et al. 1996, Day et al. 2003).

Although potential effects to the Hawaiian Petrel as a result of UCAS operations are unlikely, the Army proposes the following minimization measures:

- Amber lights will be used where possible;
- Bright lights will be shielded to prevent disorienting petrels.

1.4 Final Determination for the Hawaiian Petrel

The Army concludes that potential direct and indirect effects resulting from UCAS operations are either insignificant or discountable and the Hawaiian Petrel is not likely to be adversely affected. We request your concurrence with our determination.

2.0 POTENTIAL EFFECTS TO THE BAND-RUMPED STORM PETREL IN THE UCAS ACTION AREA

2.1 Species Background

Common name: Band-Rumped Storm Petrel
Scientific name: *Oceanodroma castro*
Family: Hydrobatidae
Federal status: Candidate (May 1989)
Projected Status Determination: FY 2015
Conservation Plan: US FWS (January 2005)

Description: The Band-Rumped Storm Petrel is a medium sized, highly pelagic petrel with an estimated life span of 15-20 years. Adult males and females are primarily blackish-brown and have a sharply defined narrow white band across the rump area. A slightly paler brownish-gray wing-bar marks the upper wing-coverts forming a V-shape on the back. The Band-Rumped Storm Petrel feeds far from shore by hovering close to the water surface and scooping up minute food often contacting the water with their feet. The species' breeding biology in Hawaii is not well known, but individuals are assumed to nest in burrows or natural cavities at high-elevation, inland habitats. The Band-Rumped Storm Petrel breeding seasonality is assumed similar to the Hawaiian Petrel. Band-Rumped Storm Petrels lay a single egg per season between May and June and young fledge in October. The species is highly faithful to nesting sites, typically returning to the same site each year. Although little is known about courtship behaviors, birds, probably un-paired juveniles, swoop and call over the colony (Harrison 1990).

Habitat: Band-Rumped Storm Petrel colonies exist on steep heavily-vegetated cliffs and high-elevation barren lava flows, similar to Hawaiian Petrels, where predation pressure is presumably relaxed. Band-Rumped Storm Petrel nests are located in burrows, crevices, or cracks in lava tubes. The species visits cinder cones to swoop and call. Confirmation of nesting colonies remains elusive on Hawaii Island (Slotterback 2002).

Suitable Band-Rumped Storm Petrel habitat at PTA has been defined as open pahoehoe lava with lava tubes and blisters suitable for nesting areas. Additionally, prominent cinder cones at PTA may be important sites for aerial displays and mate attraction. Potential petrel habitat within the UCAS action area is shown in Figure 2.

Distribution: Archaeological and subfossil evidence suggest the Band-Rumped Storm Petrel previously inhabited the main Hawaiian Islands and indicates birds nest much

closer to the shore than today. Currently, populations are extant on the islands of Kauai, Maui, and Hawaii.

Movement Patterns: Similar to the Hawaiian Petrel, island-wide movement patterns and potential flyways for the Band-Rumped Storm Petrel are poorly understood. Band-Rumped Storm Petrels access inland colonies from February to November with a small period of absence around March and April (Simons 1985). When traveling between the ocean and breeding colonies, bright lights can disorient and blind petrels, causing individuals to collide with objects and fall to the ground where they are susceptible to predators. On other islands with large seabird populations this "fallout" is highest in October when young petrels make their first seaward flight (Telfer 1987).

Previous radar studies have not specifically targeted Band-Rumped Storm Petrels and because the petrel is small and flies erratically at low speeds, it may not leave a clear radar signature (Swift and Burt-Toland 2009). However, an island-wide seabird movement study detected no inland flights for Hawaiian Petrels or Newell's Shearwaters *(Puffinus newelli)* originating from the west coast (Kona) (Day et al. 2003); therefore, it is assumed Band-Rumped Storm Petrels also rarely access colonies via the west coast. Consistent seasonal activity and documented flight patterns on the southeast flank of Mauna Loa suggests Band-Rumped Storm Petrels approach high-elevation colonies (i.e., above 8850 ft) from the east and southeast coasts (Swift and Burt-Toland 2009). A low number of Band-Rumped Storm Petrels may transit PTA, including the action area, during nightly trips from breeding colonies on Mauna Loa to the sea (Day et al. 2003).

Known Population at PTA: Surveys for the endangered Hawaiian Petrel have been conducted at PTA since 1992. Band-Rumped Storm Petrels and Hawaiian Petrels have similar habitat requirements and breeding seasons and both species are vocal at colony or display sites (Slotterback 2002); therefore, Hawaiian Petrel survey efforts are adequate to determine presence or absence of the Band-Rumped Storm Petrel at the installation. To monitor presence or absence of petrels at PTA, audio recording units are deployed at 18 monitoring sites located within potential suitable habitat during part of the breeding season (May to August). The detection radius of the audio recording units is approximately 1475 ft (450 m) and monitoring sites are distributed to cover between 44% and 59% of the potential suitable habitat found outside the Impact Area at PTA (NRO unpublished data).

Band-Rumped Storm Petrels are documented using habitat in the saddle region of Hawaii Island (NRO unpublished data). At PTA, the species was recorded between 2008-2012 (May-August) in Training Areas 21 and 23 at least once at 17 of the 18 monitoring sites (Figure 4). Generally, Band-Rumped Storm Petrels are first detected at

PTA in late May and call activity is detected more frequently in TA 21 than TA 23. In TA 21, call detections increase through June and remain steady until August when monitoring is completed. Additionally, call activity occurs throughout the sample period (i.e., between 1915 h and 2315 h). The closest distances between the UCAS and Aviation Bulls-Eye Ranges and Band-Rumped Storm Petrel detections in the southwest and southeast are 2.86 mi (4.6 km) and 4.91 mi (7.9 km), respectively.

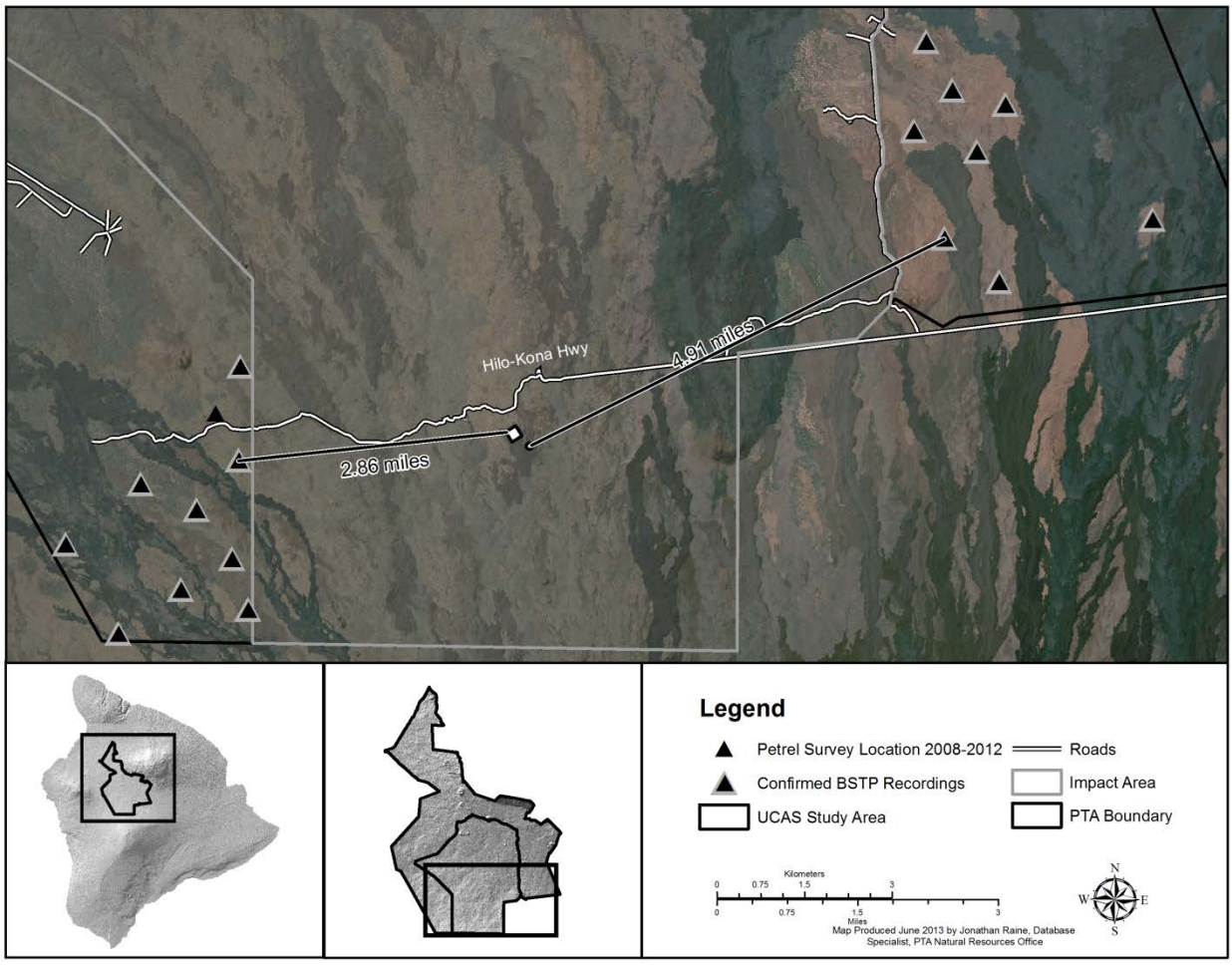


Figure 4. Band-Rumped Storm Petrel (BSTP) Survey Locations and Confirmed Recordings 2008-2012

In June 2013, Song Meter II (SM) units were deployed via helicopter at the UCAS and Aviation Bulls-Eye Ranges. The SM units were programmed to record all ambient sounds on 4 non-contiguous nights during an 8-night monitoring period. Three SM units were deployed within the action area (Figure 5). Band-Rumped Storm Petrel calls were recorded at SM location 1 over 2 different nights. Call detections were dispersed over the sample period with the earliest detection at 2142 h and the latest at 2247 h. Overall, activity levels are relatively low in the area surrounding the UCAS and Aviation Bulls-

Eye Ranges. The short intervals and attenuated signal strength between the majority of calls suggest the birds were transiting the area.

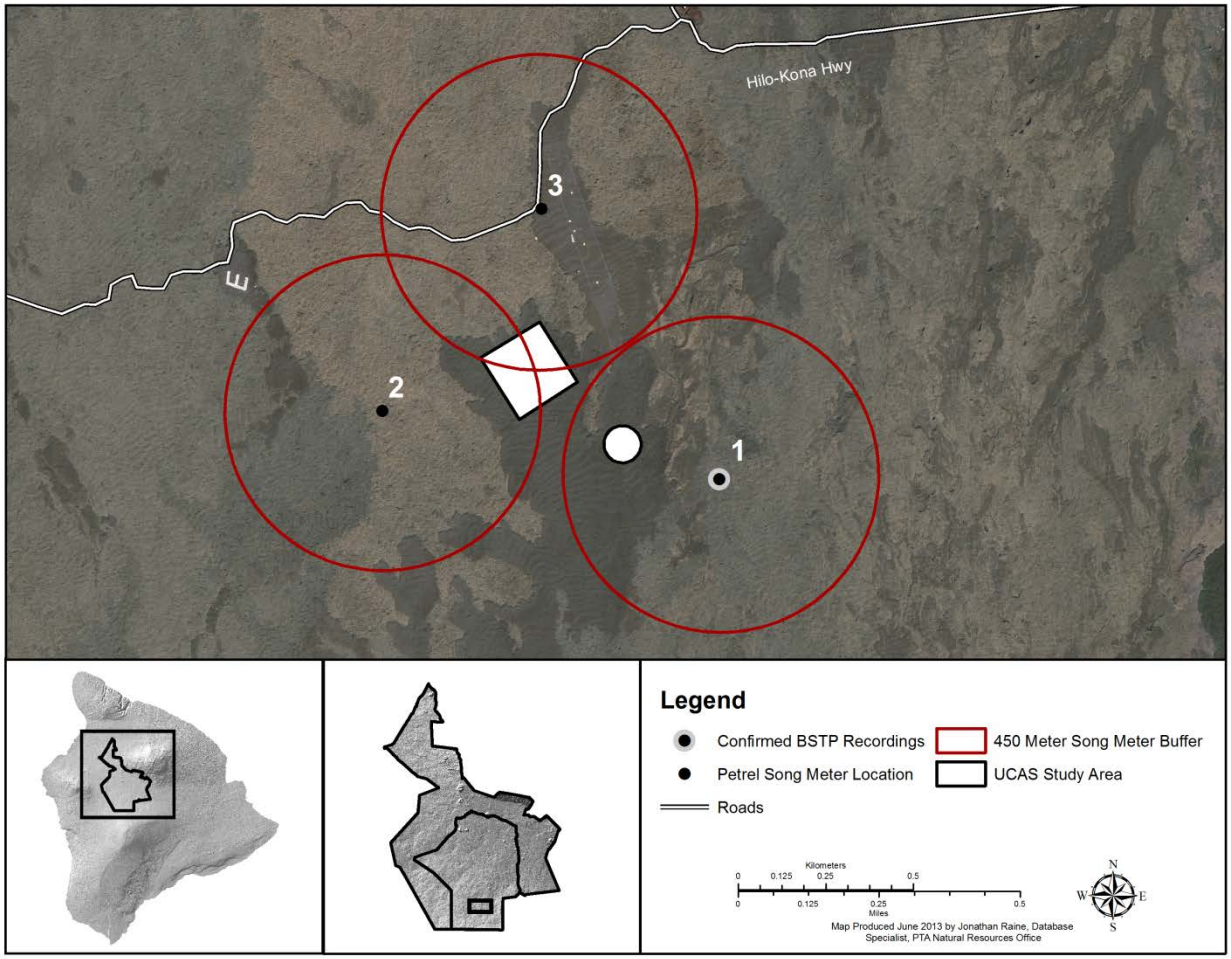


Figure 5. Petrel Survey Area and Confirmed Band-Rumped Storm Petrel (BSTP) Recordings in 2013

Band-Rumped Storm Petrels are documented within Hawaiian Petrel colonies in the National Park, and also at Red Hill cabin along the Mauna Loa summit access trail at ~3000 m elevation. Additionally, National Park personnel recovered a Band-Rumped Storm Petrel carcass from the National Oceanic and Atmospheric Administration access road on Mauna Loa proximate to the PTA boundary (D. Hu, pers. comm., 2011). Call activity suggests Band-Rumped Storm Petrels are present in portions of TA 21 and TA 23 seasonally; however, at this time it is unclear how the petrels are using habitat at PTA. It can be assumed that the species uses the saddle region as a flyway to nesting habitat on the northeast rift zone on Mauna Loa, within the Hawaii Volcanoes National Park.

2.2 Potential Effects of the Action on the Band-Rumped Storm Petrel: Direct, Indirect, and Cumulative

This section describes specific potential direct, indirect, and cumulative effects from military training actions within the action area on the Band-Rumped Storm Petrel and associated habitats. Band-Rumped Storm Petrels have habitat requirements and breeding seasons similar to Hawaiian Petrels (Slotterback 2002) and potential impacts are expected to be the same for these species.

2.2.1 Direct Effects

Potential effects to the Band-Rumped Storm Petrel from UCAS operations include injury or death from grading and leveling during construction, noise disturbance, airstrikes, and disorientation from artificial light sources. These effects were evaluated based on the expected presence of petrels within the action area during UCAS operations.

If present, impacts to the Band-Rumped Storm Petrel could occur when the bulldozer transits potential nesting habitat within the range footprints or access trails. Eggs, chicks, and/or adults could be injured or killed if occupied burrows collapse under the bulldozer. However, constructing the UCAS and Aviation Bulls-Eye Ranges is not considered to be of concern for petrels. Because the ranges are located on relatively young aa lava, grading and leveling will not impact potential nesting burrows. Pahoehoe lava with suitable openings for nesting is present within the action area.

Band-Rumped Storm Petrels were detected on 2 of 8 sampling nights and calls were recorded at monitoring location 1. Overall call activity was relatively low indicating no colonial activity. Activity was highly clustered with calling activity lasting from 1 to 7 minutes. Call clusters were typically interspersed by periods of inactivity lasting from 10 to 60 minutes with an average of 20 minutes between active periods. The minimal duration of calls within a cluster and the relatively long inactive periods between call clusters suggests petrels sporadically occupy the area possibly while in transit. The low number of calls indicates no colonial activity in these areas.

Although the recordings suggest petrels are moving through the area, Band-Rumped Storm Petrel nest site preferences and identifying characteristics are poorly understood on Hawaii Island. Survey techniques for identifying Hawaiian Petrel burrows may be insufficient to detect Band-Rumped Storm Petrel nesting activity (Swift and Burt-Towland 2009). Therefore, undetected Band-Rumped Storm Petrel burrows may be present in the vicinity of the UCAS and Aviation Bulls-Eye Ranges. To avoid impacts from bulldozer operations to unidentified burrows within the action area, the NRO will mark suitable openings in the lava for avoidance.

All classes of fixed wing and rotary wing aircraft from all services will potentially conduct UCAS at PTA. Action area delineation and petrel surveys were based on a noise contour of 80 dB for the CH-47 Chinook and CH-53E Super Stallion, the 2 loudest aircraft proposed for UCAS operations. The literature supports that many bird species live, breed, and raise young in areas with sound levels well over 80 dB (Peshut and Schnell 2011). Birds may flush from nests when sound levels are high (generally >80-100 dB), but generally return to their nests within minutes after the disturbance abates. Also, many studies indicate that birds habituate (display decreasing responses) to loud noises. Refer to the enclosed Memorandum For Record, *Biological Surveys for Urban Close Air Support Training at Pohakuloa Training Area, Island of Hawaii* (Peshut et al. 2013), for more details about noise impacts on birds as a result of military training.

Although it is recognized that exceptions are possible among individual species, the 80 dB contour was selected as the reasonable noise level threshold of concern for disturbance of bird species, based on a review of the literature. Given the expected low density of petrels within the action area, noise ≥80 dB is not expected to affect an indeterminably small number of individuals.

In a radar survey of seabirds at PTA, Cooper et al. (1996) detected 5 seabirds (0.05 birds/hr), including 3 Hawaiian Petrels, on the eastern portion of the installation. This movement rate is 6-fold lower than the lowest seabird movement rate found in a similar study by Day et al. (2003) at coastal sites (0.3 birds/hr). Indeed, in 9 of the 14 sites sampled by Day et al. (2003), seabird movement rates were greater than 1.0 bird/hr, with a maximum rate of 25.8 birds/hr at Waipio Valley (northeast of PTA). Additionally, monitoring data from the action area detected Band-Rumped Storm Petrels transiting the area near the UCAS and Aviation Bulls-Eye Ranges. From these data, we conclude relatively few birds transit PTA. Therefore, very few Band-Rumped Storm Petrels are likely to encounter noise at the proposed UCAS and Aviation Bulls-Eye Ranges.

Airstrikes as a result of UCAS operations are not considered to be of concern for Band-Rumped Storm Petrels. Most UCAS activities are scheduled for daylight hours when helicopters are visible as well as audible to petrels. Petrels that are transiting the saddle region are not expected to be in the vicinity of the action area during daylight hours. Transiting petrels during nighttime UCAS operations are expected to be minimal because petrel density in the flyway is expected to be low (Cooper et al. 1996). Band-Rumped Storm Petrels generally fly upslope within in 33 ft (10 m) of the ground (Swift and Burt-Toland 2009). Bird airstrikes are extremely rare for military aircraft overall, with only 2 airstrikes documented between 2001-2010 for all Army aircraft flights in the state of Hawaii (P. Mansoor, CW4, pers. comm., 2011). Moreover, helicopters are typically slow-moving at the elevations proposed for UCAS activities due to reduced

aircraft performance (F. Tate, COL, pers. comm., 2011), which further reduces the likelihood of bird airstrikes.

Bright lights radiating into the night sky may disorient Band-Rumped Storm Petrels, especially point source lights in an otherwise dark landscape (Reed et al. 1985). This is a known phenomenon on Kauai, where bright security lights near the shore are managed to reduce impacts to the Hawaiian Petrel. On Kauai, point-source lights were shown to disorient and blind petrels causing collisions with obstructions. Injured petrels on the ground were then subject to predation from cats, dogs, and rodents.

In the remote location of the UCAS and Aviation Bulls-Eye Ranges, distance from the shoreline and the low intensity of illumination from military activities is not comparable to the conditions on Kauai. However, the rare Band-Rumped Storm Petrel that traverses the action area may become disoriented and grounded from artificial lighting in the action area. A red safety light is planned for use atop the observation tower adjacent to the UCAS Range. Additionally, exterior lighting associated with the observation tower will be minimal and restricted to illuminating areas for human life, health, and safety such as stairwells and doorways. It is anticipated that 1-3 lights may be installed externally at the observation tower for human convenience and safety. These exterior lights will only be used when night training is scheduled. Moreover, no permanent exterior lighting is planned within the footprints for the UCAS and Aviation Bulls-Eye Ranges. Lighting within the action area is expected to be minimal because bright lights are counter to realistic training conditions. By using amber lights and shielding where possible, NRO considers the potential impacts to petrels from artificial light sources to be discountable within the UCAS action area.

2.2.2 Indirect Effects

No indirect effects were considered for the Band-Rumped Storm Petrel as a result of UCAS operations.

2.2.3 Cumulative Effects

There are no future State or public/private actions that are reasonably certain to occur within the action area. Therefore, there are no cumulative effects to Band-Rumped Storm Petrels as a result of UCAS operations.

2.3 Minimization Measures for Potential Effects to the Band-Rumped Storm Petrel

The Band-Rumped Storm Petrel was recorded within the action area; however, call recording characteristics suggest the individuals were transiting the area. Open

pahoehoe habitat near the UCAS and Aviation Bulls-Eye Ranges is sparse, providing limited suitable habitat for petrel colonies. However, nesting site characteristics for Band-Rumped Storm Petrels are poorly understood and it is possible that undetected burrows may be present in the action area.

Although potential effects to the Band-Rumped Storm Petrel as a result of UCAS operations are unlikely, the Army proposes the following minimization measures:

- The NRO will mark suitable openings for avoidance by the bulldozer.
- Amber lights will be used where possible;
- Bright lights will be shielded to prevent disorienting petrels.

2.4 Final Determination for the Band-Rumped Storm Petrel

The Army concludes that potential direct and indirect effects resulting from UCAS operations are either insignificant or discountable and the Band-Rumped Storm Petrel is not likely to be adversely affected. We request your concurrence with our determination.

3.0 Determination of No Effect for the Hawaiian Hoary Bat, Botanical Resources, and Avifauna Protected Under the MBTA

3.1 Hawaiian Hoary Bat

3.1.1 Survey Results

Surveys to assess potential available treeland roosting habitat and potential foraging habitat for the federally-listed Hawaiian Hoary Bat were conducted on 20-22 May 2013, to determine the potential for bat presence in the general vicinities of the UCAS and Aviation Bulls-Eye Ranges. These surveys were coincidental with surveys for avifauna protected under the MBTA. The Hawaiian Hoary Bat survey area was based on the 80 dB noise contour used for the avifauna surveys. This area was selected as a reasonable noise level threshold of concern for disturbance of bird and bat species (see Peshut et al. Memorandum For Record 09 July 2013). Observations on bat habitat type were recorded between each of the avifauna monitoring stations.

Out of 5 possible Hawaiian Hoary Bat habitat types that occur in this area of PTA, only 2 were recorded in the action area: 1) Barren Lava and 2) *Styphelia-Dodonaea* Shrubland.

3.1.2 Conclusions

Potential impacts to the Hawaiian Hoary Bat as a result of UCAS operations include noise disturbance and direct impact with aircraft.

Neither of the Hawaiian Hoary Bat habitat types in the action area is considered potential available treeland roosting habitat; therefore, daytime presence of roosting bats is considered to be improbable and no daytime noise impact to the Hawaiian Hoary Bat is expected. *Styphelia-Dodonaea* Shrubland is considered potential available foraging habitat for the Hawaiian Hoary Bat. It is possible that foraging bats transit across the action area during nighttime hours; however, given the expanse of barren lava at the ranges, the number of transiting bats is expected to be very low. Moreover, nighttime exercises constitute only a small part of UCAS operations. The density of insects near the UCAS and Aviation Bulls-Eye Ranges is expected to be low because of the sparse vegetation, and it is therefore likely that foraging opportunities for bats in the action area are limited.

Airstrikes as a result of UCAS operations are not considered to be of concern for the Hawaiian Hoary Bat. Bat presence within the range area is expected to be limited to rare and infrequent transiting bats, and bat density in the range area is expected to be extremely low. The potential for a helicopter collision with the Hawaiian Hoary Bat is unlikely because the bats are solitary, are only active from sunset to sunrise, only roost in trees in forested areas, and are not expected to depend upon the habitat around the UCAS and Aviation Bulls-Eye Ranges for resources. Most training activities at these ranges are scheduled for daylight hours when bats are roosting in the forested areas of the island. Additionally, airstrikes are extremely rare for military aircraft in the State of Hawaii overall, with only two airstrikes (birds) documented between 2001-2010 for all Army aircraft flights (P. Mansoor, CW4, pers. comm., 2011). If transiting bats are present during training operations in the action area, bats are expected to vacate the immediate vicinities of the aircraft and the ranges.

3.2 Botanical Resources

3.2.1 Survey Results

Surveys were conducted to determine the presence of federally-listed plant species and assess overall vegetation in the vicinity of the UCAS and Aviation Bulls-Eye Ranges on 20 and 22 May 2013. The botanical survey area comprised a buffer of 330 ft (100 m) from the perimeter of the ranges. A survey grid was overlaid to encompass the ranges, their buffer areas, and access trails, which included areas not proposed for construction to allow for flexibility in the final placement of the ranges. Survey area dimensions were based on impacts from construction only; rotorwash impacts are not applicable to the

UCAS and Aviation Bulls-Eye Ranges since aircraft will not be landing on the ranges (see see Peshut et al. Memorandum For Record 09 July 2013). All locations of federally-listed threatened and endangered plant species and/or species of concern were recorded when found during the surveys. Locations of common native and introduced plant species were also recorded.

No federally-listed or candidate plant species were located within the action area.

3.2.2 Conclusions

Potential impacts to botanical resources as a result of UCAS operations may occur during construction of the ranges and access trails, and/or during temporary localized disturbance from dust and wind generated from helicopter rotorwash.

All range construction will occur on aa lava flows that are sparsely vegetated and on which no federally-listed plant species were found. Therefore, construction of the UCAS and Aviation Bulls-Eye Ranges will have no impact to federally-listed plant species and minimal impact to common native vegetation.

The impact to botanical resources due to wind generated by helicopter rotorwash at the UCAS and Aviation Bulls-Eye Ranges is considered negligible. For the largest aircraft (worst-case scenario), the CH-53E Super Stallion, the rotorwash is first felt at the ground surface when the aircraft is 118 ft (36 m) AGL. The minimum attack altitude for rotary wing aircraft proposed for use at the UCAS Range is 200 ft (60 m) AGL; therefore, rotorwash effects are not expected at ground level. In general, vegetation in the action area is extremely sparse and includes few common native or introduced species. UCAS operations will produce little or no dust at the ranges, and the highly localized and short duration winds generated from aircraft rotorwash are not likely to permanently impact the sparse vegetation that occurs in the action area.

3.3 MBTA Protected Avifauna

3.3.1 Survey Results

Surveys were conducted to determine avifauna presence and habitat use in the general vicinity of the UCAS and Aviation Bulls-Eye Ranges on 20-22 May 2013. The surveys were conducted in a 2000 ft (610 m) radius area from the perimeter of the ranges. This area extent was selected based on a noise contour of 80 dB for the CH-47 Chinook and CH-53 Super Stallion, the 2 loudest aircraft proposed for UCAS operations (see Peshut et al. Memorandum For Record 09 July 2013). The survey area was extended from the perimeter of the UCAS and Aviation Bulls-Eye Ranges to account for potential noise effects from aircraft at 200 ft (60 m) AGL at the edge of the ranges (i.e., worst-case

scenario). The avifauna species selected for surveys were prioritized based on species' status under the ESA and the MBTA.

Two MBTA protected species were detected during the surveys: Apapane (*Himatione sanguinea*) and Omao (*Myadestes obscurus*).

3.3.2 Conclusions

Potential impacts to Apapane and Omao as a result of UCAS operations include noise disturbance, wind generated from helicopter rotorwash, and direct impact with aircraft.

The impact to Apapane and Omao due to noise is considered negligible. The literature supports that many bird species live, breed, and raise young in areas with sound levels well over 80 dB (Peshut and Schnell 2011). Birds may flush from nests when sound levels are high (generally >80-100 dB), but generally return to their nests within minutes after the disturbance abates. Also, many studies indicate that birds habituate (display decreasing responses) to loud noises.

Similarly, increased winds due to rotorwash is not likely to significantly impact nesting Apapane and Omao. For the largest aircraft (worst-case scenario), the CH-53E Super Stallion, the rotorwash is first felt at the ground surface when the aircraft is 118 ft (36 m) AGL. The minimum attack altitude for rotary wing aircraft proposed for use at the UCAS Range is 200 ft (60 m) AGL; therefore, rotorwash effects are not expected at ground level. Additionally, helicopter-generated winds are not significantly higher than natural gusty wind conditions on Mauna Loa. Overall densities of Apapane and Omao within the action area were extremely low. If present within the action area during UCAS operations, it is expected that individuals will temporarily vacate the area during the disturbance.

Airstrikes as a result of UCAS operations are not likely to affect Apapane and Omao in the action area. Most training activities are scheduled for daylight hours when helicopters are visible and audible to birds. Apapane and Omao in the vicinity of the ranges during nighttime operations are expected to be minimal. Bird airstrikes are extremely rare for military aircraft in Hawaii overall, with only 2 airstrikes documented between 2001-2010 for all Army aircraft flights in the state of Hawaii (P. Mansoor, CW4, pers. comm., 2011). Moreover, helicopters are typically slow-moving at the elevations proposed for UCAS operations because of unpredictable air mass stability and decreased air density, which affect aircraft performance (F. Tate, COL, pers. comm., 2011). Apapane and Omao are expected to vacate the immediate vicinities of the aircraft and ranges if present during training operations.

3.4 Final Determination for the Hawaiian Hoary Bat, Botanical Resources, and MBTA Protected Avifauna

Based on field surveys and supporting documents, the Army concludes that UCAS operations will have no appreciable effect on the Hawaiian Hoary Bat, botanical resources, and avifauna protected under the MBTA within the action area. This assessment and supporting documents satisfy Army responsibilities under Section 7(c) of the ESA at this time. The Army will continue to remain aware of any change in the status of these species or critical habitat, and will be prepared to re-evaluate potential project impacts if necessary.

Thank you for our considering our determination of **not likely to adversely affect** for the Hawaiian Petrel and the Band-Rumped Storm-Petrel, and our determination of **no effect** for the Hawaiian Hoary Bat, botanical resources, and avifauna protected under the MBTA, for proposed UCAS training ranges at PTA. The point of contact for questions or further clarification is Dr. Peter Peshut 808-969-1966, peter.j.peshut.civ@mail.mil. Alternatively, I am also available at 808-969-2407, eric.p.shwedo.mil@mail.mil. Please do not hesitate to contact either of us to discuss this matter further.

Sincerely,

ERIC P. SHWEDO
Lieutenant Colonel, US Army
Commander, US Army Garrison-Pohakuloa

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DEPARTMENT OF THE ARMY
HEADQUARTERS,
UNITED STATES ARMY GARRISON
PŌHAKULOA
PO BOX 4607
HILO, HAWAII 96720-0607

IMHW-PTA-PWE 09 July 2013

MEMORANDUM FOR RECORD

SUBJECT: Biological Surveys for Urban Close Air Support Training at Pohakuloa Training Area, Island of Hawaii

INTRODUCTION

In support of proposed Urban Close Air Support (UCAS) training for the US Marine Corps, the Pohakuloa Training Area (PTA) Natural Resources Office (NRO) conducted surveys for plants and animals protected under the Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MBTA). The surveys were conducted during May and June 2013. Survey objectives were to assess the potential for impacts to occur to biological resources as a result of UCAS operations.

The NRO conducted 5 types of biological surveys:

1) Avifauna;
2) Botanical;
3) Hawaiian Hoary Bat;
4) Invasive Ants;
5) Hawaiian Petrel and Band-Rumped Storm Petrel.

This memorandum presents technical findings for each survey.

For the purpose of the biological surveys, the "action area" is defined as the area of greatest extent potentially impacted by UCAS operations; i.e., the limits of the avifauna surveys. The avifauna survey area was based on a reasonable noise level threshold of concern for disturbance of bird species. Refer to the avifauna section below for more information regarding noise disturbance and the justification for the survey area delineation.

PROJECT DESCRIPTION

The primary mission of PTA is to enhance the combat readiness of training units by providing a quality joint combined arms facility that offers logistical, administrative, and service support for up to regiment or brigade-level combat teams. The installation provides a safe, modernized, major training area for the US Army Pacific and other US Pacific Command military units.

PTA is an important tactical training area for Mission Essential Task List training and provides resources and facilities for active and reserve component units that train on the installation throughout the year. PTA is the largest live-fire range and training complex belonging to the US Army Pacific. Assets are geared toward live-fire and maneuver training on ranges, dismounted maneuver training, and artillery live-fire. The 25th Infantry Division is the principal live-fire and maneuver user of the installation. Additional users include the Hawaii Army National Guard, US Marine Corps, US Navy, US Air Force and International Allied Forces.

UCAS Range

Increased urbanization and associated capabilities to fight under the concealment of city blocks offer great advantage to the enemy. In a theater of operation, UCAS assists ground operations by attacking targets in dense urban terrain in close proximity to friendly troops. UCAS training is essential to aviators who have an extremely small margin of error under increasingly complex command directives and rules of engagement.

The US Marine Corps is proposing to build a UCAS Range at PTA. Few Marine UCAS Ranges currently exist, and there are none in the Pacific. The nearest UCAS Range is at Yuma Proving Ground in Arizona.

Aviation Bulls-Eye Range

This range will allow Marine aviation units to fine tune their bombing and airstrike warfare skills. Training at both ranges will be conducted using inert munitions (i.e., no high explosives) and may include 7.62 mm, .50 cal, 20 mm, 25 mm, 30 mm, MK-76, BDU-32, laser guided training rounds, concrete dumb bombs, ATM-114 inert hellfire, and 2.75" inert rockets. This type of ordnance is already utilized on the nearby Silent E and Mock Runway training ranges of PTA.

All classes of fixed wing and rotary wing aircraft from all services will potentially conduct UCAS training at PTA. Fixed wing aircraft will typically involve the FA-18 Hornet and will rarely include the AV-8B Harrier, F-15 Eagle, F-16 Fighting Falcon, F-

22 Raptor, and F-35 Lightning. Common rotary wing aircraft used for UCAS training will include the UH-1 Iroquois, AH-1 Cobra, OH-58 Kiowa, and AH-64 Apache, with rare use of the CH-53E Super Stallion, UH-60 Black Hawk, and CH-47 Chinook for door gunnery. Typical fixed wing attack altitudes will exceed 10,000 ft (3050 m) above ground level (AGL) and speeds will range from 380 to 550 knots. Typical rotary wing attack altitudes will range from 200 to 2000 ft (60 to 610 m) AGL and speeds will range from 60 to 120 knots. Frequency of use is estimated as follows (D. Geltmacher, pers. comm., 2013):

- US Marine Corps: 6 times per year for 7 days with 5 UH-1 and 7 AH-1;
- Lava Viper Exercises: 2 to 3 times per year for 10 to 14 days with 12 FA-18, AV-8B, or F-35 and 12 to 18 UH-1 and AH-1;
- US Navy: 2 times per year for 3 days with an unspecified number of FA-18;
- US Army: 4 times per year for 10 days with 6 to 8 OH-58 and AH-64.

PROJECT LOCATION

Pohakuloa Training Area

PTA is located in the saddle region of Hawaii Island between Mauna Kea, Mauna Loa, and Hualalai volcanoes (Figure 1). At 132,800 ac (53,750 ha), it is the single largest US Army holding in the State of Hawaii. The United States first used this area in 1942 for military maneuvers during World War II and PTA was formally established as an Army installation in 1956. The installation is bordered on the north by Mauna Kea State Park, Mauna Kea Forest Reserve, and Parker Ranch, to the east and south by Hawaii State lands, and to the west by Kamehameha School lands and State lands. PTA comprises 3 main areas: Cantonment, Bradshaw Army Airfield, and training areas including the Keamuku Maneuver Area (KMA) and an Impact Area.

PTA is classified as subalpine, tropical, dryland forest, one of the rarest ecosystems in the world. The installation contains 19 federally-listed threatened and endangered plant and animal species. Average annual rainfall is approximately 15 in (38 cm), varying from 4 to 16 in (10 to 41 cm) across the installation (Shaw and Castillo 1997). Typically, most precipitation falls during the winter months (November through February) in conjunction with Kona storms. In other months, there can be prolonged periods of little or no rainfall. The average annual temperature is 55° F (12.8° C) with little monthly fluctuation (Shaw and Castillo 1997). The growing season at PTA is essentially year-round.

PTA varies in elevation from approximately 4100 to 8700 ft (1250 to 2650 m). The installation has 10 soil types reflecting the volcanic geology of the area. Approximately 80% of the installation is covered by young volcanic substrates with the greatest soil

development in the northern portion of the installation (Shaw and Castillo 1997). Soils are typically thin and poorly developed, which is characteristic of extremely young volcanic substrate. There are no surface streams, lakes, or other bodies of water at PTA due to low rainfall, porous soils, and lava substrates. Sparse rainfall, fog drip, and occasional frost are the main sources of moisture that sustain plants and animals in the dryland habitat of Pohakuloa.

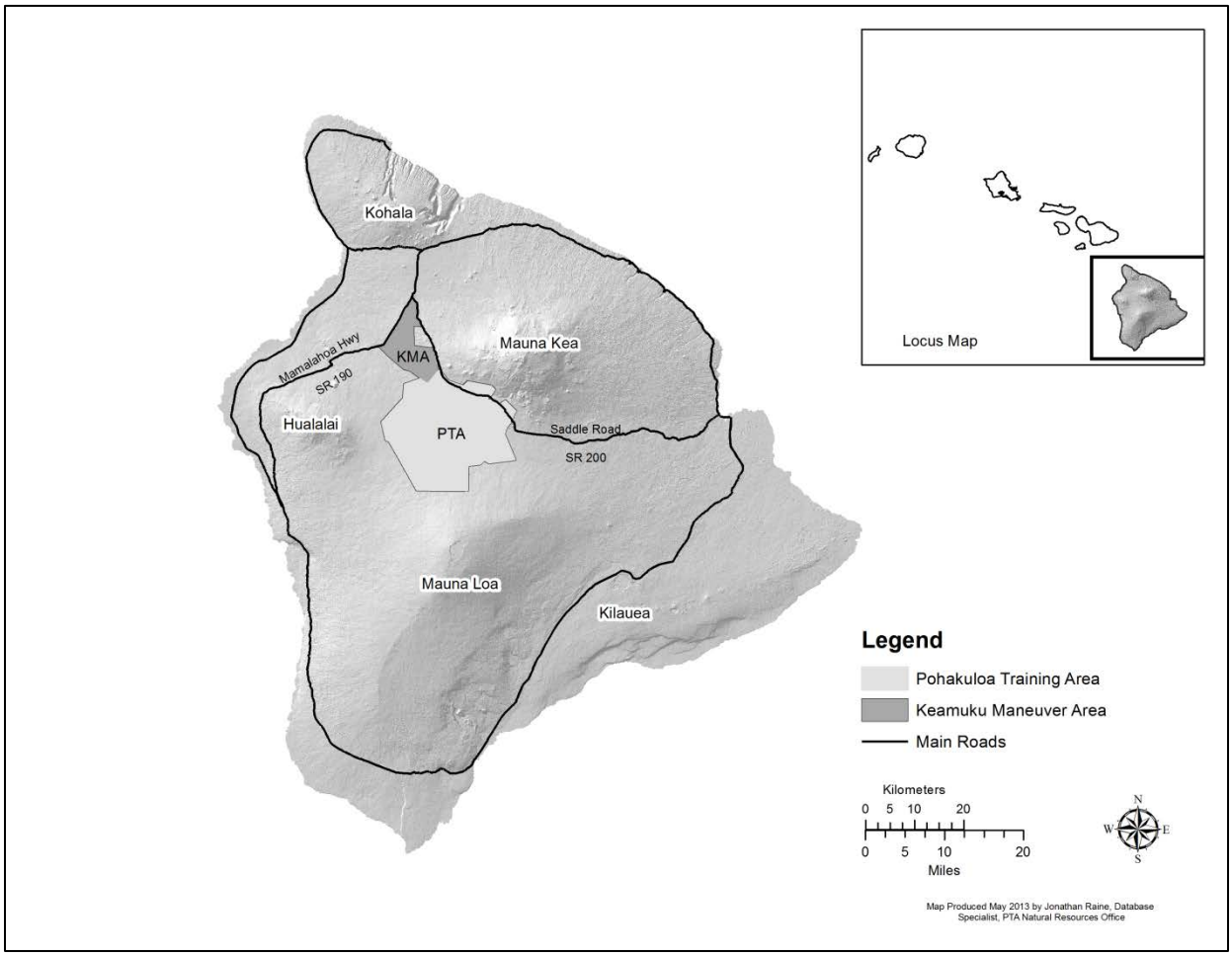


Figure 1. PTA and KMA Location on Hawaii Island

Impact Area

A centrally located Impact Area covers 51,050 ac (20,650 ha) (Figure 2). Approximately 20 ranges and artillery points are oriented to discharge munitions into the Impact Area. The installation has 23 training areas covering 57,220 ac (23,150 ha) including 22 live-fire and 4 non live-fire fixed ranges, 7 airborne drop zones, and 113 surveyed field artillery and mortar firing points. A helicopter gunnery range (Range 15) and a close air support and bombing range (Range 16) are overlaid within the Impact Area. Additional fixed ranges and firing positions have been developed in the southern

portion of the Impact Area for limited and restricted training activities, such as convoy live-fire and aerial exercises.

The Impact Area defines the physical location where all munitions lose ballistic energy and descend to earth. Some munitions fail to detonate upon impact, potentially creating perilous, unstable, unexploded ordnance (UXO). The Impact Area at PTA is a designated high-hazard area due to accumulated UXO. At this time it is not feasible to reduce UXO hazards in the Impact Area. Access to high hazard areas is prohibited unless specifically authorized by Range Operations, per 25th ID(L) and US Army, Hawaii Regulation No. 210-6 (USAG-HI 1999). The ranges for PTA are arranged so that the range firing lines and target mechanisms are outside the Impact Area wherever possible.

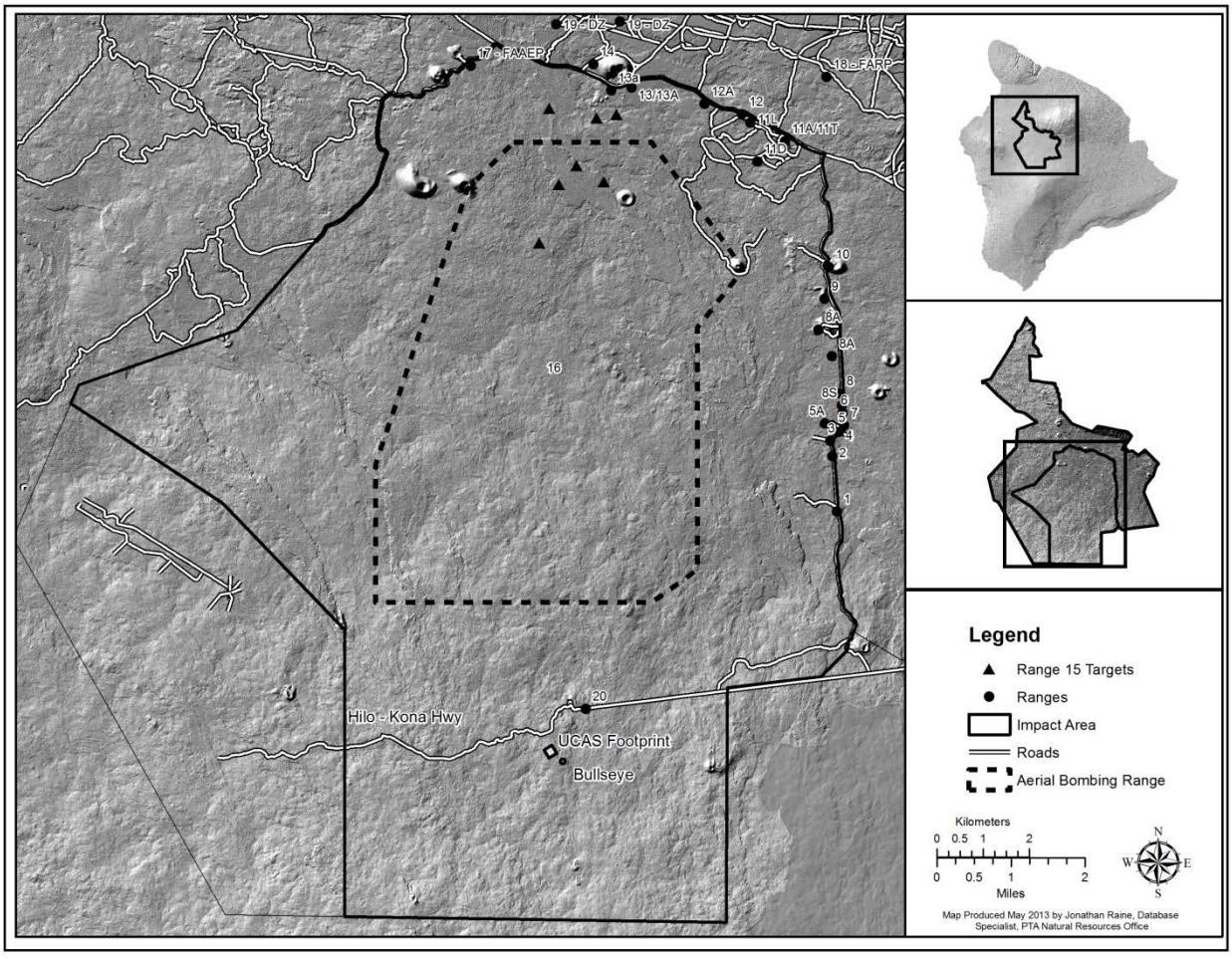


Figure 2. PTA Impact Area

UCAS Range

Construction of a UCAS Range, in the form of a simulated urban village, is proposed at PTA to enhance Marine aviator training. The built-up village will be no larger than 10 ac (4 ha) and will be located in the southern portion of the Impact Area (Figures 2 and 3). The UCAS Range will consist of an array of approximately 200 sea/land storage units. The units will be stacked adjacent to and on top of each other and secured together to simulate buildings. Stationary infantry targets, stationary armored targets, and steel full-size replica targets of armored vehicles may eventually be added. Additionally, there may eventually be a series of targets that will include hard wired and remote radio controlled (target) systems that are programmable. There will also be an observation tower along Hilo-Kona Road and an access trail leading into the UCAS Range to facilitate future maintenance.

The proposed UCAS Range location is on a young barren aa lava flow. Surface modification will include crushing, grading, and leveling with a bulldozer. No off-site material will be required with the exception of material used for concrete footings for stacked containers.

Aviation Bulls-Eye Range

This range will be located to the south and east of the UCAS Range on the same young aa flow (Figure 3), and will be serviced via a narrow vehicle trail. The surface area will be modified in the same manner as the UCAS Range footprint. No fill material will be required for this range. Painted tires will be used to create concentric circles at various distances from the center target. The Bulls-Eye Range footprint (excluding the access trail) will be no larger than 2.5 ac (1 ha).

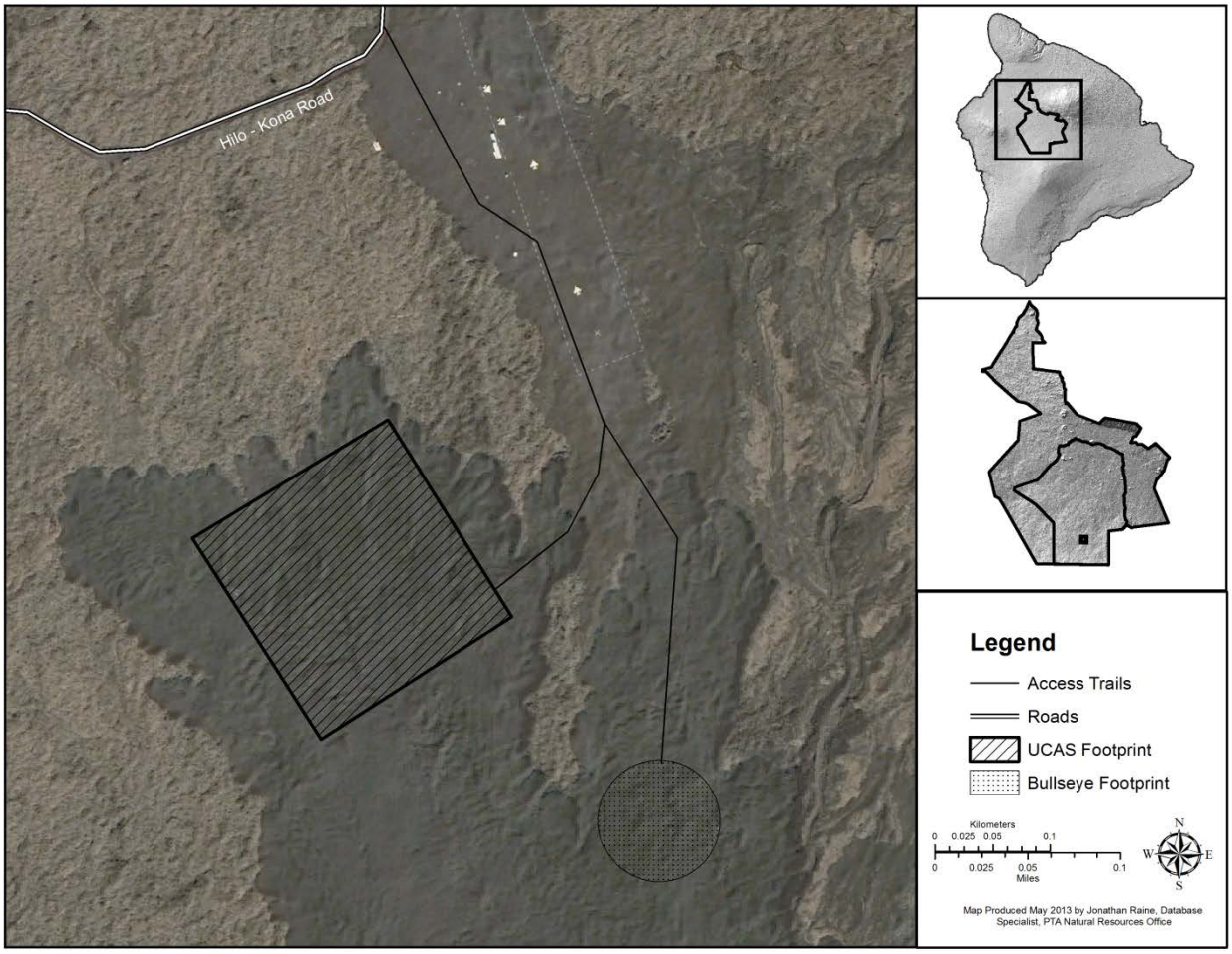


Figure 3. Location of the UCAS Range and Aviation Bulls-Eye Range

Substrate in the UCAS action area is variable and consists of approximately 36% aa and 64% pahoehoe (Figure 4). Approximately 65% of the lava within the action area is less than 1500 years old and has very little vegetative cover. The remaining 35% of the lava supports small stature native shrubs such as kukaenene (*Coprosma ernoidioides),* kupaoa (*Dubautia ciliolata*), ohelo (*Vaccinium reticulatum),* and pukiawe *(Leptecophylla tameiameiae)*. Shrub cover is sparse (≤ 10%), with most shrubs less than 3 ft (1 m) in height, and confined to cracks in the lava where soil and organic matter have accumulated. Very few trees or shrubs greater than 3 ft (1 m) tall are present within the UCAS action area.

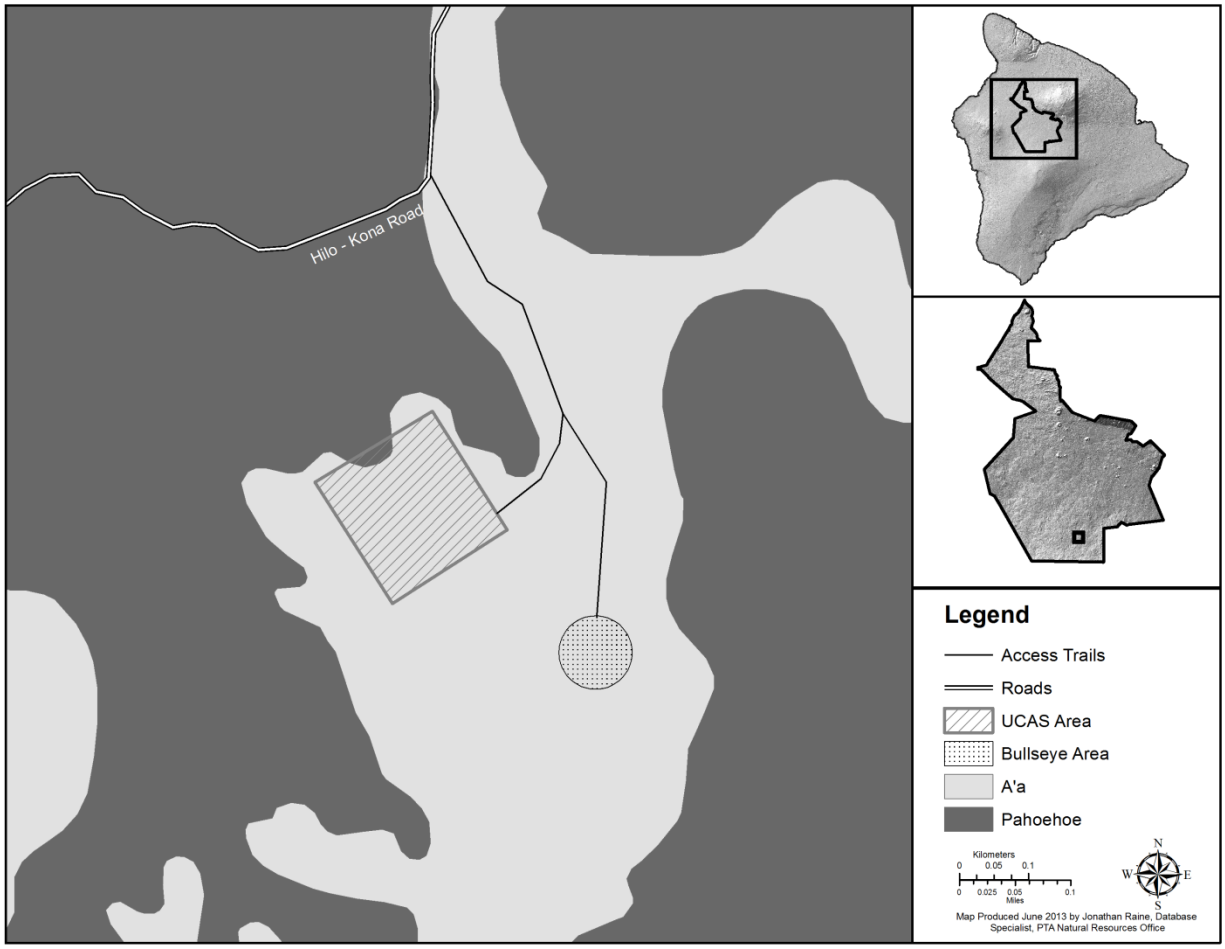


Figure 4. Lava Substrate in the UCAS Action Area

AVIFAUNA

Potential Impacts

Potential impacts to avifauna (birds) as a result of UCAS operations include noise disturbance, wind generated from helicopter rotorwash, and direct impact with aircraft. These impacts were evaluated based on the expected presence of avifauna within the action area during UCAS operations.

Survey Methods

The potential for noise disturbance was raised as a concern during previous ESA consultations for military training activities at PTA. The US FWS suggested that wildlife within the 60 decibel (dB) noise contour might be negatively impacted by helicopter operations. A basis for using the 60 dB contour could not be justified from a review of the relevant scientific literature. Bowels and Wisdom (2005) indicated that a 60 dB (A) rule (hourly A-weighted L_{eq}) for birds was originally established to prevent masking of

species-typical songs. They concluded that there is little evidence to support the effectiveness of the 60 dB (A) rule for all noise related impacts, and recommended that there should be further research prior to the 60 dB (A) rule becoming widely used for ESA consultations.

Numerous studies on noise impacts to wildlife, including over flights from military aircraft such as helicopters, have been conducted in past decades (see Appendix A - Annotated Bibliography from the Memorandum for Record, *Hawaiian Avifauna Surveys for HAMET Environmental Assessment*, Peshut and Schnell 2011). Although results cannot always be applied across species, studies demonstrate that various species, from wading birds to raptors, co-exist with loud noises. Although there is debate in the literature as to the effects from noise on the fitness of birds, many studies focus only on behavioral responses, which may not indicate physiological responses or animal fitness. The literature supports that many bird species live, breed, and raise young in areas with sound levels well above 80 dB (Peshut and Schnell 2011). Birds may flush from nests when sound levels are high (generally >80-100 dB), but generally return to their nests within minutes after the disturbance abates. Also, many studies indicate that birds habituate (display decreasing responses) to loud noises.

Although it is recognized that exceptions are possible among individual species, the 80 dB contour was selected as the reasonable noise level threshold of concern for disturbance of bird species for the purposes of the avifauna surveys. The surveys were conducted in a 2000 ft (610 m) radius area from the perimeter of the ranges. This area extent was selected based on a noise contour of 80 dB for the CH-47 Chinook and CH-53E Super Stallion, the 2 loudest aircraft proposed for UCAS operations. At a slant distance of 2000 ft (610 m), the CH-47 Chinook produces noise at the 77 dB level and the CH-53E Super Stallion produces noise at the 81 dB level (US Army 2010). Therefore, the survey area based on a 80 dB noise contour is adequate to determine noise impacts to avifauna in the action area. As previously discussed, the minimum attack altitude for rotary wing aircraft proposed for use at the UCAS Range is 200 ft (60 m) AGL. The survey area was extended from the perimeter of the UCAS and Aviation Bulls-Eye Ranges to account for potential noise effects from aircraft at 200 ft (60 m) AGL at the edge of the ranges (i.e., worst-case scenario).

For the UCAS and Aviation Bulls-Eye Ranges, there were 4 1-mi (1.65-km) transects each containing 11 monitoring stations. Transects were spaced 1640 ft (500 m) apart and monitoring stations were located at 490 ft (150 m) intervals along each transect to ensure maximum coverage within the survey area (Scott et al. 1986). There were a total of 44 monitoring stations, and the combined avifauna survey area covered approximately 555 ac (225 ha) (Figure 5).

The avifauna species selected for surveys were prioritized based on species' status under the ESA and the MBTA. The avifauna survey counting method is based on the US Fish and Wildlife Service (US FWS) Hawaiian Forest Bird Variable Circular-Plot method (Reynolds et al. 1980, Scott et al. 1986). Using this method, 1 observer conducts counts at each station along a single transect. Each station is monitored for 6 minutes during a 4.5 hour sampling period (0630 h to 1100 h). Detection type (aural, visual, or combined) and the horizontal distance from the station to the bird are recorded for every species observed. Weather conditions, wind speed, and cloud cover are also noted. Counts are not conducted on days when the weather is not within established guidelines (Reynolds et al. 1980).

During avifauna surveys, observations of Hawaiian Goose (*Branta sandvicensis*) sign were recorded between each monitoring station. Observers were instructed to look for feathers, feces, or other indicators of Hawaiian Goose presence.

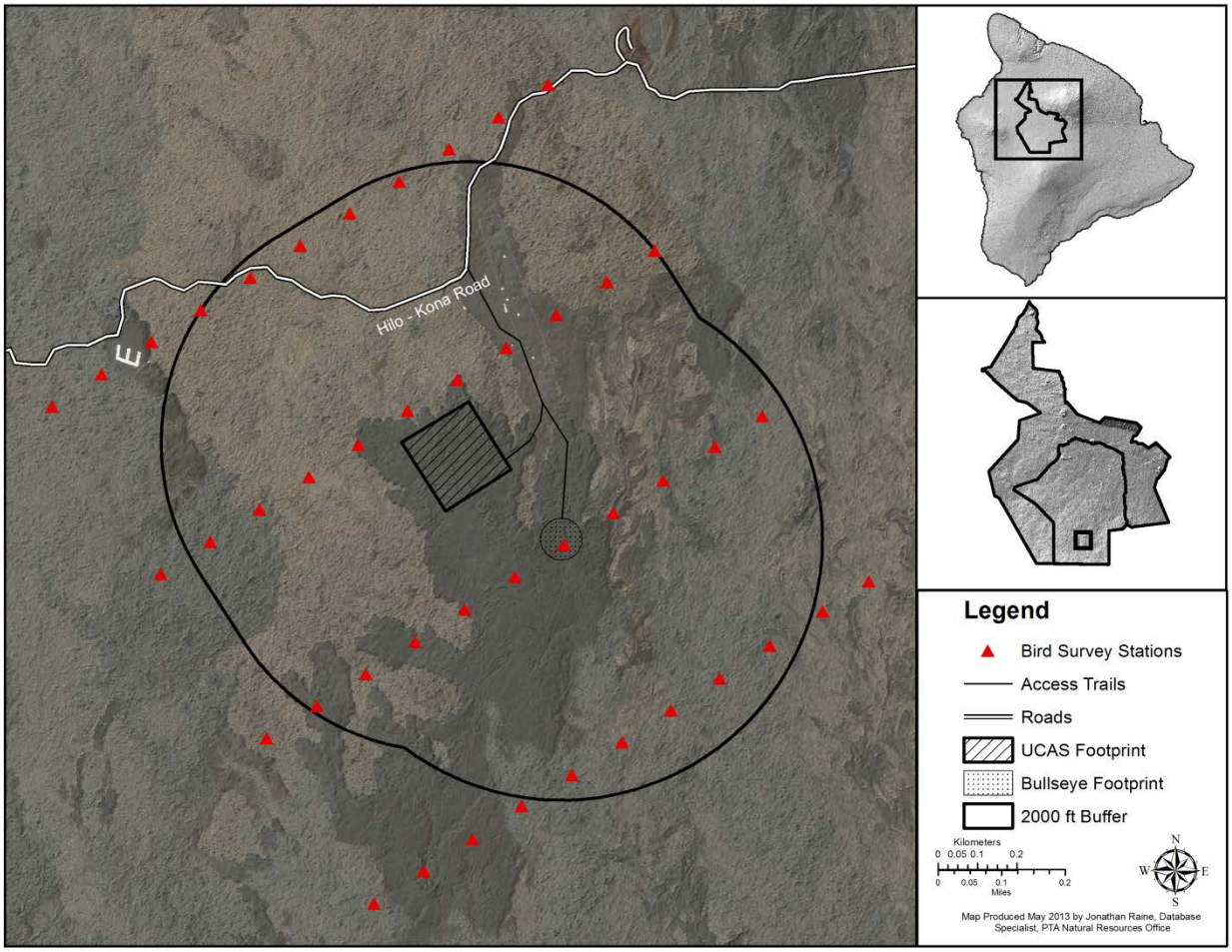


Figure 5. Avifauna Survey Locations

Results

Surveys were conducted to determine avifauna presence and habitat use in the general vicinity of the UCAS and Aviation Bulls-Eye Range areas on 20-22 May 2013. The survey team from within the PTA NRO consisted of Lena Schnell, MSc (candidate), and Martha Kawasaki, BSc. A total of 4 transects with a combined 44 stations were surveyed. Counts took place between 0630 h and 1100 h. Results are summarized in Table 1.

Table 1. UCAS Avifauna Survey Results

Common Name	Scientific Name	Quantity	Origin	Status
Apapane	*Himatione sanguinea*	30	Endemic	MBTA-Protected
Omao	*Myadestes obscurus*	25	Endemic	MBTA-Protected
Chukar	*Alectoris chukar*	7	Introduced	Not protected

Avifauna detections within the action area were as follows:

- UCAS Transect 1: 5 Apapane, 4 Omao, 4 Chukar
- UCAS Transect 2: 11 Apapane, 2 Omao, 2 Chukar
- UCAS Transect 3: 14 Apapane, 7 Omao, 1 Chukar
- UCAS Transect 4: 0 Apapane, 12 Omao, 0 Chukar

No Hawaiian Goose sign was observed along any of the avifauna survey transects.

Discussion

Airstrikes as a result of UCAS operations are not likely to affect avifauna in the action area. Most UCAS activities are scheduled for daylight hours when helicopters are visible and audible to birds. Avifauna in the vicinity of the ranges during nighttime operations is expected to be minimal. Bird airstrikes are extremely rare for military aircraft in Hawaii overall, with only 2 airstrikes documented between 2001-2010 for all Army aircraft flights in the state of Hawaii (P. Mansoor, CW4, pers. comm., 2011). Moreover, helicopters are typically slow-moving at the elevations proposed for UCAS operations because of unpredictable air mass stability and decreased air density, which affect aircraft performance (F. Tate, COL, pers. comm., 2011).

Numerous studies on noise impacts to wildlife, including over flights from military aircraft such as helicopters, have been conducted in past decades. Although results cannot always be applied across species, studies demonstrate that various species, from wading birds to raptors, co-exist with loud noises. Although there is debate in the

literature as to the effects from noise on the fitness of birds, many studies focus only on behavioral responses, which may not indicate physiological responses or animal fitness.

No ESA listed species were detected during surveys of the UCAS action area. Two MBTA protected species were detected during the surveys: Apapane (*Himatione sanguinea*) and Omao (*Myadestes obscurus*). Apapane were mostly associated with barren aa flows, and Omao with sparsely vegetated pahoehoe flows.

Apapane is the most common of the Hawaiian honeycreepers and is found on all major islands. The main food source for Apapane is nectar from ohia (*Metrosideros polymorpha)* blossoms, but this species also feeds on fruits and insects. The population on Hawaii Island is estimated at over 1 million (Scott et al. 1986). Breeding season is year-round with a nesting peak between February and June. Males feed females away from the nest during short incubation recesses. Nests inside lava tubes are documented and Apapane sometimes use old Omao nest sites and material (Fancy and Ralph 1997).

Omao is the most common of Hawaii's thrush species and is endemic to Hawaii Island with an estimated population of 170,000 (Scott et al. 1986). Populations are found in the Hamakua-Puna (eastern) and Kau (southern) regions of the island. A separate population exists in alpine scrub on Mauna Loa. Omao eat insects and fruits from many native plants. In the Mauna Loa scrub, birds perch on elevated "sentry" rocks within their territories. Sentry rocks are recognizable by green growth as a result excreted wastes from perched birds. These sentry rocks are easy to spot and are good indicators of areas used by Omao. This species likely maintains year-round core feeding areas while roosting and nesting within larger home ranges (Wakelee and Fancy 1999). In the alpine scrub, Omao will nest on the ground in lava formations and in lava tubes. Breeding activity occurs almost year-round with peak nesting from April to July. The female incubates the eggs alone and spends an average of 40 minutes per hour on the nests with recesses averaging 6.5 minutes.

UCAS operations are not expected to negatively impact the island-wide Apapane or Omao populations on Hawaii Island; however, UCAS operations could potentially impact individual Apapane and Omao within the action area. Although no sentry rocks were observed, Omao were clearly present and regularly encountered within appropriate habitats in the action area. At least 1 Omao pair was observed flying between high points and singing, indicating territorial behavior. No clear indication of territorial or breeding behavior was observed for Apapane. It is likely both Apapane and Omao use habitat within the action area for feeding and nesting, but impacts from

UCAS operations are expected to be minimal because neither species appears to be present in high numbers within this sparsely vegetated habitat.

Increased winds due to rotorwash is not likely to significantly impact nesting Apapane and Omao. Rotorwash effect height is calculated as 1.5x rotor diameter (P. Mansoor, CW4, pers. comm. 2011). For the largest aircraft (worst-case scenario), the CH-53E Super Stallion, the rotorwash is first felt at the ground surface when the aircraft is 118 ft (36 m) AGL. The minimum attack altitude for rotary wing aircraft proposed for use at the UCAS Range is 200 ft (60 m) AGL; therefore, rotorwash effects are not expected at ground level. Additionally, winds generated by aircraft proposed for UCAS operations affect relatively small areas and are short in duration. Moreover, helicopter-generated winds are not significantly higher than natural gusty wind conditions on Mauna Loa (see the botanical section below for more details on wind speeds generated by aircraft, areas of impact, and natural wind conditions on Mauna Loa). If present in the action area during UCAS operations, Apapane and Omao are expected to temporarily vacate the immediate vicinities of the aircraft and ranges.

Potential effects to Apapane and Omao as a result of UCAS operations are unlikely; however, the Army has indicated that the use of the ranges will be suspended for a period to be defined by the PTA NRO if the presence of nesting birds within the action area is verified (e.g., incidental observation). Although efforts to reduce or eliminate impacts to known nesting sites will be conscientiously pursued by the Army, there is always the potential for accidents. The US Congress has amended the MBTA to provide for the accidental death of MBTA species due to military training (Stump Act and Defense Reauthorization Act). Therefore, there is no regulatory liability in the unlikely event of the accidental death of nesting Apapane and Omao due to UCAS operations.

The following ESA and MBTA protected species may occur in the UCAS action area but were not detected during surveys:

- Hawaiian Goose (*Branta sandvicensis*);
- Hawaiian Hawk (*Buteo solitarius*);
- Hawaii Amakihi (*Hemignathus virens*);
- House Finch (*Carpodacua mexicanus*);
- Northern Mockingbird (*Mimus ployglottus*);
- Pacific Golden-Plover (*Pluvialis fulva*);
- Sky Lark (*Alauda arvensis*);
- Barn Owl (*Tyto alba*);
- Hawaiian Short-Eared Owl (*Asio flammeus sandwichensis*).

There are an estimated 500 Hawaiian Geese on Hawaii Island. The largest populations occur at Hawaii Volcanoes National Park (~210), Puu Anahulu (~110) and Hakalau National Wildlife Refuge (~100). Smaller populations also occur at Shipman (~50) and Kahuku Ranch (~10) (Hawaiian Goose Recovery Action Group, pers. comm., 2010). The Hawaiian Goose has been observed at PTA's Range 01 Complex, approximately 5 mi (8 km) from the UCAS Range (Figure 6). The species is known to use the Range 01 Complex for occasional roosting as well. Although surveys did not detect the Hawaiian Goose or Hawaiian Goose sign (e.g., feathers, feces) at the UCAS and Aviation Bulls-Eye Ranges, it is reasonable to assume that geese may have some undetermined presence in the sparsely vegetated habitat within the action area. The Hawaiian Goose is known to exploit open pahoehoe lava flows that contain food resources such as *C. ernodeoides*, *D. ciliolata, L. tameiameiae*, and *V. reticulatum* that occur near the UCAS Range.

UCAS operations are not expected to adversely affect Hawaiian Geese within the action area or at the Range 01 Complex. Noise levels from proposed UCAS operations are expected to remain below 70 dB at the Range 01 Complex during training exercises. It is improbable that geese occupy any sites within the action area. In the unlikely event that Hawaiian Geese are near the UCAS or Aviation Bulls-Eye Ranges during a training event, it is assumed that they will depart the area as a helicopter approaches if noise levels become too loud or disruptive (US FWS 2008). Although some studies indicate geese are sensitive to helicopter noise (Ward et al. 1999), this species is routinely found during flocking season in noisy habitats such as edges of highways (Saddle Road, Hawaii), airport runways (Kauai), and live-fire ranges (PTA). Historically, Hawaiian Geese at PTA are already exposed to noise from routine helicopter exercises. In addition, under certain conditions geese within PTA and KMA may be less than 50 ft (15 m) from detonations, including grenades, mortars, artillery shells, tube-launched wire-guided missiles, bombs, loud voices, fire suppression and training related helicopters, without adverse impact (US FWS 2008).

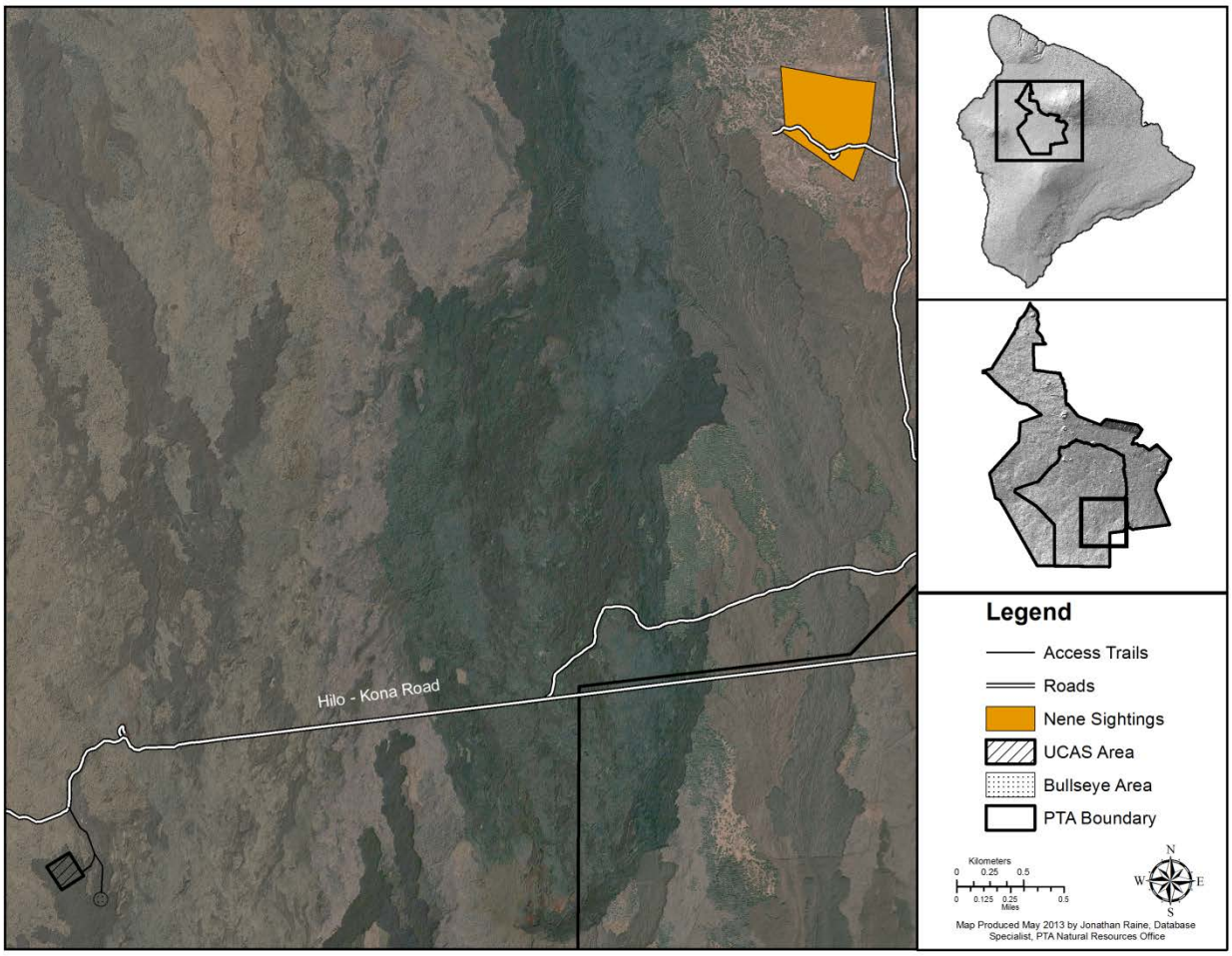


Figure 6. Hawaiian Goose Sightings at the Range 01 Complex

UCAS operations are not likely to affect the Hawaiian Hawk. No hawks were seen during surveys within the action area. Sighting records indicate that there is a gap in the hawk's range, in the region between Mauna Kea and Mauna Loa, from Puu Huluhulu and PTA on the east, westward to Puu Waawaa (Banko 1980). This gap includes the proposed UCAS and Aviation Bulls-Eye Ranges. Hawaiian Hawk population density for the action area is therefore expected to be zero or near zero (Klavitter 2000).

UCAS operations are not expected to affect the Hawaii Amakihi, House Finch, Northern Mockingbird, Pacific Golden-Plover, or Sky Lark populations on Hawaii Island. These species were not detected during surveys at the UCAS and Aviation Bulls-Eye Ranges, although they may use habitat within the action area occasionally to forage. If birds are present during UCAS operations, it is expected that individuals will vacate the area temporarily during high levels of noise and return after the disturbance.

UCAS operations are not expected to affect the island-wide Barn Owl or Hawaiian Short-Eared Owl populations; however, owls have good hearing between 1-7 KHz and are able to discriminate well between frequencies within this range (Beason 2004). Therefore, loud, low frequency noise within this range (e.g., from aircraft rotorwash near the ranges) may affect individual Barn Owls or Hawaiian Short-Eared Owls. Potential effects to owls are expected to be minimal, since no nests were discovered within the action area. There is no suitable cover for the Hawaiian Short-Eared Owl to construct nests near the UCAS and Aviation Bulls-Eye Ranges so breeding within the action area is highly unlikely. In addition, studies have suggested that owl species may not be as sensitive to loud, low frequency noise, as once believed (Delaney et al. 1999). Similar to other avifauna species, owls may use habitat within the action area occasionally to forage but it is expected that they will temporarily vacate the area while noise levels are high and return to the area once noise levels have abated.

BOTANICAL

Potential Impacts

Potential impacts to vegetation as a result of UCAS operations may occur during construction of the ranges and access trails, and/or during temporary localized disturbance from dust and wind generated from helicopter rotorwash. These impacts were evaluated based on the presence and types of vegetation within the action area.

Survey Methods

Surveys were conducted to determine the presence of federally-listed plant species and to assess overall vegetation in the action area. The UCAS Range and the Aviation Bulls-Eye Range were each buffered by 330 ft (100 m). A survey grid was overlaid to encompass the ranges, their buffer areas, and access trails, which included areas not proposed for construction to allow for flexibility in the final placement of the ranges. Survey area dimensions were based on impacts from construction only; rotorwash impacts are not applicable to the UCAS and Aviation Bulls-Eye Ranges since aircraft will not be landing on the ranges. A total of 29 transects were surveyed within the action area (Figure 7). Transects were 2035 ft (620 m) in length, with a total combined linear distance of 11 mi (18 km). The botanical survey area encompassed 70 ac (28 ha).

In sparsely vegetated areas such as the UCAS and Aviation Bulls-Eye Ranges, a 66-ft (20-m) spacing is typically used for botanical survey transects. The PTA NRO determined that this spacing yields the optimum balance between coverage and rare plant detection probability. However, for the UCAS surveys, botanical transects that

coincided with invasive ant bait stations were spaced 50 ft (15 m) apart to facilitate ant baiting. The reduction in spacing increased the integrity of the invasive ant survey data because it was more systematic (i.e., the same person drops off and picks up the ant bait) while increasing the detection probability of rare plant locations. The remainder of the botanical transects were spaced 66 ft (20 m) apart. The PTA NRO will implement this spacing as standard protocol for future botanical surveys done in conjunction with invasive ant surveys.

The botanical survey team consisted of experienced field biologists from within the PTA NRO. Only portions of the survey grid that were on aa lava were surveyed since construction will not be conducted on pahoehoe lava. All locations of federally-listed threatened (T) and endangered (E) plant species and/or species of concern (SOC) were recorded when found during the surveys. Locations of common native and introduced plant species were also recorded.

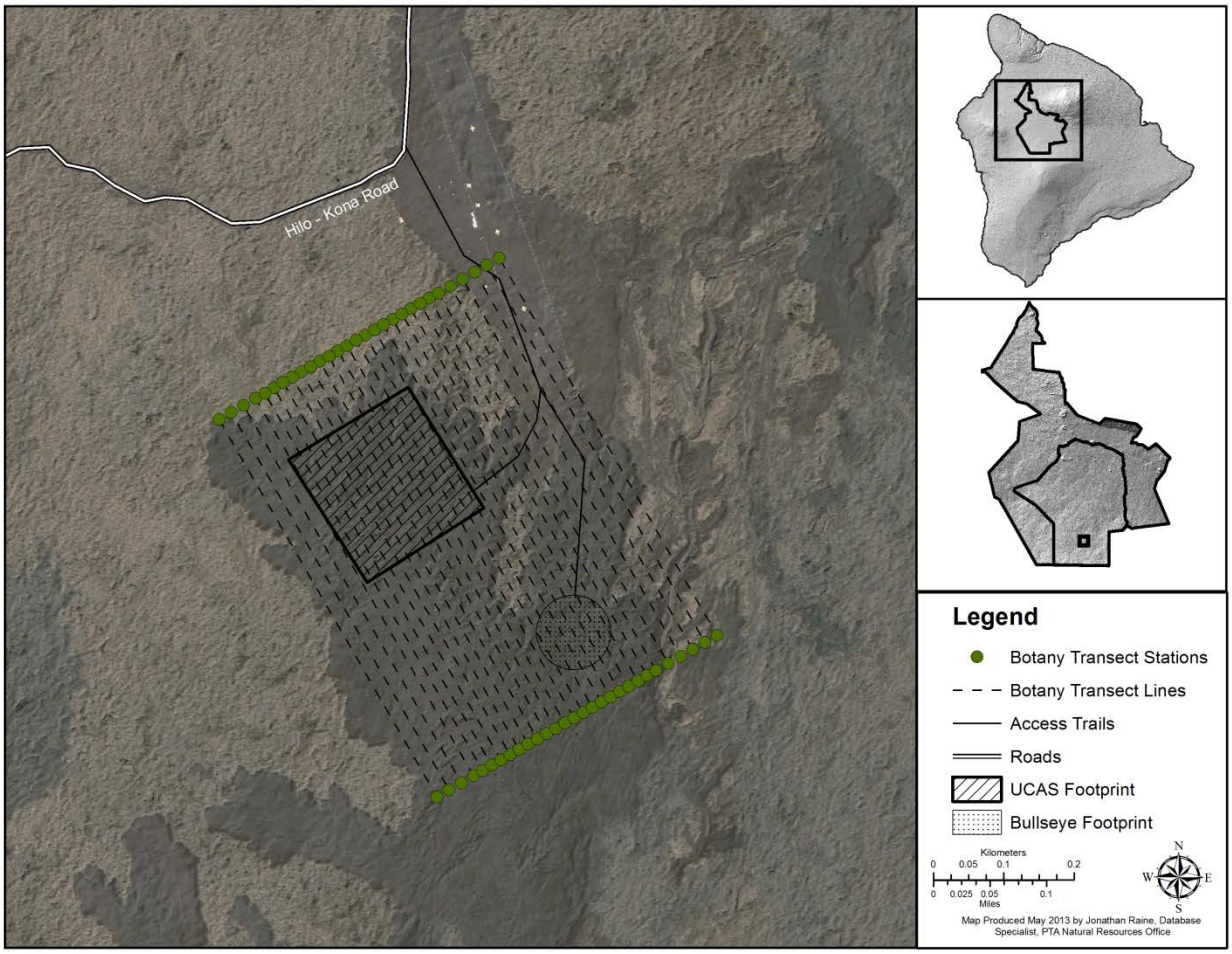


Figure 7. Botanical Survey Locations

Results

Botanical surveys were conducted on 20 and 22 May 2013 at the UCAS and Aviation Bulls-Eye Ranges. The survey team from within the PTA NRO consisted of Steven Evans, MSc, and Kip Cline, BSc. Weather conditions were favorable and visibility was extremely good for conducting the surveys. The ranges are composed almost entirely of aa lava and are very sparsely vegetated. No federally-listed plant species were recorded within the ranges, access trails, or buffers. Common native and introduced plant species present within the action area are summarized in Table 2.

The nearest federally-listed plant species to the action area is the threatened Hawaiian catchfly (*Silene hawaiiensis*) located approximately 1.6 mi (2.5 km) west of the UCAS Range. These plants are well beyond the range of effects from UCAS operations.

Table 2. Botanical Survey Results

Common Name	Scientific Name	Origin[1]	Status
Heupueo	*Agrostis sandwicensis*	Endemic	–
Maidenhair spleenwort	*Asplenium trichomanes*	Indigenous	–
Kukaenene	*Coprosoma ernodeoides*	Endemic	–
Oahu sedge	*Carex wahuensis*	Endemic	–
Bull thistle	*Cirsium vulgare*	Introduced	–
Aalii	*Dodonaea viscosa*	Indigenous	–
Kupaoa	*Dubautia ciliolata*	Endemic	–
Pukiawe	*Leptecophylla tameiameiae*	Endemic	–
Ohia	*Metrosideros polymorpha*	Endemic	–
Kalamoho	*Pellaea ternifolia*	Indigenous	–
Ae	*Polypodium pellucidum*	Endemic	–
Fireweed	*Senecio madagascariensis*	Introduced	–
Glossy nightshade	*Solanum americanum*	Introduced	–
Pamakani	*Tetramolopium humile*	Endemic	SOC
Ohelo	*Vaccinium reticulatum*	Endemic	–
Southern rockbell	*Wahlenbergia gracilis*	Introduced	–

[1]Shaw 1997

Discussion

All range construction will occur on aa lava flows that are sparsely vegetated and on which no federally-listed plant species were found. Therefore, construction of the UCAS and Aviation Bulls-Eye Ranges will have no impact to federally-listed plant species and minimal impact to common native vegetation.

Wind and dust generated from helicopter rotorwash at the UCAS and Aviation Bulls-Eye Ranges is not considered to be of concern for vegetation. Rotorwash effect height is calculated as 1.5x rotor diameter (P. Mansoor, CW4, pers. comm. 2011). For the largest aircraft (worst-case scenario), the CH-53E Super Stallion, the rotorwash is first felt at the ground surface when the aircraft is 118 ft (36 m) AGL. The minimum attack altitude for rotary wing aircraft proposed for use at the UCAS Range is 200 ft (60 m) AGL; therefore, rotorwash effects are not expected at ground level. Additionally, helicopter rotorwash velocities are within the range of typical wind conditions in the action area. Average wind speeds at the PTA East Remote Automated Weather Station, located 5 mi (8 km) northeast of the UCAS Range, vary from 0-37 mph with gusts up to 50 mph (Meso West 2013). The average wind speed at the National Oceanic and Atmospheric Administration's Mauna Loa Observatory ranges from 11-45 mph with gusts up to 54 mph (A. Colton, pers. comm., 2013). Mauna Kea has an average wind speed of approximately 57 mph (Carrasco and Sarazin 2003) with a maximum recording of 127 mph (Bely 1987).

Based on the extremely sparse vegetation found within the action area, the minimal amount of fine material within the substrate available to generate dust, and the highly localized and short duration of the action, it is not expected that UCAS operations will have any long-term impacts to vegetation in the action area. It is anticipated that the impacts to vegetation from UCAS operations will not be greater than impacts from natural conditions in the action area.

HAWAIIAN HOARY BAT

Potential Impacts

Potential impacts to Hawaiian Hoary Bats as a result of UCAS operations include noise disturbance and direct impact with aircraft. These impacts were evaluated based on the expected presence of bats within the action area during UCAS operations, determined by the extent of potential available treeland roosting habitat and foraging habitat in the action area.

Survey Methods

Surveys to assess potential available treeland roosting habitat and potential available foraging habitat for the Hawaiian Hoary Bat within the action area were conducted concurrently with the avifauna surveys described above. The survey area was based on the 80 dB noise contour used for the avifauna surveys. As discussed previously, this area was selected as a reasonable noise level threshold of concern for disturbance of bird and bat species.

For the UCAS and Aviation Bulls-Eye Ranges, there were 4 1-mi (1.65-km) transects each containing 11 monitoring stations. Observations on Hawaiian Hoary Bat habitat type were recorded between each of the 44 stations. The combined Hawaiian Hoary Bat survey area covered approximately 555 ac (225 ha).

Results

Hawaiian Hoary Bat habitat surveys were conducted in conjunction with avifauna surveys on 20-22 May 2013. The survey team from within the PTA NRO consisted of Lena Schnell, MSc (candidate), and Martha Kawasaki, BSc. Out of 5 possible habitat types within this area of PTA, only 2 were recorded in the action area: 1) Barren Lava and 2) *Styphelia-Dodonaea* Shrubland. Neither of these habitat types is considered potential available treeland roosting habitat for the Hawaiian Hoary Bat; however, *Styphelia-Dodonaea* Shrubland is considered potential available foraging habitat. The density of insects near the UCAS Range is expected to be low because of the sparse vegetation, and it is therefore likely that foraging opportunities for bats in the action area are limited.

Discussion

The Hawaiian Hoary Bat is more frequently associated with roosting and foraging within forest structure rather than open habitat (Kepler and Scott 1990, Jacobs 1994). Work conducted by the US Geological Survey Biological Resources Division indicates that bats are widely distributed throughout Hawaii Island in habitats with tree cover, including native and non-native forests, agricultural areas, and even some semi-urban areas (F. Bonaccorso, pers. comm., 2006, Uyehara and Wiles 2009). In a study of 81 bats, Jacobs (1994) observed that 44% foraged in native vegetation (*M. polymorpha* lowland forest) and 25% foraged in either exotic or mixed vegetation. Given the lack of preferred roosting habitat at the UCAS and Aviation Bulls-Eye Ranges, daytime presence of roosting bats is considered to be improbable, and therefore no daytime noise impact on Hawaiian Hoary Bats is expected. It is possible that foraging bats transit across the action area during nighttime hours; however, given the expanse of barren lava in the action area, the number of transiting bats is expected to be very low. Moreover, nighttime training constitutes only a small part of UCAS operations.

Airstrikes as a result of UCAS operations are not considered to be of concern for the Hawaiian Hoary Bat. Most UCAS activities are scheduled for daylight hours when bats are roosting in the forested areas of the island. Moreover, airstrikes are extremely rare for military aircraft in the State of Hawaii overall, with only two airstrikes (birds) documented between 2001-2010 for all Army aircraft flights (P. Mansoor, CW4, pers. comm., 2011).

Available literature and results from PTA NRO surveys support the conclusion that Hawaiian Hoary Bat presence in significant numbers is unlikely in the action area. Extremely low densities of bats during nighttime operations, or complete absence of bats during daytime operations, is to be reasonably expected. The potential for noise or airstrike impacts on bats as a result of UCAS operations is therefore considered to be minimal.

INVASIVE ANTS

Potential Impacts

There are no native ant species in Hawaii. The introduction and establishment of invasive ants poses a threat to Hawaii's native biota through competition and predation. Ants disrupt native ecosystem function and are recognized as a major cause of species extinctions world-wide. This is especially important for Hawaii, where native species are particularly vulnerable because they evolved in the absence of native ant species (Cole et al. 1992, Gillespie and Reimer 1993, Krushelnycky and Gillespie 2008). For example, on Haleakala, Maui, the Argentine ant (*Linepithema humile*) has nearly reached the 10,500 ft (3200 m) summit and has drastically altered species assemblages of insect fauna there (Krushelnycky and Gillespie 2008). At PTA, predator ants could potentially decimate native invertebrate populations through direct predation or indirectly through competition for wind-borne detritus (Cole et al. 1992).

Invasive ants may also potentially impact native plant populations at PTA. Ants are known to tend ("farm") alien pests such as aphids and scale insects, which impact plant vigor and may serve as a vector for further spread of plant disease (Messing et al. 2007). Foraging ants may impact fruit development and seed set of rare and native plants. Additionally, ants indirectly affect plant pollination by attacking native arthropods. For example, *L. humile* has been shown to reduce populations of important native pollinators such as *Hylaeus* spp., a ground nesting native bee (Cole et al. 1992).

Several invasive ant species have been documented at PTA (HNHP 1998, Oboyski et al. 2001):

- Argentine ant (*Linepithema humile*);
- Big-headed ant (*Pheidole megacephala*);
- Cardiocondyla ant (*Cardiocondyla venustula*)*;*
- Hypoponera ant (*Hypoponera opaciceps*)*;*
- Pharaoh ant (*Monomorium pharaonis*);
- Singapore ant (*Monomorium latinode*);

- Tiny yellow house ant (*Tapinoma melanocephalum*);
- White-footed ant (*Technomyrmex albipes*).

Survey Methods

Invasive ant surveys were conducted to determine invasive ant presence in the vicinity of the UCAS and Aviation Bulls-Eye Ranges. Surveys are conducted pre- and post-construction to establish if ants were present in the action area prior to UCAS operations or if they were introduced via construction or training activities. Invasive ant bait stations were placed in a 100 x 100 ft (30 x 30 m) grid throughout the UCAS and Aviation Bulls-Eye Ranges and at 500 ft (150 m) intervals along access trails (Figure 8). Additional bait stations were placed on a nearby cinder cone and at "observation points" near the ranges. A total of 76 ant bait stations (49 for the UCAS Range, 12 for the Aviation Bulls-Eye, 4 for access trails, 5 for the cinder cone, and 6 for the observation points) were deployed throughout the combined survey area of 14 ac (6 ha).

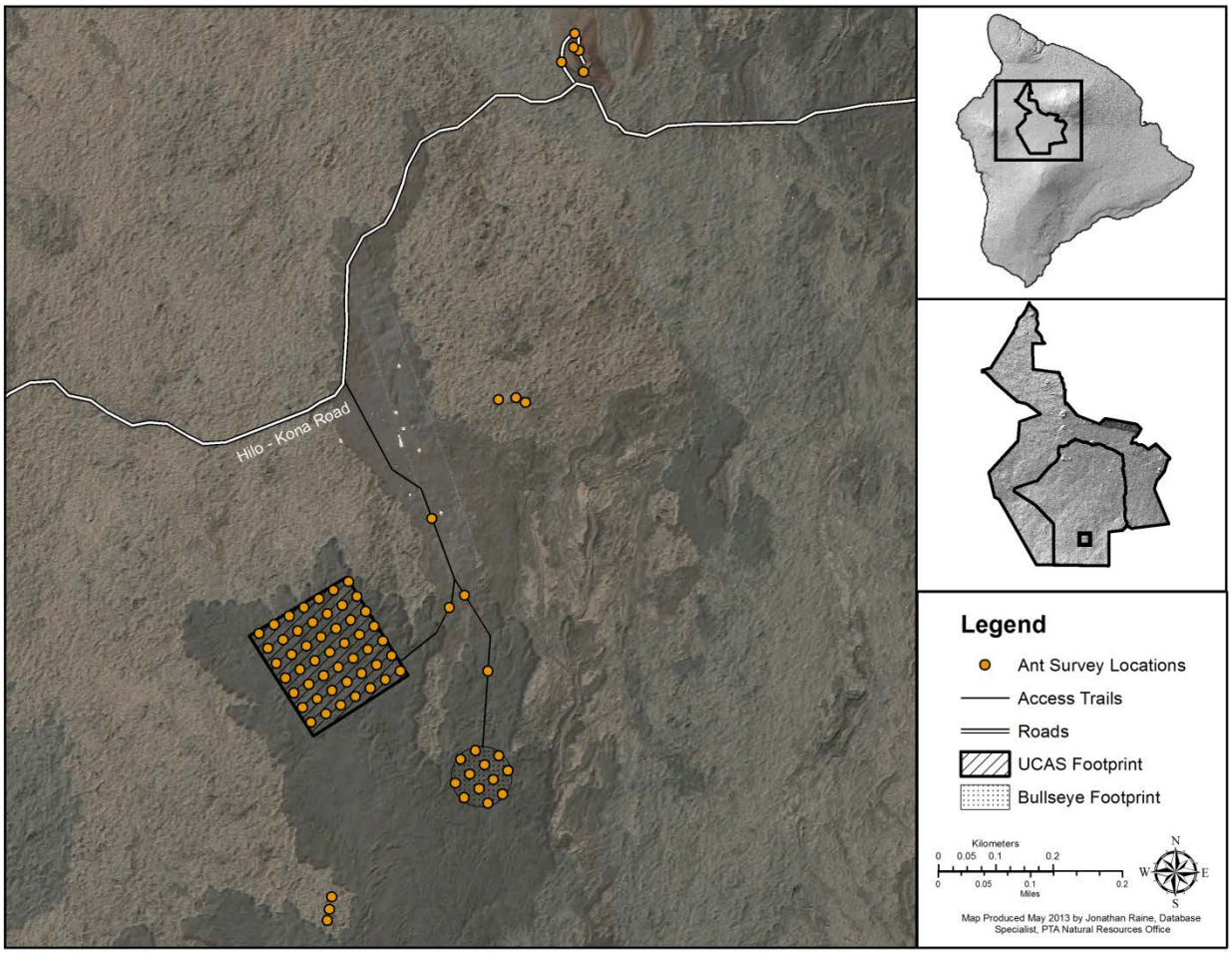


Figure 8. Invasive Ant Survey Locations

Bait stations were inspected and collected between 1-3 hours after deployment to allow adequate time to attract ants. On all survey days, ant baiting began when ants are expected to have predictable foraging behavior; i.e., when the temperature was at least 50° F (10° C).

Results

Surveys for invasive ants were conducted on 20 and 22 May 2013 at the UCAS and Aviation Bulls-Eye Ranges in conjunction with the botanical surveys previously described. The survey team from within the PTA NRO consisted of Steven Evans, MSc, Kip Cline, BSc, and Martha Kawasaki, BSc. No ants were found during the survey period; however, ants were observed during surveys for the Hawaiian Petrel and Band-Rumped Storm Petrel (described below). *Cardiocondyla* sp. was observed by Rogelio Doratt, MSc, on 25 June 2013 at petrel monitoring location 1 (Figure 12). Ants are therefore within the action area but currently not at the proposed construction site for the UCAS and Aviation Bulls-Eye Ranges.

Discussion

The status of ants in the action area is not a direct factor for assessing impacts from UCAS operations. The ant surveys do, however, provide a baseline for further study. Argentine ants are established in northern PTA, including Cantonment, and importation of ants to the action area during construction of the UCAS ranges is to be avoided. Although ants were not observed at the range construction site during surveys, natural movement from within the action area is possible. Standard operating procedures require that construction equipment be inspected and cleaned prior to use (USAG-HI 2008). Aircraft inspection and cleaning protocols are also in place and must be implemented prior to missions. Ant survey baseline results will further encourage adherence to existing protocols.

HAWAIIAN PETREL AND BAND-RUMPED STORM PETREL

Potential Impacts

Potential impacts to the Hawaiian Petrel and the Band-Rumped Storm Petrel from UCAS operations include injury or death from grading and leveling during construction, noise disturbance, airstrikes, and artificial light sources. These impacts were evaluated based on the expected presence of petrels within the action area during training operations.

Between 2008 and 2012, the PTA NRO deployed recording equipment annually to 18 survey locations in 2 study sites in Training Areas (TAs) 21 and 23. In 2011, 2 to 5

Hawaiian Petrel calls were recorded in short succession on a single night in TA 23, 2.86 mi (4.6 km) from the UCAS Range (Figure 9). This was the only detection of this species in more than 5000 recorded hours in TA 23 (NRO unpublished data). In 2012, a Hawaiian Petrel was recorded on a single night in TA 21, 5.27 mi (8.5 km) from the Aviation Bulls-Eye Range (Figure 9). This was the only detection from more than 2000 recorded hours in TA 21 (NRO unpublished data). All detections in TA 21 and TA 23 were assessed to emanate from birds transiting the installation due to the short call-time duration on each recording.

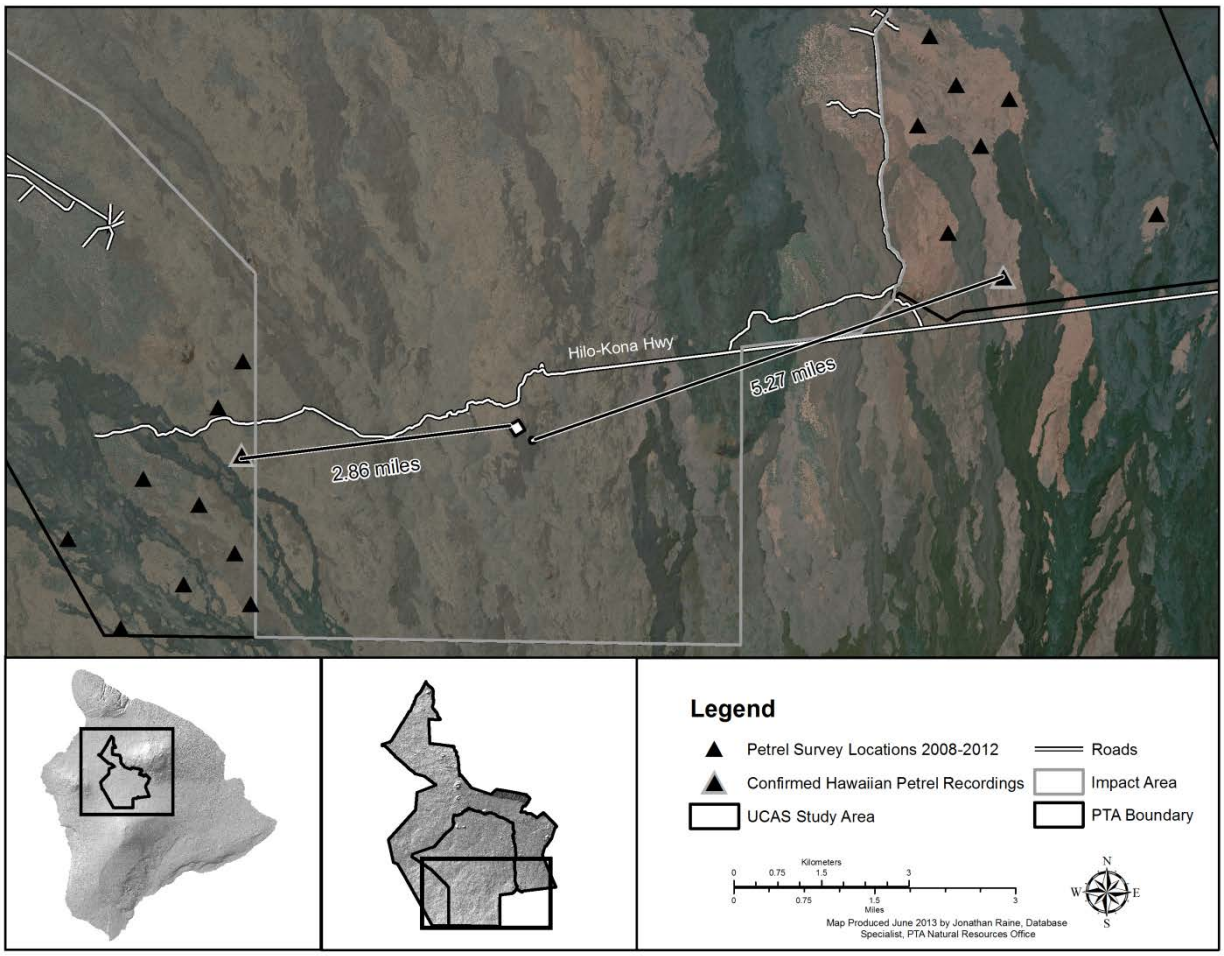


Figure 9. Hawaiian Petrel Survey Locations and Confirmed Recordings 2008-2012

The Band-Rumped Storm Petrel was recorded at PTA between 2008-2012 (May-August) in Training Areas 21 and 23 at least once at 17 of the 18 monitoring sites (Figure 10). Generally, Band-Rumped Storm Petrels are first detected at PTA in late May and call activity is detected more frequently in TA 21 than TA 23. In TA 21, call detections increase through June and remain steady until August when monitoring is completed. Additionally, call activity occurs throughout the sample period (i.e., between 1915 h and 2315 h). The closest distances between the UCAS and Aviation

Bulls-Eye Ranges and Band-Rumped Storm Petrel detections in the southwest and southeast are 2.86 mi (4.6 km) and 4.91 mi (7.9 km), respectively.

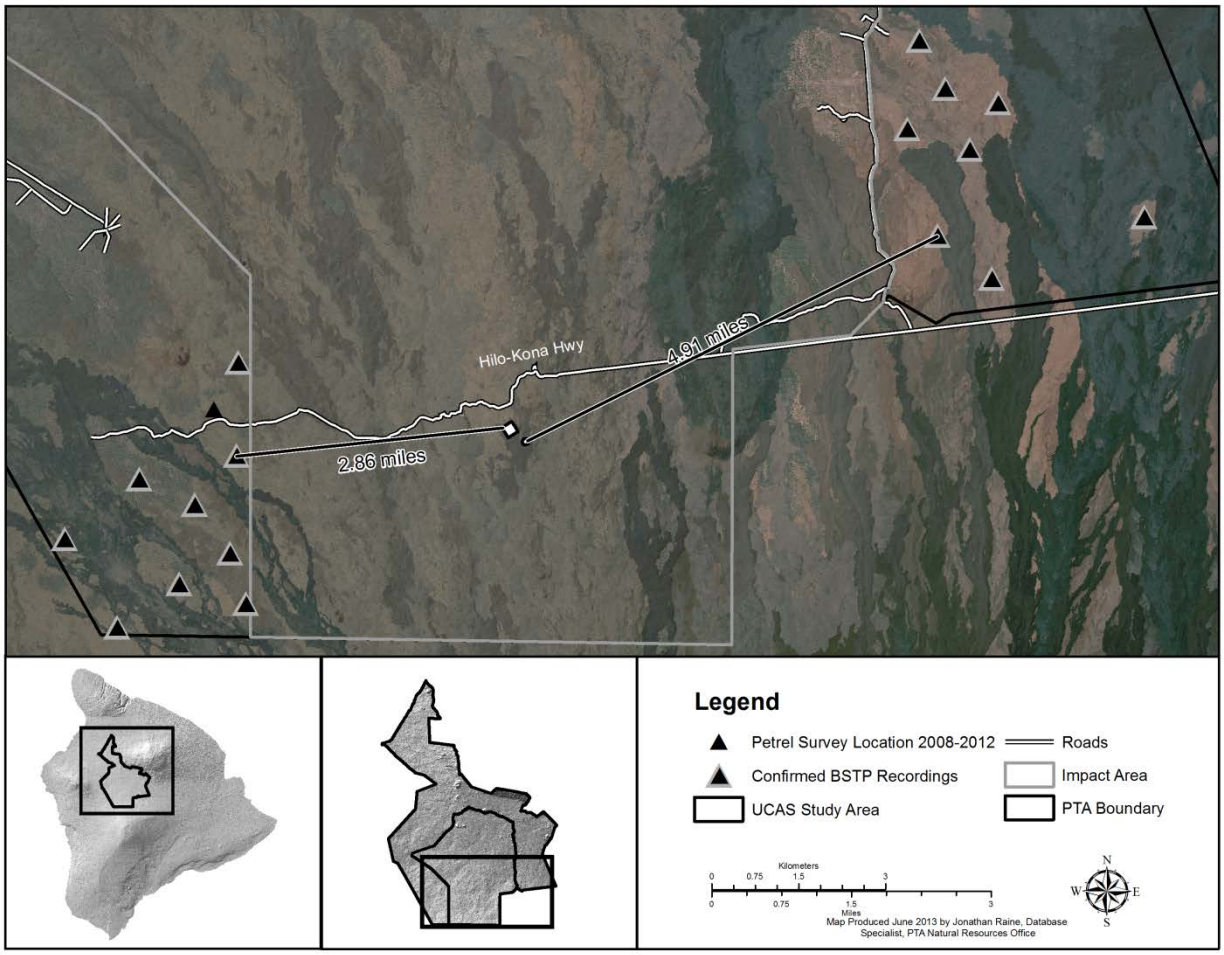


Figure 10. Band-Rumped Storm Petrel (BSTP) Survey Locations and Confirmed Recordings 2008-2012

Suitable Hawaiian Petrel habitat at PTA has been defined as open pahoehoe lava with lava tubes and blisters suitable for nesting sites. Figure 4 shows substrate within the UCAS action area. Approximately 64% of this area has been identified as potential petrel habitat (i.e., pahoehoe) and 36% has been identified as unsuitable habitat (i.e., aa). The UCAS and Aviation Bulls-Eye Ranges are located on the northeast slope of Mauna Loa, 12 mi (19 km) from known petrel colonies in Hawaii Volcanoes National Park. Limited investigations suggest that the Hawaiian Petrel and the Band-Rumped Storm Petrel use the saddle region as a flyway from the west coast to the colonies along the Mauna Loa northeast rift zone in the park (Cooper et al. 1996).

Survey Methods

Surveys were conducted to determine Hawaiian Petrel and Band-Rumped Storm Petrel presence and habitat use in the general vicinity of the UCAS and Aviation Bulls-Eye Ranges. In colonies, petrels use openings in the lava as burrows to raise their young. Breeding pairs visit their burrows briefly in February to initiate the breeding season. Pairs then depart the colonies to feed at sea, usually by March, and return to the colony in late April or early May to lay eggs. Both parents assist with incubating and rearing. Young petrels fledge from the colonies in October or November. Non-breeding petrels visit colonies from May to August. Non-breeding petrels call almost continuously within the colony during this period and are the portion of the population easiest to detect. It is assumed that healthy functional colonies will contain a non-breeding component. Surveys were therefore conducted between May and June when non-breeding petrels were expected to be present if extant colonies were in the action area.

All classes of fixed wing and rotary wing aircraft from all services will potentially conduct UCAS at PTA. Similar to the avifauna surveys, the petrel survey area was based on a noise contour of 80 dB for the CH-47 Chinook and CH-53E Super Stallion, the 2 loudest aircraft proposed for UCAS operations. Although it is recognized that exceptions are possible among individual species, the 80 dB contour was selected as the reasonable noise level threshold of concern for disturbance of petrels (Peshut and Schnell 2011). The petrel survey area was extended from the perimeter of the UCAS and Aviation Bull-Eye Ranges to account for potential noise effects from aircraft at 200 ft (60 m) AGL at the edge of the range footprints (i.e., worst-case scenario). See the avifauna section above for more details about noise impacts on birds as a result of military training.

To maximize the potential for detecting Hawaiian Petrels and Band-Rumped Storm Petrels, suitable habitat within the 80 dB noise contour within the action area was surveyed using automated recording units (Figure 11). Three Song Meter II (SM) (Wildlife Acoustics, Inc., Concord, MA) units were deployed via helicopter and were set up with a recording radius of 1475 ft (450 m). The SM units were programmed to record all ambient sounds on 4 non-contiguous nights during an 8-night monitoring period from 1915 h to 2215 h, thereby incorporating the daily peak calling times for petrels (Simons and Hodges 1988). All SM units were deployed inside a protective wire cage and were suspended 1.6 ft (0.5 m) from the ground. Audio data was analyzed by comparing sound patterns recorded by SM units with known Hawaiian Petrel and Band-Rumped Storm Petrel call patterns. Each identifiable call, whether complete or a fragment, is considered a detection. Call activity cannot readily be equated to numbers of individuals. Additionally, when multiple calls are detected by

the same recording unit over short periods of time and clearly show signal attenuation, petrels are assumed to be transiting the monitoring area.

Habitat along access trails was also surveyed for evidence of petrel use. Ocular surveys for suitable Hawaiian Petrel and Band-Rumped Storm Petrel habitat were coincidental with the biological surveys described above.

Results

In May 2013, ground surveys conducted by Lena Schnell, MSc (candidate), identified some (minimal) potential petrel habitat within the action area where a few rocky outcrops provide crevices, cracks and soil for excavating burrows. However, no other evidence (e.g., guano, footprints, feathers, carcasses) indicated the outcrops were recently used by petrels for nesting. No petrel colonies were observed during surveys.

Surveys to assess the presence and habitat use of petrels at the UCAS and Aviation Bulls-Eye Ranges were conducted from 17 to 25 June 2013 using automated recording units. The survey team from within the PTA NRO consisted of Rogelio Doratt, MSc and Rachel Moseley, BSc. Three SM units were deployed in the action area (Figure 11) for an 8-night monitoring period. Band-Rumped Storm Petrel calls were recorded at monitoring location 1 over 2 different nights. Call detections were dispersed over the sample period with the earliest detection at 2142 h and the latest at 2247 h. Overall, activity levels are relatively low in the action area. Lastly, the short intervals and attenuated signal strength between the majority of calls suggest the birds were transiting the area.

No confirmed Hawaiian Petrel calls were recorded.

Additionally, surveys for nocturnal seabirds in the action area failed to detect Newell's Shearwater (*Puffinus newelli*), an MBTA protected species.

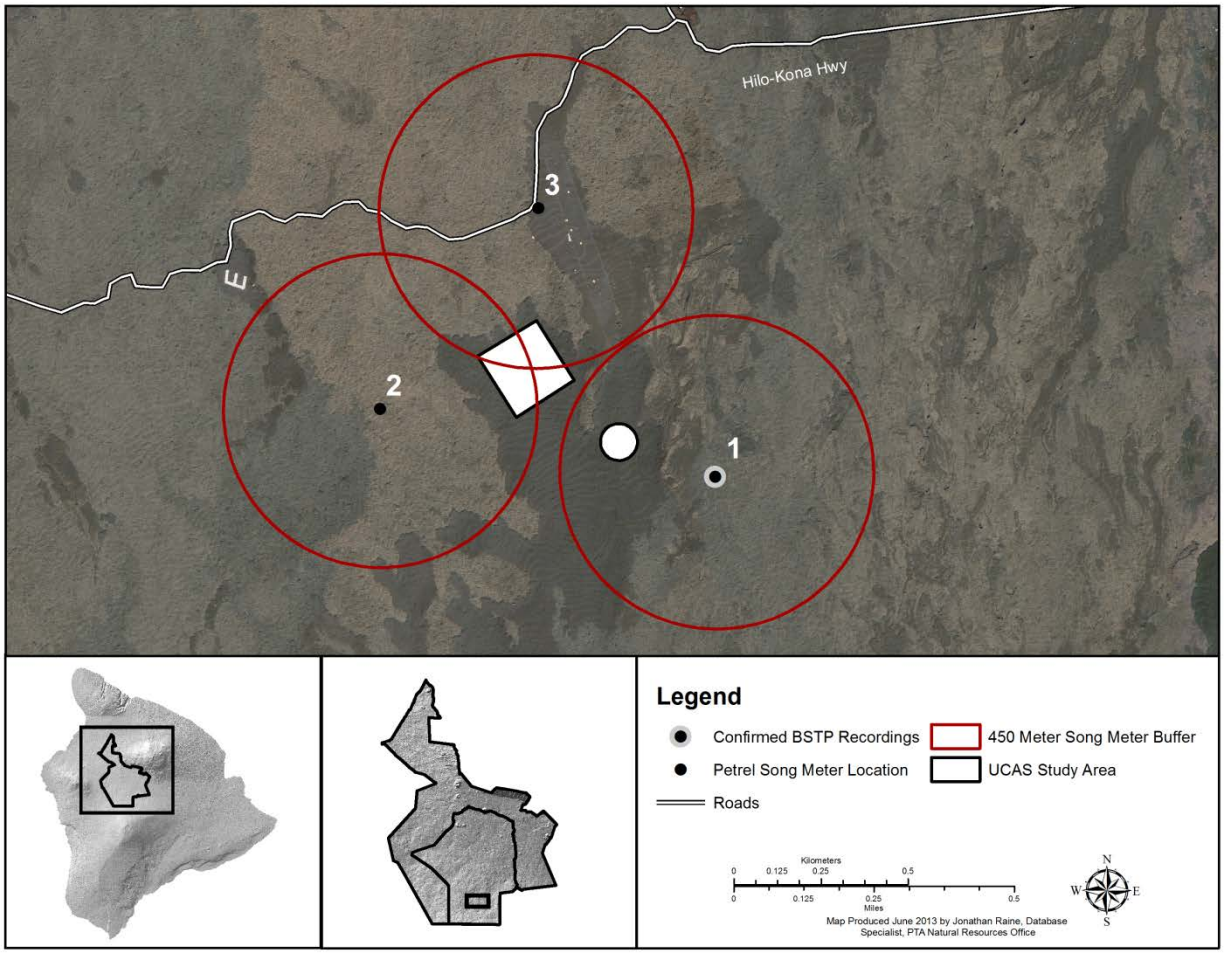


Figure 11. Petrel Survey Area and Confirmed Band-Rumped Storm Petrel (BSTP) Recordings in 2013

Discussion

Construction of the UCAS and Aviation Bulls-Eye Ranges and access trails is not of concern to nesting Hawaiian Petrels or Band-Rumped Storm Petrels because the construction area is confined to aa lava substrates unsuitable for petrel burrows. Band-Rumped Storm Petrels were detected on 2 of 8 sampling nights at monitoring location 1. Overall call activity was relatively low, indicating no colonial activity in these areas.

As previously discussed, the 80 dB contour was selected as the reasonable noise level threshold of concern for disturbance of bird species for the purposes of these surveys, based on a review of the literature. Given the expected low density of petrels within the action area, noise ≥80 dB is not expected to affect an indeterminably small number of individuals.

In a radar survey of seabirds at PTA, Cooper et al. (1996) detected 5 seabirds (0.05 birds/hr), including 3 Hawaiian Petrels, on the eastern portion of the installation. This movement rate is 6-fold lower than the lowest seabird movement rate found in a similar study by Day et al. (2003) at coastal sites (0.3 birds/hr). Indeed, in 9 of the 14 sites sampled by Day et al. (2003), seabird movement rates were greater than 1.0 bird/hr, with a maximum rate of 25.8 birds/hr at Waipio Valley (northeast of PTA). Additionally, monitoring data from the action area detected Band-Rumped Storm Petrels transiting the action area. From these data, we conclude relatively few birds transit PTA. Therefore, very few petrels are likely to encounter noise at the proposed UCAS and Aviation Bulls-Eye Ranges.

Airstrikes as a result of UCAS operations are not considered to be of concern for the Hawaiian Petrel and the Band-Rumped Storm Petrel. Most training activities are scheduled for daylight hours when helicopters are visible as well as audible to petrels. Petrels that are transiting the saddle region are not expected to be in the vicinity of the UCAS Range during daylight hours. Transiting petrels during nighttime exercises are expected to be minimal because petrel density in the flyway is expected to be low (Cooper et al. 1996). Band-Rumped Storm Petrels generally fly upslope within 33 ft (10 m) of the ground and Hawaiian Petrels also tend to fly close to the ground when at high elevations, especially within colonies (Swift and Burt-Toland 2009). As discussed in the avifauna section above, bird airstrikes are extremely rare for military aircraft overall, with only 2 airstrikes documented between 2001-2010 for all Army aircraft flights in the state of Hawaii (P. Mansoor, CW4, pers. comm., 2011). Moreover, helicopters are typically slow-moving at the elevations proposed for UCAS operations due to reduced aircraft performance (F. Tate, COL, pers. comm., 2011), which further reduces the likelihood of bird airstrikes.

Artificial light sources are known to be hazardous to fledging petrels because they disrupt navigation (Simons and Hodges 1988). A red safety light is planned for use atop the observation tower adjacent to the UCAS Range. The rare petrel that traverses the action area may become disoriented and grounded from the safety light. Additionally, exterior lighting associated with the observation tower will be minimal and restricted to illuminating areas for human life, health, and safety such as stairwells and doorways. It is anticipated that 1-3 lights may be installed externally at the observation tower for human convenience and safety. These exterior lights will only be used when night training is scheduled. Moreover, no permanent exterior lighting is planned within the footprints for the UCAS and Aviation Bulls-Eye Ranges. Lighting within the action area is expected to be minimal because bright lights are counter to realistic training conditions. By using amber lights and shielding where possible, NRO considers the potential impacts to petrels from artificial light sources to be discountable within the UCAS action area.

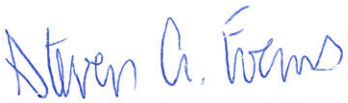
The Hawaiian Petrel was not observed transiting the action area and no petrel colonies were observed during the survey period. Results are considered conclusive with respect to Hawaiian Petrel colonies, and support the proposition that petrel occurrence in the saddle region flyway is infrequent. The Band-Rumped Storm Petrel was recorded within the action area; however, call recording characteristics suggest the individuals were transiting the area.

UCAS operations are not likely to affect Newell's Shearwater. On Hawaii Island, shearwater colonies are limited to the Puna District (25 mi southeast of PTA), the Hamakua coast (25 mi northeast of PTA) and Waipio Valley (20 mi northwest of PTA). No shearwater colonies are known in the subalpine or alpine areas of Hawaii Island. Since Newell's Shearwater colonies are located near the coasts, inland flights through the saddle region are extremely unlikely during UCAS operations.

Please contact Peter Peshut, 808-969-1966, peter.j.peshut.civ@mail.mil, for further discussions on UCAS operations and potential impacts to biological resources.

Tiana M. Lackey, MSc
Technical Documentation Specialist
Center for Environmental Management of Military Lands
Pohakuloa Training Area

Lena D. Schnell, MSc (candidate)
Senior Program Manager
Center for Environmental Management of Military Lands
Pohakuloa Training Area



Steven A. Evans, MSc
Botanical Program Manager
Center for Environmental Management of Military Lands
Pohakuloa Training Area

Rogelio E. Doratt, MSc
Wildlife Program Manager
Center for Environmental Management of Military Lands
Pohakuloa Training Area

Peter J. Peshut, PhD
Army Biologist
Natural Resources Office
Pohakuloa Training Area

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