



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
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Honolulu, Hawaii 96850



In Reply Refer To:
2008-F-278

DEC 12 2008

Colonel Matthew T. Margotta
U. S. Army Installation Management Command, Pacific Region
Headquarters, United States Army Garrison, Hawaii
851 Wright Avenue, Wheeler Army Airfield
Schofield Barracks, Hawaii 96857-5000

Subject: Reinitiation of Formal Section 7 Consultation for Additional Species and New Training Actions at Pohakuloa Training Area, Hawaii

Dear Colonel Margotta:

This Biological Opinion responds to your request for reinitiation of formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to the Endangered Species Act of 1973, as amended (Act). We initiated consultation on July 21, 2008, to address modifications to the 2003 Biological Opinion for Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army Installations, Island of Hawaii (1-2-2003-F-02) (2003 Biological Opinion). The 2003 Biological Opinion addressed impacts from training activities conducted by the Army to 15 listed plant species, the Hawaiian hoary bat (*Lasiurus cinereus semotus*) and designated critical habitat for one avian species, palila (*Loxioides bailleui*) at Pohakuloa Training Area (PTA) and the Keamuku Maneuver Area.

Reinitiation of the 2003 Biological Opinion is necessary, pursuant to 50 CFR §402.16, to address impacts of new construction, training, and conservation actions that may affect *Asplenium fragile* var. *insulare* (fragile fern, endangered), *Silene hawaiiensis* (Hawaiian catchfly, threatened), and *Solanum incompletum* (popolo, popolo ku mai, endangered). The endangered nene or Hawaiian goose (*Branta sandvicensis*) was not addressed in the 2003 Biological Opinion but since that time nene have been observed utilizing PTA as a resting area or loafing site as well as potentially nesting on the Keamuku Maneuver Area. In addition, a few months ago a Hawaiian hoary bat was discovered impaled upon a barbed-wire fence in western PTA. This unintentional death is an unfortunate consequence of having barbed-wire fences in areas where bats fly or forage. We mutually agreed to address this impact to Hawaiian hoary bats in this reinitiation since bat mortality associated with fencing was not addressed in 2003. This reinitiation will be appended to the 2003 Biological Opinion and will supersede or augment information only for the species addressed within this document. All other information within the 2003

Biological Opinion remains in effect. The new portion of this Biological Opinion will be valid through July 1, 2010, at which point it is anticipated that new data regarding impacts of the actions will be available to enable the Army and the Service to develop conservation measures to avoid, minimize, and offset impacts from training actions occurring on PTA and the Keamuku Maneuver Area.

The findings and recommendations in this reinitiation are based on:

- 1) Biological Assessment for Reinitiation of the December 2003 Section 7 consultation on Training at Pohakuloa Training Area, Hawaii (September 30, 2008) (U.S. Army 2008);
- 2) The above referenced 2003 Biological Opinion;
- 3) Programmatic Biological Assessment for Transformation of the 2nd Brigade 25th Infantry Division (Light) U.S. Army Island of Hawaii (U.S. Army 2003a);
- 4) Integrated Wildland Fire Management Plan Oahu and Pohakuloa Training Areas, October 2003 (U.S. Army 2003b) (referenced in this document as Wildland Fire Management Plan);
- 5) Informal consultation between the U.S. Army (Army) and the Service;
- 6) Meetings; electronic mail (email), phone calls (see Consultation History); and
- 7) Other sources of information in our files.

Thank you for granting us an extension until December 12, 2008, to finalize this reinitiation. A complete administrative record of this consultation is on file at the Service's Pacific Islands Fish and Wildlife Office.

Action Area

The action area pursuant to section 7 regulations consists of “all areas to be affected directly or indirectly by the Federal action” that include land outside of the installation boundaries if the Army Natural Resource Staff are conducting any action on that land. In the past the Army has worked with the State of Hawaii to plant endangered plant species at various sites to help increase the offsite populations of these species. We have determined that the activities conducted by the Army’s Natural Resource Staff will not have any detrimental effect to listed plant species or designated critical habitat. We came to this conclusion because any threat reduction pursuant to the Pohakuloa Implementation Plan (e.g., fence building, ungulate removal, invasive plant removal, out-planting) that is implemented in these areas will benefit species and critical habitat by enhancing conditions for both the species and the primary constituent elements of the critical habitat. The Army’s Natural Resources Staff are trained in resource conservation and they understand that no adverse impacts may result from any proposed work in these areas. If the Natural Resource Staff determine that an action “may adversely affect” a listed species or designated critical habitat, they will coordinate with us prior to

implementing that action. The portion of the action area that encompasses the Army management areas outside of the training action area, and the listed species or critical habitat that may overlap or coincide with these areas will not be considered further in this consultation. The action area for this reinstated Biological Opinion is the entire installation, PTA proper and the Keamuku Maneuver Area (Figure 1).

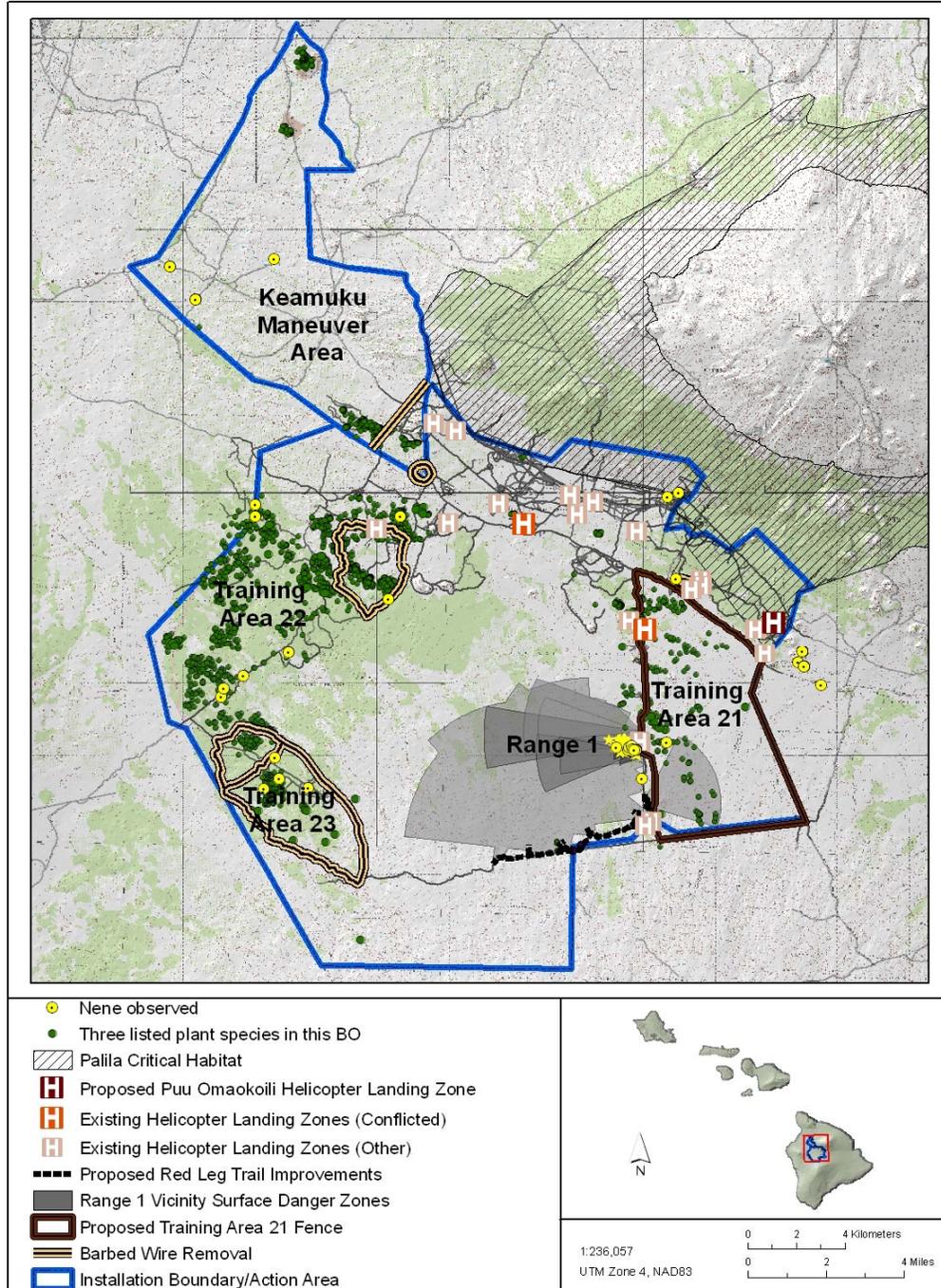


Figure 1. Locations of proposed actions at PTA and Keamuku Maneuver Area.

Particular attention will be paid to the footprint of the Red Leg Trail road improvements, the area within the surface danger zones associated with convoy live fire and other weapon use on Range 1, the Puu Omaokoili pinnacle landing helispot, the Keamuku Maneuver Area, the extent of existing barbed wire fences, and the area bounded by the proposed Training Area 21 fence (see Figure 1).

Summary of Actions Not Likely to Adversely Affect Listed Species or Critical Habitat

The proposed project consists of multiple actions. Several of the actions may affect, but are not likely to adversely affect federally listed species or critical habitat. These are described below and are not considered further within this Biological Opinion.

Pinnacle Landing on Puu Omaokaoli in Palila Critical Habitat

The Army plans to conduct helicopter pinnacle landings on Puu Omaokaoli. Pinnacle landings involve multiple attempts at landing in a physically restricted area with complicating factors (i.e., swirling winds, other adverse weather conditions). No weapons are used during this training and no personnel enter or exit the aircraft from the pinnacle landing site (i.e., Puu Omaokaoli) (Figure 2).

Currently Puu Omaokaoli does not support any listed species. The landing site is within designated critical habitat for palila. The primary constituent elements of palila critical habitat are large and intermediate-sized mamane (*Sophora chrysophylla*) and naio (*Myoporum sandwicense*) trees, enough space for the palila population to expand; and an area which encompasses the full range of altitudinal and geographical sites needed by the palila for normal life cycle movements in response to shifting seasonal and annual patterns of flowering, seed set, and ensuing pod development of mamane (42 FR 40685). The area proposed for pinnacle landings consists of sparse vegetation (Figure 2) and does not include any mamane or mamane-naio habitats; however, it is unoccupied space that palila could expand into if the area were restored.

Pinnacle landings may prevent any natural re-vegetation in Puu Omaokaoli. However, natural regeneration may not occur within the area even without the proposed training due to weather conditions and browsing pressure from ungulates. Pinnacle landings could also increase the risk of transporting invasive species into palila critical habitat. The Army currently implements conservation measures from the 2003 Biological Opinion to prevent the introduction and spread of invasive plant and animal species. Due to the implementation of these measures, the action is unlikely to increase the risk of invasive species spread beyond that analyzed in the 2003 Biological Opinion. Only one helicopter has crashed at PTA in the past 30-year period (U.S. Army 2008a, p. 7). In the unfortunate event of a training helicopter crash on Puu Omaokaoli, it is unlikely that the crash would ignite a fire or that a fire would spread within the sparsely vegetated, disturbed area within the landing zone. The implementation of this training action in Puu Omaokaoli is not likely to result in an increase fire risk beyond that analyzed in the 2003 Biological Opinion because use of the new site will reduce use of other landing sites assessed in the 2003 analysis. Additionally, wildland fire conservation measures will continue to be implemented pursuant to the 2003 Biological Opinion (pp. 21-25 and 34-

47). Based on the information above, we determined that pinnacle landing at Puu Omaokaoli is not likely to adversely affect palila critical habitat. Palila are not known to exist in the Puu Omaokaoli vicinity at this time (U.S. Army 2008a, p. 7) and, therefore, we concur with the Army's determination that this species is not likely to be adversely affected by the proposed helicopter landing exercises on this pinnacle.



Figure 2. Sparse vegetation on Puu Omaokaoli.

CONSULTATION HISTORY

The Army submitted a draft Pohakuloa Implementation Plan to our office in 2004, pursuant to the 2003 Biological Opinion. The Service requested the Army amend the Pohakuloa Implementation Plan to include a more detailed list of action items. Following coordination meetings between the Army Natural Resource Manager, Michelle Mansker, and the Service's Consultation and Technical Assistance Program Coordinator, Patrice Ashfield, it was agreed that a new plan was needed with input from species experts. The team of experts included individuals from the U.S. Geological Survey, U.S. Forest Service, Volcano Rare Plant Facility, Hawaii Department of Land and Natural Resources, and several non-agency affiliated biologists. Pohakuloa Implementation Plan Team meetings were held in 2006 and 2007, and a draft Plan was circulated to the team members for review and comment in the summer of 2007.

January 10, 2007: The Army sent the Service a draft of their plan to survey for nene at PTA. The Service commented on the plan and the Army incorporated Service recommendations into their survey methodology.

May 8, 2008: Michelle Mansker (U. S. Army Environmental) sent a memo via email regarding terms negotiated by previous PTA staff in the 2003 Biological Opinion. The

Army requested some modifications to the 2003 Biological Opinion and asked for Service guidance.

July 21, 2008: The Service received a letter from Colonel Margotta, dated July 14, 2008, requesting our concurrence with the new proposed timelines for completion of the Pohakuloa Implementation Plan and fencing and removal of feral ungulates on the western portion of PTA.

July 21, 2008: The Service received a letter from Colonel Margotta dated July 14, 2008, requesting reinitiation of formal consultation to address new training and conservation actions at PTA, including addressing adverse effects to the endangered nene observed on PTA and the Keamuku Maneuver Area.

August 20, 2008. The Service sent a letter to Colonel Margotta concurring with the Army's request for formal consultation. We agreed to complete our biological opinion within 135 days (December 3, 2008) with the proviso that the Army would assist us with additional information needs in a timely manner.

September 5, 2008: A meeting was held to discuss the project description and to gather additional information on the proposed project. Attendees included: Commander Warline Richardson (U. S. Army), Megan Laut (Service), Jeff Zimpfer (Service), Dawn Greenlee (Service), Alvin Char (U.S. Army Department of Public Works), Bert Borju (U.S. Army, Range Control), Ken Torre (U.S. Army, Range Control), Michelle Mansker (U.S. Army Environmental), Peter Yuh (U.S. Army Department of Public Works), Lena Schnell (PTA Natural Resources). The Service presented an overview of section 7 of the Act and the formal consultation process. The Army presented their conservation and training plans and answered Service questions. The Army agreed to provide us with a final project description by September 30, 2008.

September 25 and 26, 2008: Representatives from the Army Department of Public Works, Army Natural Resource Staff, Range Control and Service biologists (Jeff Zimpfer, Megan Laut and Patrice Ashfield) attended a site visit to PTA and Keamuku Maneuver Area. Participants observed the proposed training areas, new construction sites, and discussed how the avoidance and minimization measures were to be implemented to reduce training impacts to nene. Participants spent the first day along Red Leg Trail and Range 1 and the second day at the Keamuku Maneuver Area. On the afternoon of September 26, 2008, Service biologists (Jeff Zimpfer, Megan Laut) and Patrice Ashfield met with Michelle Mansker (U.S. Army Environmental) and Lena Schnell (PTA Natural Resources) to further discuss conservation and avoidance and minimization measures that would be incorporated into the Army's project description.

October 14, 2008: A meeting was held in Hilo, Hawaii. In attendance were Paul Banko (U.S. Geological Survey-Biological Resources Discipline), John Jeffrey (Hakalau National Wildlife Refuge), Donna Ball (Service), Megan Laut (Service), Jeff Zimpfer (Service), Kathleen Misajon (Hawaii Volcanoes National Park), Lena Schnell (PTA Natural Resources), and Sara Knox (U. S. Army Natural Resources) to solicit information

from island of Hawaii nene land managers and nene biologists in order to finesse the proposed nene avoidance and minimization measures for this consultation.

DESCRIPTION OF THE PROPOSED ACTION

The Army training actions analyzed in the original PTA Biological Opinion will be implemented with the addition of the supplementary training and conservation measures detailed in this project description. This Biological Opinion will address the following training- and conservation-related actions:

- Convoy live-fire and Range 1 training
 - Red Leg Trail road widening
 - Convoy live-fire training range access road and trail development
 - Convoy live-fire training scenarios
 - Ball Ammunition Fired at Targets in Training Area 21, East of Red Leg Trail
 - Other Training exercises at Range 1
 - Known Distance Range operation and maintenance
 - Modified record fire range operation and maintenance
 - Range 1 Conservation Measures
 - Range 1 vicinity nene monitoring
 - Range 1 personnel education
 - Nene monitoring and training restrictions
 - Night-time training
 - Development of an alternative site for nene flocking
- Keamuku Maneuver Area
 - Construction, maintenance, and training actions
 - Keamuku Maneuver Area fire suppression and prevention
 - Keamuku Maneuver Area nene avoidance and minimization measures
 - Nest location protection and monitoring
 - Brood translocation
 - Surveying for nene in the Keamuku Maneuver Area
 - Reporting
- Fence Replacement and Construction
 - Training Area 21 fencing to protect *Asplenium peruviana* var. *insulare* and *Silene hawaiiensis*
 - Fencing to protect *Solanum incompletum*
 - Removal of barbed wire from fences

Convoy Live-Fire and Range 1 Training

General Information

Existing military operations at PTA include convoy live-fire training as described in the 2003 Biological Opinion and training activities will be expanded pursuant to the 2003 Biological Assessment, with minor modifications to minimize potential impact to nene, as specified in this project description. The convoy live-fire training course will provide

realistic scenarios and support for standard training events and threats associated with convoy travel. A large-scale, realistic range is needed to simulate attacks by roadside bombs, organized ambushes, rocket-propelled grenades and other threats. To respond to these threats, a wide range of weaponry and tactics are required. The Armed Services must simulate these conditions and provide training on a convoy live-fire course to meet current requirements and training goals. The course will meet both U.S. Marine Corps and Army range and training requirements.

A convoy live-fire training range is a complex set of actions used to train and test Soldiers and Marines, crews, platoons, and companies on the skills necessary to detect, identify, engage and defeat stationary and moving vehicle and infantry targets from a stationary or moving platform (i.e., vehicle) using specified weapons and weapon systems. The targets may be presented individually or as part of a tactical array in an open (i.e., rural roadside) or urban environment (in this case, building facades adjacent to a road). The facility will consist of a course route (road), an entry control point event at the beginning and end of the course, and five additional objectives (live-fire events) along the route.

The U. S. Army Garrison Hawaii proposes the construction of an Army standard convoy live fire/entry control point range and is currently preparing an Environmental Assessment for this action. The course begins south of Range 1 on Red Leg Trail and extends 10 kilometers (km) (6.2 miles (mi)) along the Hilo Kona Highway, terminating at Training Area 20 near the southern-most portion of the PTA impact area (Figure 3). The course will have seven separate objectives, or training events, equally spaced along the course road. Use of the new ranges with surface danger zones that point into the impact area are covered under the 2003 Biological Opinion as no new weapons are being proposed (U.S. Army 2008a, p. 2) Surface danger zones delineate the impact area and an additional buffer area where fragments from exploding rounds could land. They are developed to specify the area that will contain all but one in one million rounds fired and are used to ensure personnel safety.

Red Leg Trail Road Widening

Red Leg Trail is the main vehicle route and is referred to as the course route. Between Range 1 and Firing Point 807 Red Leg Trail is approximately 7.3 to 8.5 meters (m) (24 to 28-feet (ft)) wide. This width is considered adequate to support the convoy live-fire training requirements. The road narrows at firing point 808, averaging approximately 4.5 to 5.5-m (15 to 18-ft) wide between Firing Point 807 and Puu Koli where Red Leg Trail turns west. Approximately 8.6 km (5.6 mi) of road will be widened by approximately 2.4 to 3.0 m (8 to 10 ft) to accommodate two lanes of tactical vehicle traffic. Some narrower sections occur between Puu Koli and Range 20, the end point for the convoy live-fire training course. A section of road approximately 0.5 km (0.3 mi) long between Puu Koli and Range 20 crosses the Mauna Loa Forest Reserve (State of Hawaii-owned land), and will not be widened (see Figure 3). Road widening will consist of bulldozing, grading, and the addition of 15-25 centimeters (cm) (6 to 10 inches (in)) of road base material (6 in minus gravel) and cap material (3 in minus gravel) from the active quarry on PTA.

The total volume of road base material needed for this project is estimated to be approximately 917 m³ (1,200 yd³).

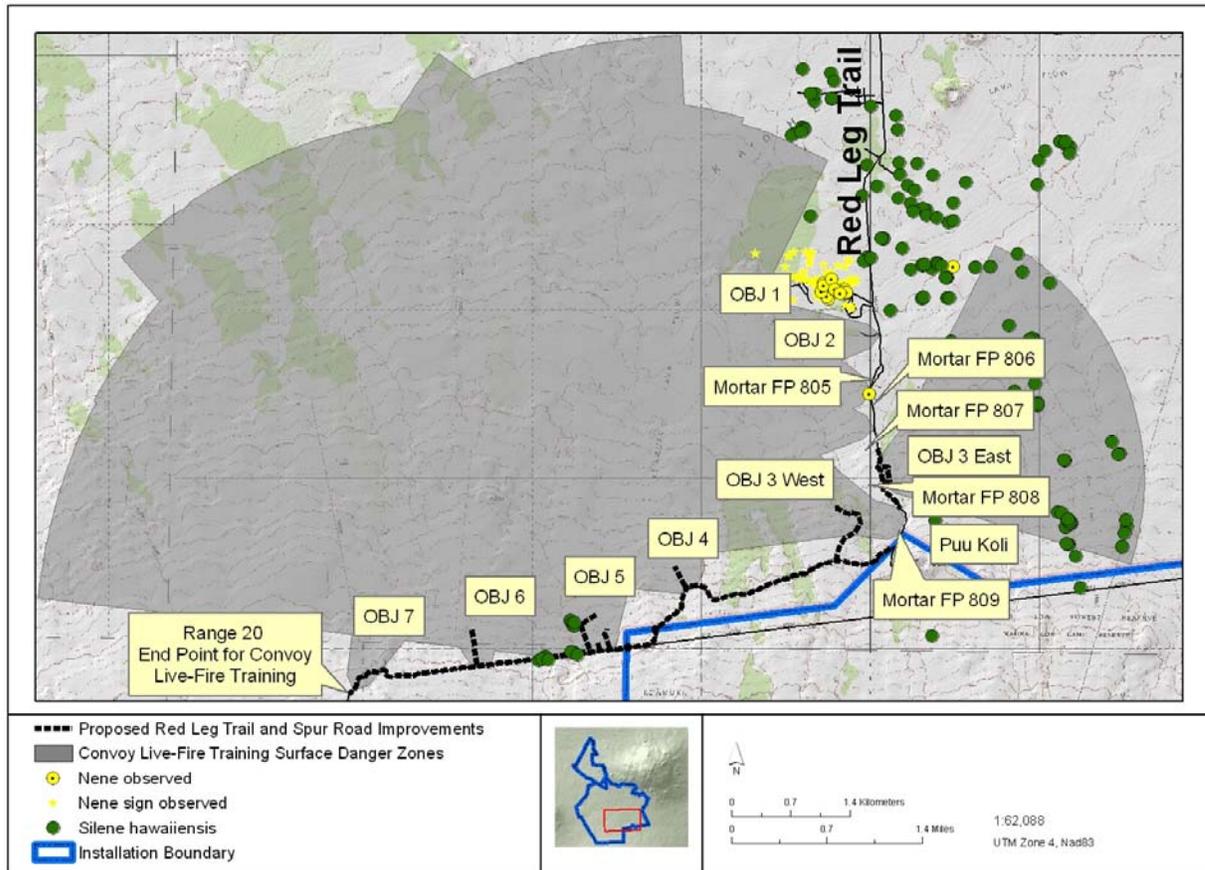


Figure 3. Listed species in the vicinity of proposed convoy live-fire training route objectives and road improvements.

Convoy Live-Fire Training Range Access Road and Trail Development

The Army proposes the creation of a network of target access roads and trails at defined points along the convoy live-fire training course. Target access trails will be no greater than 3 to 4 m (10 to 14 ft) wide, semi-improved roads that are level, free of ruts and obstacles, and capable of providing access for two-wheel drive pick-up trucks. The trails will be used to transport targets and materials, and to perform periodic inspections and maintenance. On pahoehoe lava, roads and trails will be built up on top of the existing surface, whereas, on aa (rough) lava, trails will be created by crushing and consolidating the in-situ material and adding additional road base material as necessary to create a relatively smooth road surface. Grading will be performed as needed to develop smooth road surfaces and desired grades, which minimizes the rock tonnage required to establish the road base. The length of the access trails will be minimized as much as possible. Entry control points 1 and 2 will use existing roads/trails for target maintenance. The total access trail length will be approximately 3.3 km (2.1 mi). Target access trail construction will employ bulldozing, grading, and adding road base and cap material from the active quarry on PTA. No listed plants are known to occur within the network

of target access roads and trails; therefore, the impacts from convoy live-fire will only be from conducting the training.

Convoy Live-Fire Training Scenarios

Training scenarios require groups of vehicles traveling in a convoy. The majority of convoys will consist of High Mobility Multipurpose Wheeled Vehicles (HMMWV) and other trucks. A minority of the convoy live-fire training exercises will involve amphibious assault vehicles, the only tracked vehicle currently used at PTA. There are eight training events/objectives along the course: two entry control point escalation of force objectives - one each at course start and end; a sniper event; two near/urban ambush objectives (east and west sites); a blocked ambush with an improvised explosive device/small arms objective; a far/urban ambush event; and a rocket propelled grenade reaction event. Obstacles, disabled vehicles, improvised explosive devices scenarios, and safety considerations require that the road provide for two lanes of passage by combat vehicles. Firing will occur from the road from positions inside and outside vehicles. Training activities may also involve civilian and military personnel as role players. Convoy live-fire training along a portion of the proposed course currently takes place approximately 60 days per year. The frequency of training exercises by Marine units is approximately one battalion training cycle per quarter, or approximately 8 to 15 days per quarter. This usage by Marines of approximately 60 days per year will continue under the proposed action. Use of the course by Army and other units is currently 20 to 25 days per year, and will increase to approximately 60 days per year, for a total usage of approximately 120 days per year for all users combined.

Small arms weapons firing will be limited to the engagement boxes. Surface danger zones were created for each objective based on the locations of engagement boxes and targets and the type of ammunition fired along the convoy route (see Figure 3). Ammunition will be limited on this range to: 5.56 millimeter (mm), 7.62 mm, and .50 caliber small arms weapons; MK19 training practice target (firing a 40 mm grenade machine gun round that produces a “flash-bang” to simulate combat ammunition, and releases a powder at the point of impact to show the impact location – non high-explosive); and the M-72 light anti-tank weapon and M136 AT4 (both shoulder-fired rockets). Supporting fire, from 60 mm, 81 mm, and 120 mm mortars, 155 mm howitzers (towed artillery) and 105 mm Stryker Mobile Gun System will occur from existing firing/mortar points 805, 806, 807, 808, and 808. Only 5.56 mm ammunition will be fired at Ambush 1 (near/urban) targets east of Red Leg Trail (outside the impact area). Fixed targets representing armored vehicles within the impact area will be engaged by practice rounds from helicopters and fixed-wing aircraft, mortars, and grenade guns. No dud-producing ammunition will be used on the convoy live-fire training range. Both ball and tracer ammunition will be used during daytime and nighttime training.

Ball Ammunition Fired at Targets in Training Area 21, East of Red Leg Trail

The training is intended to help prepare Soldiers and Marines traveling in a convoy to properly react to enemy contact and/or improvised explosive devices. A typical convoy might consist of up to 10 wheeled HMMWVs, family of medium tactical vehicles, 5 ton truck, Stryker, etc. Vehicles and personnel on this course use only ball ammunition no

larger than 0.50-caliber. Objective three has a target that is east of Red Leg Trail (Figure 4). The only ammunition fired at this target is 5.56 mm ball ammunition and this is the only area along Red Leg trail where weapons are targeted toward the east, away from the impact area. The targets will be established within a 0.5 km (0.25 mi) of the firing point and it is expected this is where the rounds will fall.

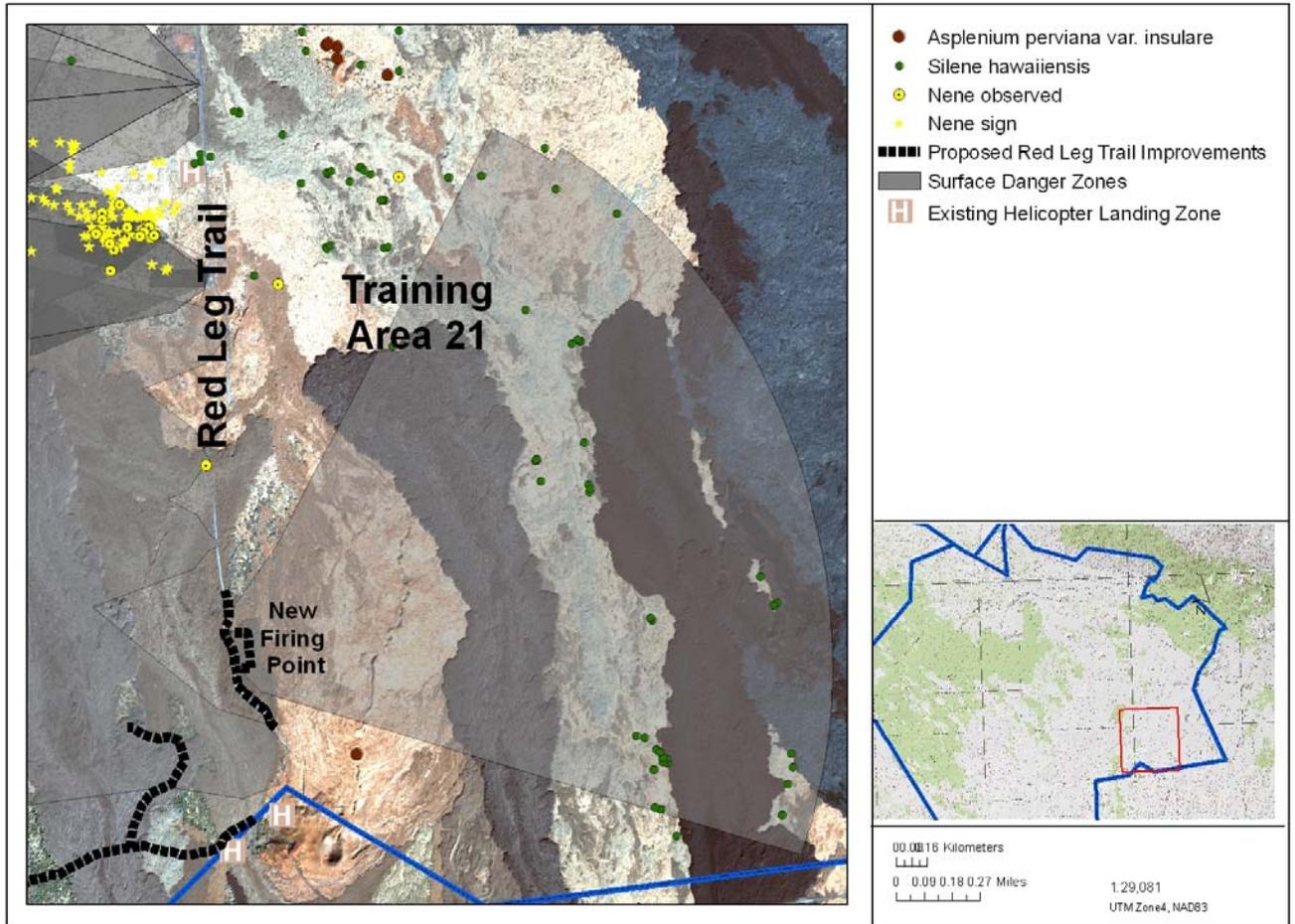


Figure 4. Surface danger zone for firing points targeted east of Red Leg Trail.

Training Area 21 comprises 4,864 hectare (ha) (12,019 acres (ac)) and contains 19 km (12 mi) of bordering and interior roads and trails (see Figure 1). This training area is used for maneuver, bivouac, and live-fire training. The Army proposes development of a new firing point that directs fire to the east of Red Leg Trail. As outlined above in the “Convoy Live-Fire” section, only small ammunition, 5.56 mm ball, will be used at this firing point. Although the surface danger zone for a 5.56 mm round is large, the actual area within which most of the rounds will land is the area between the firing point and the targets.

Other Training Exercises at Range 1

In addition to the convoy live-fire exercises, the Range 1 complex of ranges is used for training exercises with a number of weapons (Table 1). The use of these ranges entails

live-fire exercises, target installation and maintenance, and other maintenance and operations activities.

Table 1. Range 1 projected ammunition utilization per year.

Weapon	Kill radius¹	Number of rounds²
Cord, Detonation-ft	10 ft	5,060
Ign-Blast Fuse	N/A	460
Charge, demo TNT-11b	50 ft/lb	4,020
Cap, Blasting: In-Li	N/A	13,590
.50-caliber Blanks	N/A	10,400
.50-caliber	N/A	32,000
5.56 mm	N/A	827,000 (163,540)
7.62 mm	N/A	212,120 (23,080)
5.56 mm Blank	N/A	152,930
7.62 mm Blank	N/A	65,770
40 mm Practice	N/A	5,500
40 mm M203 Smoke	N/A	0
RKT 2.75 HE	70 ft	210
Pyro-Smoke	N/A	1,890
Bangalore torpedo	249 ft/set	0
Practice Grenades	N/A	390
Pyro	N/A	200

¹Kill Radius provided by Army Explosive Ordnance Disposal.

Those with N/A do not have the capability for a catastrophic kill.

²Number of tracer rounds are in parentheses.

Known Distance Range Operation and Maintenance

The Known Distance Range is a 10-lane facility capable of qualifying Soldiers on rifle, machine gun, sniper rifle and pistol, using 7.62-, 5.56-, 0.50-caliber, ball or tracer ammunition. The range footprint is approximately 1,000 m (3,280 ft) long and 150 m (492 ft) wide. Fourteen crushed lava (ground softening) firing lines (the positions from which fire is delivered) will span the width of the range footprint. Ten firing lines (the positions where weapons are fired) will be placed at 100-m (328-ft) intervals from the line of targets placed out at 1,000 m (3,280 ft), and four additional firing lines will be placed at 5 m (16 ft), 15 m (49 ft), 25 m (82 ft), and 50 m (164 ft) from the targets, respectively.

Targets are shielded from fire by a 4.3-m (14.1-ft) high crushed lava (earthen) berm, lined with a 0.9-m (3 ft) thick earthen retaining wall. The berm and retaining wall span the entire 150-m (492-ft) width of the range. The target area consists of a 0.9-m (3-ft)-wide landing, 1.2-m (3.9-ft) wide concrete cover, 25 target butts (area where the targets sit), three (0.9-m (3-ft) x 3.7-m (12.1 ft)) target sheds, and a 4.6 m (15 ft) wide driveway. Access to the target area and various firing lines will be provided by a 10 m (32.8 ft) wide crushed lava road constructed along the south end of the firing range footprint.

Standard paper targets are mounted on 2-m (6-ft) square frames and lifted by a simple mechanism from the protected target butt area. The targets are raised, fired upon, lowered, marked (at point of impact), and then raised again so that the shooter can see what he or she has hit. Because accuracy results are displayed on the spot, good firing practices can be immediately reinforced. An added benefit of Known Distance Range use is that Soldiers and Marines, taking turns working the manually operated targets, become familiar with the sound of incoming fire. Construction of this range has already been completed. Maintenance of the Range will only be conducted on previously disturbed surfaces (Figure 5).

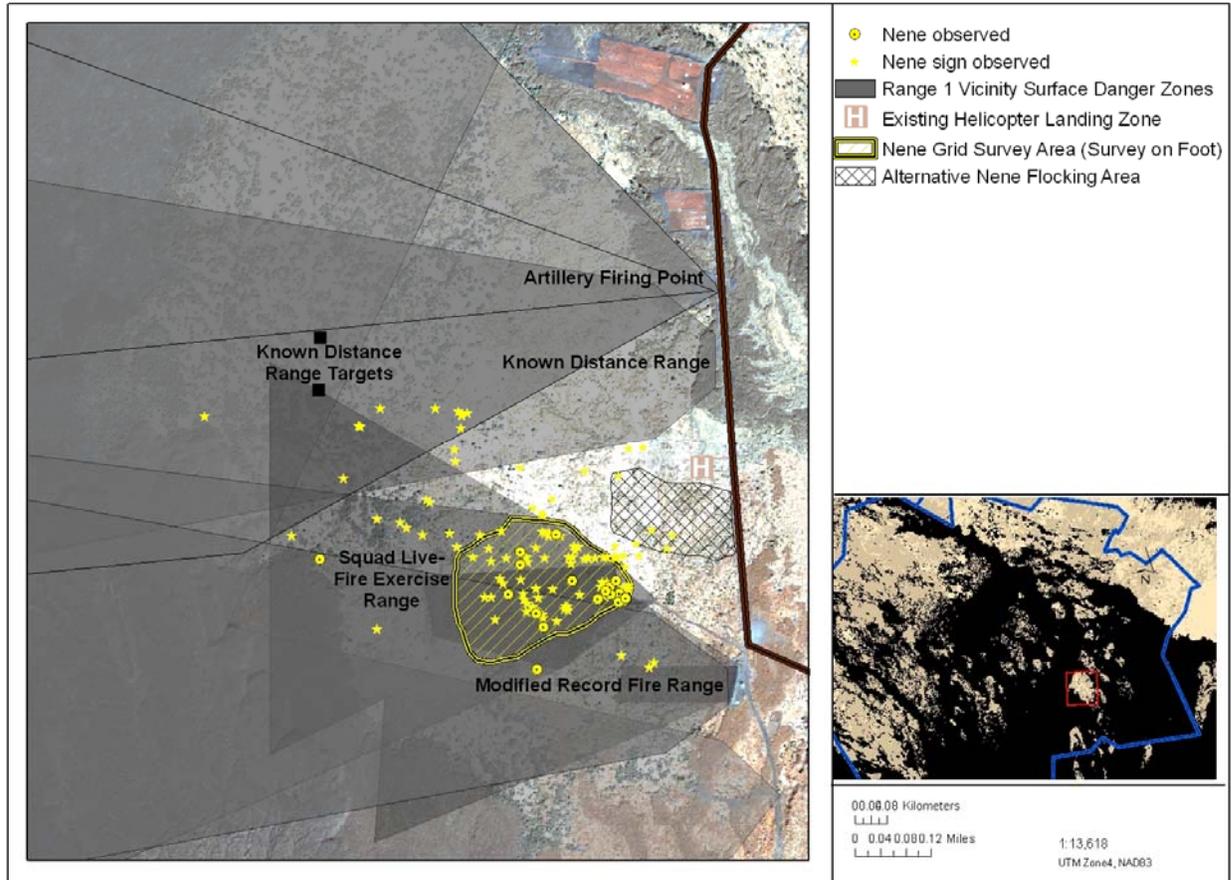


Figure 5. Range 1 vicinity actions.

Modified Record Fire Range Operation and Maintenance

The modified record fire range located at Range 1 (see Figure 5), includes 90 stationary infantry targets and 10 firing positions (foxholes or fighting positions), and is equipped with Army standard targetry operated from a computerized control console. Each firing lane is 20 m (66 ft) wide and 300 m (984 ft) long. To simulate realistic firing conditions, targets are positioned to take advantage of the existing terrain profile. Existing maintenance roads and trails will be used to access targets.

The modified record fire range is a 10-lane range where Soldiers and Marines qualify with the M16A2 or M4 semi-automatic rifles, firing 5.56 mm ball or tracer ammunition.

Marksmanship training on the Known Distance Range will precede weapons qualification on modified record fire ranges. All targets are fully automated and the target sequence is computer driven and scored from the computerized console in the range tower. The console is capable of providing immediate performance feedback to Soldiers, Marines, and Commanders in the field.

Night-firing will also be conducted on the modified record fire range. Night-firing consists of firing at targets 50 m (164 ft), 25 m (84 ft) and 0 m from the firing line. Chemical light sticks are usually placed on the targets to help the Soldier acquire the target at night and in low light conditions. Night-fire is conducted primarily for marksmanship and tracer ammunition is used. No artificial or supplemental night-lighting other than chemical light sticks, flash lights and vehicle head lamps will be required.

Specific operation guidelines for Range 1 are outlined in the PTA Range Standard Operating Procedures (U.S. Army 2008a, Appendix B). Live-fire and range scenarios for Range 1 have been previously described in the Army's 2003 Programmatic Biological Assessment (U.S. Army 2003a, pp. 1-336) and the Service's 2003 Biological Opinion (Service 2003, pp. 1-213). The use of the modified record fire and Known Distance ranges falls within the activities the Service addressed in the 2003 Biological Opinion (U.S. Army 2008a, p. 6).

Range 1 Conservation Measures

When used in the context of the Act, "conservation measures" represent actions proposed by the Federal action agency that are intended to further the recovery of and/or minimize or compensate for project effects on the species under review. Because conservation measures are pledged in the Project Description by the action agency, their implementation is required under the terms of the consultation. In addition to the actions described in the 2003 Biological Opinion (Service 2003, pp. 40-52), the following measures will reduce the overall project impacts associated with military training activities by avoiding or minimizing specific impacts on listed species. The following conservation measures are proposed by the Army as part of their overall actions in the Convoy Live Fire and other Range 1 vicinity actions. All conservation measures described in the various sections of this project description will be incorporated into the Final PTA Implementation Plan.

Range 1 Vicinity Nene Monitoring

Natural resource staff will monitor Range 1 for nene to document temporal use of the area and to identify banded individuals (see Figure 5). Monitoring will consist of remote sensing cameras and natural resource staff onsite.

- Two remote sensing cameras were installed on the range in January 2008 to record nene activity. Depending on the angle of the target as it passes the camera's field of view, each of the two cameras has approximately a 9-m (30-ft) range. In July 2008 the Army natural resource staff discovered that some geese are not recorded by the camera. The natural resource staff placed the cameras to capture activity in the "hot spot" under the trees where the birds have been

- observed to congregate the most. During flocking season, natural resource staff will continue to check the cameras on a monthly basis and document any activity for the next two-and-a-half years. The number of birds recorded by the cameras, band combinations of individuals, and time of day the birds landed and departed the range will be entered into a spreadsheet. If possible, natural resource staff will use the spreadsheet developed by nene biologists at Hawaii Volcanoes National Park. When training is scheduled, the cameras will be checked within one week prior to the scheduled training event.
- The natural resource staff will investigate the possibility of installing an active camera on the range that has a wider field of view and can be monitored remotely. Army natural resource staff will inform the Service of the feasibility of this camera configuration by March 2009. If an active camera with a wider field of view is an improvement over the current camera monitoring system, the improved system will be installed by June 2009. The number of birds recorded by the camera, band combinations, and time of day the birds landed and departed will be entered into a spreadsheet.
 - Starting with the 2009 flocking season, the natural resource staff will monitor Range 1 on a weekly basis for nene presence throughout the flocking season. The beginning of flocking season varies; therefore, natural resource staff will coordinate with Hawaii Island nene biologists to determine when flocking season begins each year. If nene are observed, the number of birds, location, band combinations of individuals, and the time of day will be recorded and entered into a spreadsheet. Natural resource staff will conduct follow-up surveys on the days following the first observation until two days have passed with no nene observed on the range. If this weekly schedule does not provide useful data or is determined to be an inefficient use of time, the natural resource staff will work with the Service to revise the schedule (i.e., switch to biweekly surveys). These surveys will be conducted for three years after which point (2012) the Service and the natural resource staff will use the data to determine what new management actions should be incorporated into the project description to better avoid and minimize training activities to nene.

The following measures will be implemented to minimize impacts from training events at Range 1:

Personnel Education

- Every unit to be trained on Range 1 will receive a brief on the issues associated with nene in the area and provided with a pamphlet that outlines the Army's responsibility under the Endangered Species Act.
- Siebert stakes have been installed in areas under the trees at Range 1 to warn soldiers to avoid an area heavily used by nene.
- Signs educating soldiers about the nene will be installed by natural resource staff on the range by March 1, 2009.
- Range Control and the military units will be briefed on the requirement to alert the natural resource staff if a dead nene is found. If a dead nene is found, the Service will be informed within 48 hours. The dead bird will be collected by

- natural resource staff and submitted to Dr. Thierry M. Work at the National Wildlife Health Center, Honolulu Field Station (U.S. Geological Survey-Biological Resources Discipline) for a necropsy.
- During their pre-training sweeps of the range, every military unit training on Range 1 will be required to report all dead nene to the natural resource staff.
 - The natural resource staff has developed sighting cards (number of nene, band color, time of day) to be used by Range Control and Range Maintenance to track goose observations while performing standard range duties. The tracking cards will be given to the natural resource staff at the end of each day that nene are seen.
 - Vehicles will be driven at speeds no greater than 15 miles per hour (mph) unless troops are present. If troops are present the speed limit is 5 mph.

Nene Monitoring and Training Restrictions

- Natural resource staff will be present during all training events at Range 1 when nene are present.
- Natural resource staff will have one staff person “on call” during all training events at Range 1. Natural resource staff will provide the person’s name and contact telephone number (or radio call sign). This person must be immediately available to go to Range 1 upon contact from Range Control.
- Range Control will call the natural resource staff immediately if nene enter the Range 1 area, including the surface danger zones associated with training at Range 1 during a training event.
- Within an hour of the commencement of training, ground-based surveys will be conducted in areas known to be used by nene. The area where nene are observed most often will be surveyed by Soldiers, accompanied by a natural resource staff biologist (See Figure 5). Surveyors will move in parallel line at a spacing of 3 to 5 m (10 to 15 ft) within this nene survey area. In addition, the area between the Known Distance Range and the nene survey area will be surveyed by a biologist using a spotting scope mounted on a vehicle on Red Leg Trail or another high vantage point.
- No weapon will be fired while a nene is known to be present within that weapon’s surface danger zone. To facilitate training and when practical, if nene are present down range of a firing point, the line of departure (starting position for an attack on enemy positions) will be moved further into the range (beyond the area where nene are loafing).
- No live-fire training will occur at Range 1 when more than six nene are present within the nene survey areas (nene grid survey area/area between the Known Distance Range and the nene survey area). An unlimited number of nene may be present outside the surface danger zones at Range 1 during live-fire training exercises.
- If units are training and nene fly into the vicinity of the line of fire, the unit will call a cease fire and natural resource staff personnel will proceed to the site to observe training until the nene move, on their own accord, to safe locations.

- The nene observer will take precautions to minimize the likelihood nene will habituate to human presence. The nene observer will stay as far away from nene as possible. The nene observer will maintain a minimum distance of 30 m (100 ft) from the birds. This distance will allow good visibility of bands using binoculars/scope. Once bands are determined, the observer will move away as far away as possible while keeping the birds in sight. If nene approach, the observer will move to maintain the maximum distance practical. An exception to the minimum distance of 30 m may be made for safety purposes for the nene observer. If the observer must approach closer than 30 m to avoid military training hazards, it is acceptable to do so, but the observer should move away again as soon as it is safe to do so. The objective of this monitoring is to identify if nene are approaching unsafe areas.
- When a natural resource staff nene observer is onsite during training events, to the extent possible, natural resource staff will document nene location, behavior, time of arrival and departure, number of birds, and through band combination which nene interact with other nene.
- Beginning in January 2009, if the threshold of 60 bird days (days with training events on the ranges and between 1 to 6 birds are present) is exceeded within a calendar year, the Army will cease live-fire training on the range while nene are present anywhere on the range for the remainder of that calendar year.
- Range Control staff will check the area after each training event to ensure that the areas used by the nene are clear of all refuse. If a dead nene is found, natural resource staff will collect the bird for a necropsy study and the Service will be informed.

Night-time training

- The Army assumes that nene do not roost on the range at night. Regular observations of nene on Range 1 support this assumption. Biologists have seen nene depart the range between 6:30 and 6:45 pm. The earliest known arrival is 6:20 am. No birds have been seen flying over the range once they departed for the night. During three separate night observations, using night-vision goggles (7.5 hours total), no nene were observed. While training at night, at least one nene observer will be required to observe the training with night-vision goggles to look for nene in the area.
- Day-time training restrictions associated with number and locations of nene at various locations at Range 1 will apply at night.
- In the event that military units are conducting only night training (no training the following day) a biologist will sweep the range to look for dead nene the following morning.
- Military units will only be allowed to bivouac at the designated bivouac site located across Red Leg Trail while training at Range 1. Bivouacking will not be allowed in the Range 1 complex as it was in the past.

Development of an alternative site for nene flocking

- In an effort to reduce the number of geese that utilize the areas used for live-fire training at Range 1, an alternative site that may be suitable for loafing was

- identified and is denoted on Figure 5. It has some of the same physical features such as mineral soil, rather than lava rock, and has a relatively level terrain for a clear line-of-sight. In addition, it is in close proximity to Range 1 and should be visible to nene as they fly into Range 1 from any direction. However, the site lacks mature trees that could serve as a source of shade.
- Beginning in January 2009, natural resource staff will begin to improve the site to make it attractive to nene. In order to prevent the site from attracting additional nene to PTA, which could hinder training, regular monitoring and adaptive management (in coordination with the Service) of the site will be implemented.
 - In January 2009, native trees will be planted to provide shade. The trees will be covered with shade cloth structures in the beginning to protect them while they grow and to provide shade for nene.
 - After the first observation of nene at Range 1 in 2009, several methods will be employed to increase the initial attractiveness of the alternative site. A water source and flats of turf grass will be placed in 50 by 50 m (150 by 150 ft) fenced areas. Decoys resembling nene may also be placed inside the fenced enclosure. Natural resource staff will monitor the site daily until nene are observed using the site. Pertinent nene data will be recorded and entered into a spreadsheet. When nene are present at the alternative site, nene elsewhere on the Range 1 complex will also be monitored to assist in determining if attraction away from Range 1 is successful. Abundance of nene at Range 1 when birds are present at the alternative site will be noted.
 - In coordination with the Service, the water and turf grass will be removed from the alternative site after nene are determined to be consistently using the area. Natural resource staff will then monitor this site on the same schedule as Range 1 (weekly) to confirm the presence of nene.
 - If, after the removal of the water source and grass, nene are no longer observed at this site, in coordination with the Service additional methods will be explored to increase the attractiveness of the area as a loafing site.
 - In order to increase understanding of nene use of PTA and throughout the island of Hawaii, natural resource staff will support an ongoing satellite transmitter study conducted by the U.S. Geological Survey-Biological Resources Discipline and the National Park Service. Dr. Steve Hess is the project lead for the U.S. Geological Survey and is working with National Park Service biologist with Kathleen Misajon. The Army will purchase 10 transmitters to be placed on nene known to use Range 1. The Army will coordinate with the project leads to target specific birds for study in either 2009 or 2010.

Keamuku Maneuver Area

Construction, Maintenance, and Training Actions

The Keamuku Maneuver Area is approximately 9,074 ha (22,422 ac). The parcel is located between PTA proper, the Mamalahoa Highway (SH 190), and Saddle Road (see Figure 1). The area will be used as a maneuver area to support training for the Stryker Brigade Combat Teams and Legacy forces. Within the Keamuku Maneuver Area, aviation drop-zone and brigade task force maneuver training areas have been proposed.

There is no associated construction with these two areas. The parcel will be used for company- to battalion-size tactical operations. In preparation for training at Keamuku, roads will be constructed. The Army will also conduct aviation training in and around the site. Aviation training will involve touch-downs and drop-zone training. No live-fire will be conducted in the Keamuku. A survey was conducted in the summer of 2002 and several federally listed plant species were identified within Keamuku Maneuver Area (Arnett 2002, pp. 1-96). Since acquiring the land, the Army has fenced Puu Papapa and will re-fence Puu Nahono o Hae, two areas with many listed plant species and part of the project description the 2003 Biological Opinion. This has been addressed in greater detail in the 2003 Biological Opinion.

Keamuku Maneuver Area Fire Suppression and Prevention

The Army will develop and implement measures to minimize the occurrence and size of training-related fires within the Keamuku Maneuver Area in addition to ensuring such fires are prevented from escaping from the installation boundary. These measures will include fire suppression resource staffing procedures, training restrictions based on calculated fire danger, and installation and maintenance of dip sites, fuel modifications, and weather stations.

Keamuku Maneuver Area Nene Avoidance and Minimization Measures

In addition to the geese found on the main installation, several pairs of nene were sighted in the Keamuku Maneuver Area during the 2007 to 2008 breeding season (October to March), including one pair with an active nest. It unclear to what extent nene are using the area during the breeding season, since this was the first time birds were observed by natural resource staff onsite.

Nest Location, Protection and Monitoring

- The natural resource staff will conduct intensive surveys for nests during the 2008 to 2009 and 2009 to 2010 breeding seasons (See *Survey for nene in the Keamuku Maneuver Area* for details).
- If a nest is found, natural resource staff will control threats around any nesting nene to include mongoose/rat trapping and cat trapping. The nest area will be protected from cattle grazing and efforts to prevent goat and sheep disturbance will be further investigated (i.e., emergency fences around nest with adequate buffer area). Threat determination and abatement will occur on a nest by nest basis. Orange snow fencing will not be used, as it has the likelihood of disturbing nesting birds.
- The objective of nest monitoring is to determine hatch date or the cause of nest failure. Nests will be monitored twice weekly in a manner that minimizes disturbance to nesting birds. Nest checks will include the following: assess whether the male is onsite and guarding; obtain a visual observation of the female from the maximum distance possible using binoculars and/or a spotting scope to determine whether she is present and if she is incubating; if there are egg shells visible outside of the nest, if there are goslings, etc. If a pair is not present, inspect the nest area more closely to determine whether or not the nest has failed. If the nest has not failed, assume the pair is on nest break and reassess the nest on

the next visit. Natural resource staff will not disturb active nests or touch eggs. Cameras and other monitoring equipment will be serviced during nest checks to minimize disturbance. Nest checks will be completed in the shortest amount of time possible and should not exceed 5 to 10 minutes. Camera placement will be determined in coordination with the Service, based on the type of equipment to be used.

- When a nest is located, the Service shall be notified within 48 hours and relevant information such as the location of the nest and pair information will be provided.
- To assist in determining hatch date or causes of nest failure, nests will be monitored from blinds or with remote sensing cameras to minimize disturbances.
- Nest will be monitored for fledgling success and a report will be submitted to the Service at the end of each nesting season.
- Natural resource staff will develop a “no-go” area to include the nest site plus a concentric 200 m (600 ft) buffer around the nests. The buffer area will be marked with Seibert stakes. No training will be allowed in these no-go areas. The airspace above the 200 m (600 ft) buffer will also be off-limits to helicopter training. If there is a road adjacent to the nest that bisects the no-go area, the road will be off limits to all traffic until the birds have left the area. Natural resource staff will develop and distribute maps that clearly show the no-go areas and educate incoming units of the no-go areas during the nesting season.
- All nest failures will be reported to the Service within 48 hours.
- Natural resource staff will monitor the nests for hatching success. If hatching occurs, the Service shall be notified immediately and the family will be moved by a biologist with nene handling permits to a more appropriate location if possible. See Nene brood translocation below for additional details on coordination.
- To reduce mortality of nene on roads, the natural resource staff will work with the Service and nene managers on the island of Hawaii to develop and install nene deterrents along road edges within the Keamuku Maneuver Area once the roads are in place, starting in 2009.
- Natural resource staff will work with nene managers on the island of Hawaii to implement the GPS tracking study developed by the U.S. Geological Survey’s Biological Resources Discipline and the National Park Service. Equipment, such as satellite transmitters, tracking equipment, and staff time for on-the-ground tracking of nene at PTA can be incorporated as part of the on-going study through coordination with the U.S. Geological Survey-Biological Resources Discipline and the National Park Service.
- If families are not captured and relocated from the Keamuku Maneuver Area, natural resource staff will work with the Service to develop an additional no-go buffer area around the brood sites.
- The natural resource staff will be active members of the island of Hawaii nene working group starting immediately.

Nene Brood Translocation

- In an effort to reduce future breeding efforts in the area from offspring hatched in Keamuku Maneuver Area, natural resource staff will notify the Service who will

- coordinate translocation efforts of hatched broods with island of Hawaii nene managers.
- Because translocations involve extra time, and effort, they must be coordinated well in advance. In addition to informing the Service of nests that are found, natural resource staff will provide bi-weekly updates of nest checks and possibly hatching dates to the Service.
 - Banding of adults and goslings (of appropriate age/size) onsite will be done by biologists with permits to handle nene and coordinated with the Service.

Surveying for Nene in the Keamuku Maneuver Area

Surveys will be conducted in the priority areas of the Keamuku Maneuver Area once a month during the nene breeding season (October to March) starting in November 2008 and continuing until the end of the 2010 breeding season. The Keamuku Maneuver Area has been divided into sections based on different levels of priority. Priority ranking was assigned to each section based upon four criteria:

1. Whether or not the section is in a buffer zone;
2. If the section had previous nene sightings/nests;
3. The Army's proposed development of the section; and
4. The suitability of the habitat and vegetation for nene activities

The highest priority survey areas will include sections that are located outside of buffer zones with previous nene sightings and suitable habitat, which the military plans to develop. High priority sections will be surveyed on foot, systematically across transects where the vegetation is appropriate for nesting. Low priority areas will be surveyed by vehicle where vegetation is a monoculture of short grass with no nesting areas. Detailed survey methodology will be developed in coordination with the Service.

Reporting

- Natural resource staff will send the Service an email summarizing the nest survey effort and results on a monthly basis or notify us within 48 hours of finding an active nest.
- After the first season of nest surveys and monitoring, natural resource staff will provide a report detailing all pertinent biological information including a summary of all survey efforts, breeding activity, banding, and nene translocations. The report will be provided to the Service no later than July 1, 2009. The Service may make further recommendations based upon the number of nene nesting at the Keamuku Maneuver Area. If no changes are recommended, survey, nest monitoring, and translocation protocols will remain the same in the second year.
- Natural resource staff will provide a final report to the Service no later than July 1, 2010, that summarizes all activities conducted (and their results) during both breeding seasons.

Fence Replacement and Construction

Training Area 21 Fencing to Protect *Asplenium peruviana* var. *insulare* and *Silene hawaiiensis*

A thorough description of *Asplenium peruviana* var. *insulare* is given in the 2003 Biological Opinion. To date, a total of 11 caves have been identified as occupied and only 15 caves may be suitable for *A. peruviana* var. *insulare* within Training Area 21. Only four percent of these caves were found within the fence units proposed in the 2003 Biological Opinion. To comply with the intent of the 2003 Biological Opinion, the Army will fence all of Training Area 21. The new fence will enclose a majority of the 300 caves with potential habitat for *A. peruviana* var. *insulare*. The fence will be completed by the end of 2013 and ungulates will be removed by the end of 2015. In addition, any military unit wishing to train in Training Area 21 will be required to coordinate with the Natural Resource office in order for unit leaders to understand avoidance measures for listed plants and their habitat as outlined in the Army's Standard Operating Procedures and the 2003 Biological Opinion.

The 2003 Biological Opinion stated that a total of 50 occurrences of *Silene hawaiiensis* occurred at PTA in a 200-sq km (77-sq mi) area. The 2003 Biological Opinion required that five exclosures be constructed in Training Area 21 to protect the "majority" of the occurrences of this species from browsing by ungulates and trampling by Soldiers and Marines utilizing this area. The Service determined appropriate fence unit locations based on the most current data at the time. Additional surveys conducted in the last few years have identified approximately 216 occurrences with 874 individuals of *S. hawaiiensis* plants found within a 234 ha (578 ac) area. Based on the vegetation community type this species is known to prefer, Army natural resource staff estimates the total number of plants within Training Area 21 to be approximately 4,500 individuals. When the 2003 Biological Opinion was finalized there were 65 known locations of *S. hawaiiensis* within Training Area 21 and the Army committed to 347 ha (610 ac) of fenced units to protect all known occurrences of this species. Additional surveys of Training Area 21 revealed the proposed fencing protected only 35 percent of the known locations of *S. hawaiiensis* in Training Area 21. The Army will fence all of Training Area 21 to comply with the intent of the 2003 Biological Opinion (Figure 6).

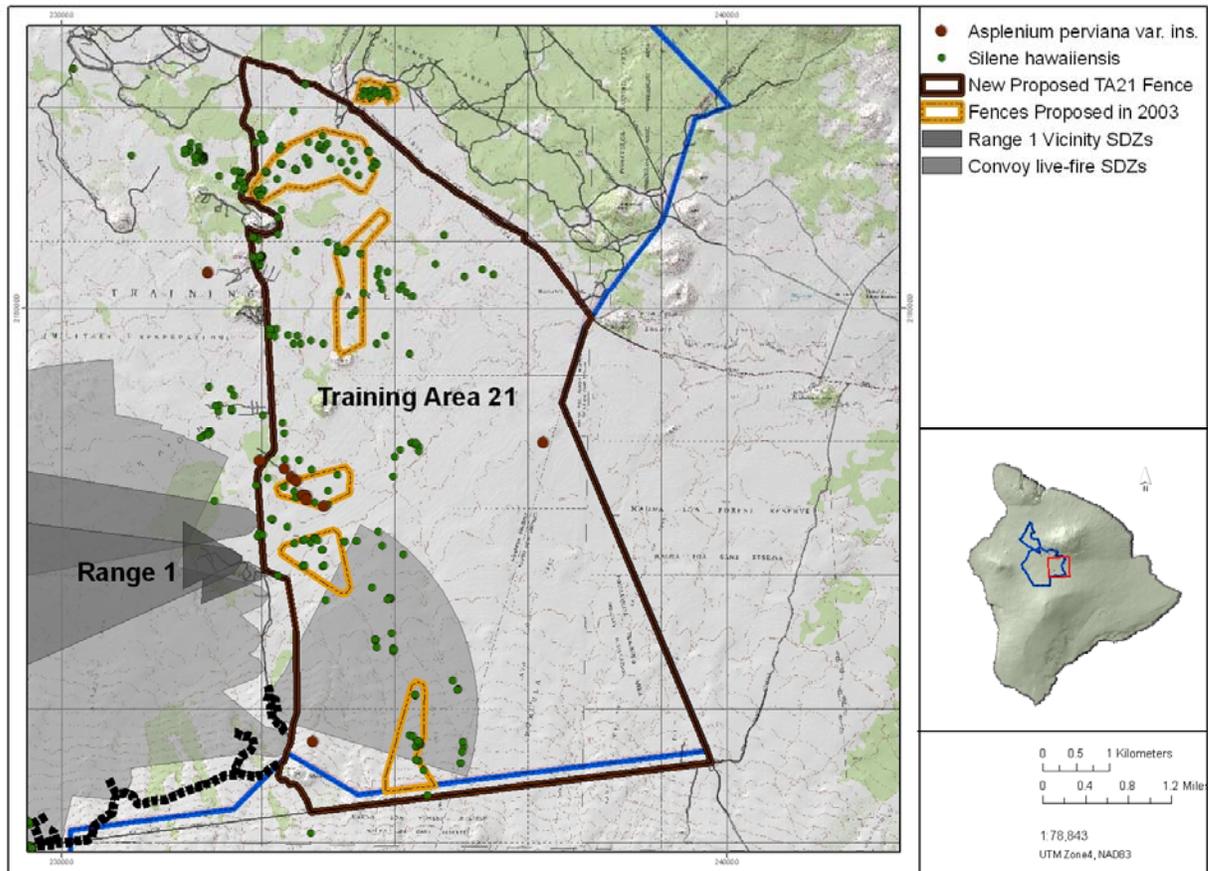


Figure 6. Training Area 21 fence.

Fencing to Protect *Solanum incompletum*

The natural resource staff recently found additional individuals of *Solanum incompletum* while conducting surveys to construct a fuelbreak in western PTA. While surveying Kipuka Road, a single *S. incompletum* was found west of the road, in an area not previously identified as containing this species. Additional surveys were then conducted in the surrounding area and a total of five new locations were found with approximately 72 individuals of *S. incompletum*. The majority of the plants are more than 100 m (300 ft) from the road. Only one plant is in close proximity to the road and this individual is already fenced. Ungulate browse is the most significant threat to the continued existence of these recently discovered individuals. As outlined in the 2003 Biological Opinion, the natural resource staff will permanently fence all known individuals of this species at PTA. The fence will be completed by the end of 2009 and ungulates removed from within the fence by the end of 2010. Natural resource staff will also conduct weed control around the plants to help encourage regeneration of native plant species. The area that will be fenced is not known to carry a heavy fuel load. No training will be allowed within the fenced area. Firing points 440 and 506 are located within the proposed fence area but will not be used. There is a firing point within 500 m (1,500 ft) of the area to be fenced but it is separated by a lava flow from the firing point. Most of the plants occur on sparsely vegetated aa lava. The main fuel source is *Pennisetum setaceum* (fountain grass), however, due in part to terrain and moisture limitations, grass density is currently

too sparse to carry fire (U.S. Army 2008a, p. 2). To minimize the fire threat to this population from training, the natural resource staff has installed 25 m (75 ft) of vegetation-control buffers. Some of the plants are located in a shrubland kipuka, which has a higher fuel load. In this area, the natural resource staff has installed 50 m (150 ft) grass-control buffers.

Removal of Barbed Wire from Fences

On September 3, 2008, Army natural resource staff found a dead Hawaiian hoary bat entangled in a strand of barbed wire on a fence that encloses the Kipuka Alala fence unit. Many of the Natural Resource Program fences at PTA have a strand of barbed wire as the top strand. There are 45 km (28 mi) of Natural Resource Program fences at PTA with barbed wire (see Figure 1). The Army will upgrade all existing Natural Resource Program fences that currently contain barbed wire. The new fences will stand 2 m (6 ft) and will not contain barbed wire. The fence upgrade will be completed by 2018. There are 8.6 km (5.4 mi) of security fences surrounding the Cantonment at PTA. The Army will check fences with barbed wire on a quarterly basis for entangled bats (Mansker 2008a).

STATUS AND ENVIRONMENTAL BASELINE OF THE SPECIES

These factors include past and present impacts of all Federal, State, or private actions, and other human activities in the action area; anticipated impacts of all proposed Federal projects in the action area that have already undergone formal consultation; and impact of State or private actions that are contemporaneous with the consultation. The majority of the information presented in the status and baseline in the 2003 Biological Opinion for *Asplenium peruvianum* var. *insulare*, *Silene hawaiiensis*, *Solanum incompletum*, and the Hawaiian hoary bat (Service 2003, pp. 52, 72-74, 77-79, 90-107) remains valid. However, in this section we included new information for the three plant species and a complete status and baseline for nene since this species was not analyzed in 2003. Overall the environmental baseline for the three plant species has improved since 2003 as a result of additional surveys and observation of more individuals.

***Asplenium peruvianum* var. *insulare* (No common name)**

A complete description of the status of *Asplenium peruvianum* var. *insulare* is presented in the Service's 2003 Biological Opinion (Service 2003, p. 52). Recent Army survey data suggests there are at least 34 known occurrences of *A. peruvianum* var. *insulare* on Army-owned lands at PTA (U.S. Army 2008c, p. 5). The estimated total number of individuals is between 550 and 900 (Table 2).

On Maui, two new occurrences of *A. peruvianum* var. *insulare* have been recently identified. One reproductive plant (spores and vegetative) was located in Waikamoi Preserve and four plants were located in the Hanawi Natural Area Reserve (Oppenheimer 2008, pers. comm.). In June of 2005, Dan Goltz reported finding 41 individuals of *A. peruvianum* var. *insulare* in the North Kona Game Mammal Management Area (Goltz

2005, pers. comm). More than 95 percent of all known individuals of *A. peruvianum* var. *insulare* occur on Army lands at PTA.

Table 2. Range-wide (islands of Maui and Hawaii) distribution of naturally occurring *Asplenium peruvianum* var. *insulare*.

Location	Number of individuals
Area of Species Recovery 11	4-6
Area of Species Recovery 33	147-247
Area of Species Recovery 34	122-302
Area of Species Recovery 35	10-15
Area of Species Recovery 36	148
Area of Species Recovery 38	70-119
Area of Species Recovery 39	5
Management Unit Naohuleelua	9
Management Unit Kipuka Alala South	27
Management Unit <i>Kadua coriacea</i>	2
Outside Management Units	1-10
North Kona Game Mammal Management Area	41
Waikamoi Preserve (Maui)	2
Hanawi Natural Area Reserve (Maui)	4

Shaded locations are inside the action area.

Silene hawaiiensis (No common name)

A complete description of the status of *Silene hawaiiensis* is presented in the Service's 2003 Biological Opinion (Service 2003, pp. 72-74). From 2003 to 2005, the Center for Environmental Management of Military Lands (Colorado State University) conducted a study to assess the abundance and distribution of *S. hawaiiensis* across the species' known historical range. This study found a total of 6,416 plants outside of the PTA installation boundaries. During the 2003 survey, 1,564 plants were recorded on the north slope of Mauna Loa, 1,886 plants in the Kau Desert, and 15 plants were recorded on the east slope of Mauna Loa. In 2005, 641 plants were recorded on the summit of Hualalai, 1,884 plants on the south-southeast slopes of Hualalai, and 425 plants near Puu Keanui (U.S. Army 2006, p. 19).

Recently, Army Natural Resources Staff conducted a survey for *Silene hawaiiensis* at PTA and approximately 216 occurrences containing a total of 874 individuals within a 234-ha (578-ac) portion of Training Area 21. Based on the habitat type these plants are known to prefer, Army Natural Resources Staff extrapolated their survey data to estimate the total number of plants within Training Area 21 (1,424 ha, 3,518 ac) to be 4,371 individuals. Additionally, Army Natural Resources Staff completed additional surveys within the footprint of the proposed construction and training areas associated with convoy live-fire training along Red Leg Trail. They determined there are 14 occurrences containing a total of 86 *S. hawaiiensis* individuals within the construction project

footprint. Approximately 50 percent of all known individuals of *S. hawaiiensis* occur on Army lands at PTA (Table 3).

Table 3. Range-wide distribution of naturally occurring *Silene hawaiiensis*.

Location	Number of individuals
Area of Species Recovery 1	127
Area of Species Recovery 2	337
Area of Species Recovery 3	307
Area of Species Recovery 19	197
Area of Species Recovery 29	48
Area of Species Recovery 30	1
Area of Species Recovery 37	39
Kipuka Alala South Management Unit	7
Puu Koli Management Unit	475
Outside Management Unit	306
Training Area 21	4,371
North slope of Mauna Loa	1,564
Kau Desert	1,886
Summit of Hualalai	641
south-southeast slopes of Hualalai	1,884
Puu Keanui	425

Shaded locations are inside the action area.

***Solanum incompletum* (Popolo ku mai)**

Solanum incompletum is endemic to the Big Island and a complete description of the status of this species is presented in the Service's 2003 Biological Opinion (Service 2003, pp. 77-79). During fuelbreak construction surveys conducted in 2008, Army Natural Resources Staff found new *S. incompletum* plants in an area where previously this species had not been observed. A total of five new locations with approximately 70 individuals were found in the vicinity of the Twin Puus areas to the east of Kipuka Road (U.S. Army 2008a, p. 19). An additional 10 individuals were found at Puu Waawaa in 2007 (Service 2008a). Outplanting of *S. incompletum* began in 2002 and to date 1,084 individuals have been planted at seven sites (three sites in the action area: two sites within the Kipuka Kalawamauna East Fence Unit (46 plants), and one site within the Kipuka Alala Fence Unit (109 plants), and four sites outside the action area: Puu Huluhulu (400 plants), Kohala (78 plants), Puu Waawaa (225 plants), and Kipuka Oweowe (226 plants) (U.S. Army 2008b, p. 47). Overall survival of outplanted individuals has been 85 percent, with 849 of the 1,003 planted between 2002 and 2005 remaining. Natural recruitment was noted for the first time in 2006. Individuals at upper elevation sites are susceptible to frost damage (U.S. Army 2007, p. 2.59). Outplanting locations and numbers of surviving plants as of 2006 include: 55 immature individuals at the Koaia Tree Sanctuary, 201 immature individuals at Oweowe, 212 immature individuals at Puu Waawaa cone, 102 mature individuals at Kipuka Alala, 318 immature individuals at Puu Huluhulu, 32 immature individuals at Kipuku Kalawamauna number 4, and 10 immature individuals at

Kipuku Kalawamauna number 6. In total, 163 mature and 848 immature individuals are known from eight different populations (Service 2008b).

More than 20,000 seeds are in storage from all but one of the known *Solanum incompletum* locations. The majority of the seed is from greenhouse grown individuals representing three founders. All known plants are fenced within small-scale emergency fences, with invasive plant and rodent control in the immediate vicinity of each individual. A large-scale fence is under construction to protect the plants and their habitat. Approximately six percent of all known individuals of *S. incompletum* occur on Army lands at PTA (Table 4).

Table 4. Range-wide distribution of naturally occurring *Solanum incompletum*.

Location	Number of individuals
Area of Species Recovery 11	20
Area of Species Recovery 13	1
Area of Species Recovery 24	65
Twin Puus area	70
Puu Waawaa	10

Shaded locations are inside the action area.

Hawaiian Hoary Bat, opeapea (*Lasiurus cinereus semotus*)

A complete description of the status and environmental baseline of Hawaiian hoary bat can be found in the 2003 Biological Opinion (Service 2003, pp. 95-107). Recent surveys of national parks on the island of Hawaii suggest Hawaiian hoary bats are opportunistic and forage in a variety of habitats, including native and non-native forests and shrublands, and along roads and trails (Frasher et al. 2007, p. 1). Pursuant to the 2003 Biological Opinion, PTA Natural Resources Staff are developing and implementing systematic survey protocols for Hawaiian hoary bats on Army owned lands. Initial data indicates Hawaiian hoary bats occupy a variety of habitat types at PTA, but data suggests bat densities are low (U.S. Army 2007, pp. 3.1-3.7). Ongoing research by Dr. Frank Bonaccorso (U.S. Geological Survey-Biological Resources Discipline), corroborates the Army's findings. Dr. Bonaccorso's data suggests the density of Hawaiian hoary bats in the saddle region of the island of Hawaii is very low (Bonaccorso 2008, pers. comm.). There are been several incidental observations of Hawaiian hoary bats at PTA. In September of 2008, PTA Natural Resources Staff inadvertently flushed a Hawaiian hoary bat during survey work for nene in Training Area 21. Training Area 21 is pukiawe (*Styphelia tameiameia*) shrubland area with very few trees presumed to be large enough to serve as a day roosting site. In early September of 2008, Army Natural Resources Staff discovered a Hawaiian hoary bat entangled on the top strand of barbed wire fence enclosing the Kipuka Alala fence unit. The habitat type of the Kipuka Alala fence unit is nainoa/mamane (*Myoporum sandwicense/Sophora chrysophylla*) shrubland with native understory.

Nene (Hawaiian goose, *Branta sandvicensis*)

Taxonomy and Species Description

The nene is a medium-sized goose, with an overall length of approximately 63 to 69 cm (25 to 27 in). The crown and the back of the neck are black, with a bright, cream-colored cheek patch. The sides of the neck are a paler beige color with deep furrows which are unique among waterfowl (Banko et al. 1999). The bill, legs, feet, and tail feathers are black. Contour feathering of the back and upper wing areas are gray-brown with lighter distal edges, which gives a heavily scaled or barred appearance. The feathering of the sides, chest, and belly are lighter gray-brown with a much less scaled appearance. The rump is pure white. This species is adapted to a terrestrial and largely non-migratory lifestyle in the Hawaiian Islands with limited freshwater habitat. Adaptations to a terrestrial life include greatly reduced webbing between the toes, and a relative increase in the size of the hind-limbs (Olson and James 1991). Nene wings are 16 percent smaller and their flight is weaker than the closely related Canada goose. Nonetheless, nene are capable of both interisland and high altitude flight (Banko et al. 1999).

The nene was listed as endangered in 1967 (Service, 1967, p. 4001). The Nene Recovery Plan was first written in 1983. A Draft Revised Recovery Plan for the Nene or Hawaiian Goose was recently published and incorporated a considerable amount of new information in the fields of genetics, paleontology, nutrition, behavior, effects of predation, and predator control. The plan also recommended a shift in recovery efforts to include more intensive habitat management and releases of captive-reared birds at lower elevations (Service 2004, p. 3).

Historic and Current Distribution

Fossil evidence indicates nene historically occurred on all the main Hawaiian Islands. It is believed that they were abundant (about 25,000 birds) on the island of Hawaii before the arrival of Captain James Cook in 1778 (Service 2004, p. 24). Currently, there are wild populations of nene on the islands of Hawaii (503 individuals), Maui (425 individuals), Molokai (152 individuals), and Kauai (820 to 870 individuals) (Nene Recovery Action Group 2008, pers. comm.). After narrowly avoiding extinction in the 1940s and 1950s, nene populations have been slowly rebuilt through captive-breeding programs. As a result of such programs, nene have been reintroduced onto four of the main Hawaiian Islands (Kauai, Maui, Molokai, and Hawaii). Since 1960, 1,854 nene have been released at seven sites on the island of Hawaii, including Hakalau National Wildlife Refuge, Hawaii Volcanoes National Park, Kahuku, Keaau, Keauhou, Keauhou II, and Kipuka Ainahou. The largest populations of nene on the island of Hawaii occur at Hawaii Volcanoes National Park (approximately 200 birds) and Hakalau National Wildlife Refuge (approximately 160 birds). Smaller populations of nene also occur at Puuwaawaa (approximately 100 birds) and Keaau (approximately 60 birds) (Nene Recovery Action Group 2007, pers. comm.).

Life History

The nene has an extended breeding season with eggs reported from all months except May, June, and July, although the majority of birds in the wild nest during the rainy

(winter) season between October and March (Banko et al. 1999). Nesting peaks in December and most goslings hatch from December to January (Banko et al. 1999). Nene nest on the ground, in a shallow scrape in the dense shade of a shrub or other vegetation. A clutch typically contains three to five eggs, and incubation lasts for 29 to 31 days. While the female incubates the eggs, the male stands guard nearby, often from an elevated location. Once hatched, the young remain in the nest for one to two days (Banko et al. 1999). Fledging of captive birds occurs at 10 to 12 weeks, but may occur later in wild birds. During molt, adults are flightless for a period of 4 to 6 weeks, generally attaining their flight feathers at about the same time as their offspring. When flightless, goslings and adults are extremely vulnerable to predators such as dogs, cats, and mongooses. From June to September, family groups join others in post-breeding aggregations (flocks), often far from nesting areas.

Habitat Description

The current distribution of nene has been highly influenced by the location of release sites for captive-bred nene. Nene are known to occupy various habitat and vegetation community types ranging from coastal dune vegetation and non-native grasslands (such as golf courses, pastures, and rural areas) to sparsely vegetated low- and high-elevation lava flows, mid-elevation native and non-native shrubland, cinder deserts, native alpine grasslands and shrublands, open and nonnative alpine shrubland-woodland community interfaces (Banko 1988; Banko et al. 1999). Nene are browsing grazers. The composition of their diet depends largely on the vegetative composition of their surrounding habitats and they appear to be opportunistic in their choice of food plant as long as they meet nutritional demands (Banko et al. 1999; Woog and Black 2001, p. 324). Nene may exhibit seasonal movements to grasslands in periods of low berry production and wet conditions that produce grass with a high water content and resulting higher protein content. The distribution of nene nests generally has also been associated with the location of release sites of captive-bred nene since 1960. The sites used by nene for nesting range from coastal lowland to subalpine zones and demonstrate considerable variability in physiognomic features (Banko et al. 1999). Nest sites studied at Haleakala National Park were located in well vegetated habitat (Black et al. 1994, pp. 65-109). During the breeding season, nene were observed feeding mainly on berries and other plant items found near their nest sites. Although some birds supplemented their diets by feeding in grasslands due to declining berry density, during the pre- and non-breeding season their principal foods are cultivated grasses.

Threats, Recovery Strategy, and Ongoing Conservation Measures

The primary limiting factors currently affecting nene recovery are predation by introduced mammals, insufficient nutritional resources for both breeding females and goslings, limited availability of suitable habitat, and human-caused disturbance and mortality (Service 2004, p. iii). In 2008, as a result of being struck by vehicles, four nene deaths occurred on a recently completed portion of Saddle Road and three nene deaths occurred on the Mauna Kea Access Road.

In order for nene populations to survive, they must be provided with relatively predator-free breeding areas and sufficient food resources, human-caused disturbance and

mortality must be minimized, and genetic and behavioral diversity maximized. At the same time, it is recognized that nene are highly adaptable, successfully utilizing a gradient of habitats, ranging from highly altered to completely natural, which bodes well for the recovery of the species. The goal of the recently revised Service's Draft Revised Recovery Plan is to enable nene conservation by utilizing a mix of natural and human-altered habitats in such a way that meets the life history needs of the species and promotes self-sustaining populations at or above recovery target levels (Service 2004, pp. iv-vi). On the island of Hawaii, captive releases are considered an important strategy for nene recovery for establishing new populations and supplementing current unstable populations. However, releases must occur in conjunction with predator control and habitat manipulation (Service 2004, p. 47). Additionally, birds released at low to mid-elevation sites, with access to more grassland habitats, and parent or foster-parent reared birds apparently survive better (Black et al. 1997, pp. 1161-1173).

Environmental Baseline

Status of the Species in the Action Area

From 2004 through 2007, Army Natural Resources Staff conducted systematic nene surveys at PTA in an effort to establish nene presence, abundance and use of the various habitat types. No nene were observed during any of the systematic surveys. However, observations of nene have been noted by Natural Resources Staff and PTA employees during other routine work activities (U.S. Army 2007, pp. 3-8).

On the main portion of the installation, nene have been incidentally observed for several years during the flocking season (March to September) primarily in the vicinity of Range 1 (U.S. Army 2007, p. 10). Nene are very site tenacious (Banko et al. 1999), thus it is believed that Range 1 is a historic nene flocking area. At Range 1, nene have been seen feeding, sleeping and interacting socially (U.S. Army 2007, p. 10). In August 2008, systematic surveys for nene sign (feces and footprints) on Range 1 were conducted in areas safe enough for biologists to traverse (reduced unexploded ordinance) and in areas with suitable habitat. Nene sign was found throughout the survey area, but was significantly more concentrated in the Squad Live-fire Exercise Range (see Figure 5) (U.S. Army 2007, p. 10). Higher concentrations of nene sign are attributed to a greater presence of nene. For the last four years Natural Resources Staff have surveyed Range 1 for the presence of nene. The results of the Range 1 surveys (Table 5) reveal that nene can be present throughout the year with the exception of the peak of the breeding season, January and December. It is also normal to see up to six birds on the Range at any one time, with pairs of birds being the most frequent sighting (Table 6).

Table 5. Number of days nene were observed at Range 1, 2005 to 2008.

Year	Month											
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2005								1	1	4	2	
2006										2	1	
2007								4	1			
2008		1	2			2	8	4				

Table 6. Frequency distribution of nene sightings at Range 1 from 2005 to 2008.

Number of flocking Nene	Frequency
Unknown	8
2	8
3	5
4	4
5	2
6	3
7	1
18	1
24	1

In August and September 2008, Natural Resources Staff conducted more intensive surveys of areas within surface danger zones east of Red Leg Trail in the vicinity of Range 1. During September 2008, systematic surveys for nene sign (feces and/or footprints) were conducted in suitable habitat within the surface danger zones east of Red Leg Trail. Suitable nene habitat is located on a pahoehoe finger between two aa lava flows (see Figure 5). The Army speculated that nene are using this area because of the presence of a native, high-protein preferred food source, *Silene hawaiiensis* (Service, 2004, p. 116). Nene sign was found throughout the survey area. No nene sign was observed in the area located between the firing point and the targets since this area contains marginal habitat.

In addition to the nene observed consistently at Range 1, there have been random observations of nene at various locations throughout PTA proper. Figure 1 depicts the approximate locations of these 15 sightings from 1991 to 2007. Some of these observations were nene in flight, thus we do not know if these individuals were using areas on PTA for foraging or loafing or just passing through.

In 2007, two pair and one lone adult were observed utilizing the Keamuku Maneuver Area during the breeding season (see Figure 1). Army Natural Resource biologists speculate that one pair may have nested as nest-guarding defensive behavior was observed. After time had passed and no goslings were observed the Army biologist searched and found what appeared to be a constructed nest. Unfortunately, no sign of eggs or goslings was discovered so it is not known whether the pair even attempted egg laying or if the nest was preyed upon early in the nesting cycle. Overall, two nene pairs were observed displaying territorial behavior on the Keamuku Maneuver Area during the breeding season in 2007 (U.S. Army 2007, p. 10).

EFFECTS OF THE ACTION

Summary

This Biological Opinion will focus on impacts to *Asplenium fragile* var. *insulare*, *Silene hawaiiensis*, and *Solanum incompletum* within the footprint of the Red Leg Trail road improvement, the area in the vicinity and to the south of Range 1 that will be impacted by new proposed Convoy Live Fire training, and the areas encompassed by the Training Areas 21, 22, and 23 ungulate exclusion fencing. Impacts of the full range of actions described in the 2003 Biological Opinion are not reassessed for these species.

Nene were not addressed in the 2003 Biological Opinion. Therefore, this Biological Opinion will assess all potential ongoing and proposed new training actions to nene on PTA and Keamuku Maneuver Area (see Figure 1).

A few months ago a Hawaiian hoary bat was discovered impaled upon a barbed wire fence in western PTA. The Hawaiian hoary bat effects analysis is limited to the extent of existing barbed wire fences on PTA.

The effects analysis for these various specific actions are presented in detail below. This section is organized by action.

Project Impacts to *Silene hawaiiensis*, *Asplenium fragile* var. *insulare* and *Solanum incompletum*

Approximately 50 percent of all *Silene hawaiiensis* plants (6,215 of a total of 12,615) grow within the boundaries of the PTA installation. The species is known to occur at five locations outside the installation boundary (see Table 3) (U.S. Army 2006, p. 19). The total number of known individuals of this species has increased as a result of new survey efforts and successful outplanting activities. The Army's Natural Resource Staff is managing this species pursuant to the guidelines and conservation measures outlined in the 2003 Biological Opinion.

Fourteen locations, containing 86 individuals of *Silene hawaiiensis* were discovered within the footprint of the proposed Red Leg Trail road widening project (U.S. Army 2008a, p. 3) (see Figure 6). These individuals will be lost when the road is bulldozed, and we assume, due to road use and maintenance, the plants will not regenerate in this area.

Silene hawaiiensis occurs in approximately 175 locations within the surface danger zone for live-fire training in Training Area 21. These plants grow on sparsely vegetated pahoehoe lava flows in the area. There is a risk a plant will be impacted by this type of training by a round. However, a 6-m (20-ft) tall aa lava flow serves as a backstop for ammunition that misses the targets. This aa lava flow is a barrier that will minimize the likelihood of a stray round hitting a *S. hawaiiensis* during training. However, the risk of

rounds striking plants is very low and even if they were in the line of fire, the risk of actually killing the plant is even lower.

The potential damage or loss of *S. hawaiiensis* individuals from road construction and small arms training will be offset by the ungulate control within the 4,862-ha (12,013-ac) Training Area 21 fence.

New Conservation Fencing

Conservation fencing will be installed at Training Area 21 to protect *Asplenium fragile* var. *insulare* and *Silene hawaiiensis*. The fence will also protect the majority of the 300 caves in Training Area 21 that are believed to have potential habitat for *A. fragile* var. *insulare* (U.S. Army 2008a, p. 9) (see Figure 6). Best management practices will be implemented to avoid fencing impacts to listed plants within the fence footprint as discussed in the 2003 Biological Opinion. All *A. fragile* var. *insulare* and *S. hawaiiensis* occurring within the Training Area 21 ungulate exclusion fence will benefit from the removal of grazing animals from their habitat. Based on our analysis of the effects of the actions outlined in the Project Description, we conclude that the risks associated with the Army's proposed action are outweighed by the long-term benefits of the Army's ecosystem management actions.

Upon completion of the fencing, all ungulates will be removed from the fenced area. Fencing and removing ungulates from Training Area 21 will be wholly beneficial to these plant species. Ungulate browsing and trampling represents one of the greatest threats to these species and their removal should result in natural regeneration of these species. Additionally, we expect that fencing and ungulate removal will allow for natural habitat regeneration which we expect will result in increased roosting and foraging habitat for the Hawaiian hoary bat. These fenced areas may also benefit nene by providing a protected area for loafing.

Additional Fence Enclosure for *Solanum Incompletum*

Per the 2003 biological opinion, all *Solanum incompletum* on PTA were to be fenced with subsequent ungulate removal. The Army located additional individuals of *S. incompletum* near Kipuka Road. These 72 newly discovered individuals will be enclosed within the proposed conservation fence for the area and we therefore expect the conservation fence to be wholly beneficial and provide even greater conservation benefit since more individuals have been discovered.

Fencing Best Management Practices

To ensure that the fencing is wholly beneficial to listed plants (*Asplenium fragile* var. *insulare*, *Silene hawaiiensis*, and *Solanum incompletum*), the Hawaiian hoary bat, and nene the Army has proposed to use best management practices to align, install, and maintain the fencing. These best management practices include:

- The exact location of the fence will be coordinated by the Army and the Service.
- The specific fence boundary location will be surveyed for federally listed endangered or threatened plant species. When rare, endangered, or threatened

species are located, the fence corridor will be rerouted to avoid the plants by a minimum of 2 to 3 m (7 to 10 ft) from the edge of the cleared fence corridor and will be aligned so that the plants are within the fence boundary to receive the benefit of protection from ungulates.

- Care will be taken to not disturb or impact any listed plant species during construction and maintenance.

To prevent bat entanglement, no barbed wire will be installed on new fences.

Project Impacts to Nene

Direct Mortality to Nene from Training Round, Vehicle, or Aircraft Strike

More than a million rounds of ammunition may be fired on PTA each year in implementation of the training exercises described in the project description of the 2003 Biological Opinion, in addition to the new training exercises described in this project description. Small arms, demolitions, grenades, mines, simulators, mortars, artillery, bombs up to 2,000-pounds, and ground- and air-based missiles and rockets are among the weapons proposed at PTA. Nene traversing the impact area in flight or loafing undetected within the impact area could be killed by a direct hit of a round, shrapnel or fragments from a detonation, or by compression due to blast overpressure resulting from detonation of rounds from these weapons. Although nene have been observed flying across the center and western portions of PTA they have not been known to remain in these areas for extended periods of time.

Flying nene may be struck and killed by helicopters or rounds as they are shot into the impact area on PTA. Helicopters training at PTA fly at an altitude of approximately 152 m (500 ft) or greater (Mansker 2008b, pers. comm.). Flights are closer to terrain during landing and takeoff exercises and, particularly in the vicinity of dip sites, fire suppression operations, increasing the risk of avian collisions. An existing helicopter landing zone, generally used fewer than 14 hours per year (Mansker 2008c), is adjacent to an area in Range 1 which the Army is proposing to restore for nene attraction. Nene have been observed in Training areas 22 and 23 in the western portion of PTA (see Figure 1). However, to date, there has been no known air collision with nene in Hawaii, whether on PTA or elsewhere (Federal Aviation Administration 2008). Nene have only been observed sporadically in the western portion of PTA. Therefore, we conclude that while a nene may be struck by a helicopter or a round as it flies across the installation, the risk is minimal due to nene behavior and the locations of landing zones. If a nene is killed by a helicopter collision, the take will be reported to the Service and we will work with the Army to determine if this risk can be avoided in the future.

Nene may be hit by vehicles on improved and unimproved roads on the installation. Support vehicles and Stryker vehicles, which are an integral component of training, could strike nene. Nene have been documented foraging along roadsides and have been struck by passenger vehicles on Saddle Road, near PTA (Command 2008). Nene may unexpectedly walk into the path of a vehicle during a training exercise and the driver may not have sufficient time to respond and avoid hitting the nene resulting in death of a nene.

To minimize the impacts to nene from vehicular strike at PTA, vehicles will be driven at speeds no greater than 15 mph unless troops are present. If troops are present, the speed limit is 5 mph (Mansker 2008d). All Soldiers and Marines training on any portion of PTA are provided with briefings detailing the measures they are required to implement to minimize potential impacts to nene.

Noise Impacts to Nene

The proposed live-fire training and associated use of helicopters and construction equipment will result in loud noise. Nene within PTA and Keamuku Maneuver Area may be located less than 15 m (50 ft) from detonations of demolitions, grenades, mortars, artillery, tube-launched wire-guided missiles, bombs, fire suppression and training-related helicopters, and loud voices. Potential consequences of exposure to the noise associated with live-fire training at PTA could include increased metabolism, discomfort, and temporary damage to auditory cells (see Table 7).

Table 7. Noise levels of live-fire training compared with familiar noise levels.

Noise Source	Decibel (dBA) at 15 m (50 ft) from source	References
Rustling leaves, idling car, normal conversation	35 to 55 dBA	(National Institute for Deafness and other Communication Disorders 2008; Resource Systems Group 2006, p. 3)
Beginning of Human Hearing Damage	85 dBA	(Hamby 2004)
Helicopter	95 to 112 dBA	(Federal Aviation Administration 2004, pp. 4-7; Hughes et al. 2008, p. 1521)
Human body begins to perceive vibration	116 dBA	(Hamby 2004)
Extremely damaging to human hearing	140 dBA	(Hamby 2004)
Rifle, Handgun, Shotgun Firing	139 to 142 dBA	(Clark and Bohne 1999, p. 1658; Ylikoski et al. 1995, p. 3)
Human body vibration is violent, nausea intense, difficulty breathing and seeing	158 to 163 dBA	(Hamby 2004)
Fatal to insects and mice with sufficient exposure	160 to 165 dB	(Allen et al. 1948, p. 62)
Artillery, 25 kg (55 lb) HE Detonation, M1 Grenade Detonation	168 to 173 dBA	(Albert 2002, p. 203)

The noise generated from Army actions is expected to increase startle, alarm, and alert behavior of nene at PTA. Nene may take flight to avoid the noise associated with training activities, increasing their risk of being struck by the live-fire rounds and increasing energetic demands from flying. Nene in close proximity to detonations are expected to respond to loud noises and vibration with increased activity and therefore their food demands are expected to increase.

Sound levels over 85 dBA are considered harmful to inner ear hair cells, 95 dBA is considered unsafe for prolonged periods (Hamby 2004), and extreme damage occurs as a result of brief exposure to 140 dBA (Hamby 2004). A review of avian hearing loss was conducted and it was determined that hearing loss in birds is difficult to characterize because birds, unlike mammals, regenerate inner ear hair cells, even after substantial loss (Corwin and Cotanche 1988, pp. 1772-1774; Stone and Rubel 2000, pp. 11714-11721). Therefore, we do not expect permanent hearing loss in nene to result from the proposed action.

Studies on the impacts of aircraft overflights to nene have not been conducted. Several studies have examined the impacts to birds of prey (Andersen et al. 1989, pp. 296-299; Delaney et al. 1999, pp. 60-76; Palmer et al. 2003, pp. 499-509; Trimper et al. 1998, pp. 122-130; Watson 1993, pp. 171-178), and waterbirds (Conomy et al. 1998a, pp. 1127-1134; Conomy et al. 1998b, pp. 1135-1142; Ward et al. 1999, pp. 373-381). These studies have reported a wide range of reactions to overflights depending on the biology of the species, its previous exposure to overflights, whether the species is breeding, the type of aircraft, the altitude of the aircraft, and the lateral distance between aircraft and the species. Birds habituate to noises and may not respond to stimuli when they do not perceive a direct threat. This habituation, however, may be individual or species specific. For example, individuals with previous exposure to aircraft overflights may display less reaction to overflights than individuals without previous exposure (Andersen et al. 1989, p. 296; Conomy et al. 1998b, pp. 1135-1142). For water birds, American black ducks (*Anas rubripes*) reacted to 39 percent of military aircraft overflights on their first day of exposure, but after two weeks they responded only six percent of the time. However, wood ducks (*Aix sponsa*) in the same study, did not habituate to the aircraft noise (Conomy et al. 1998b, pp. 1135-1142). Incubating herring gulls (*Larus argentatus*) and great black-backed gulls (*L. marinus*) habituated to the continual presence of humans by modifying their responses, but would continue to be disturbed when they perceived direct approach by a human walking directly toward their nests (Burger and Gochfeld 1981, pp. 242-267). In addition, the degree of disturbance to which a species can habituate may also be limited (National Park Service 1994, p. 5.18). If the nene at PTA are returning adults, these nene would have been previously exposed to training noises and may be habituated. Habituated nene may remain in the area during training exercises and could experience little to no stress as a result of the noise associated with training. However, nene that are from a new cohort may react differently and may take flight during a training exercise. Because nene have been observed loafing in the vicinity of Range 1 during live fire exercises in the past (see Tables 5 and 6), they appear to have habituated to noise associated with training. Our assumption is that when noise is too loud or

disruptive, the nene will leave the premises or if they are habituated to the noise, then they are not losing any metabolic resources.

Nene evolved in the absence of mammalian predators and generally have a reduced response to stimuli that could be harmful. Nene response to noise may vary depending on the intensity and proximity of the source. Camera and onsite biologist monitoring protocols incorporated into the project description will enable collection of new information which would indicate any risks to nene associated with noise which were not anticipated at the time of this analysis.

Specific Impacts to Nene in the Range 1 Vicinity

The following types of activities occur on Range 1: small arms fire, pyrotechnics fire, mortar fire, attack helicopters firing 2.75 rockets and vehicle traffic. In the vicinity of Range 1, nene are known to occur in small flocks (generally six or fewer birds), with the largest flock observed to be 24 birds (U.S. Army 2007, p. 10). The area used by nene is within the surface danger zones for weapons fired from Range 1 as well as other firing points utilized for Convoy Live-Fire training (see Figure 1). It is very plausible that live-fire ammunition, compression and/or shrapnel resulting from detonation of these rounds, could harm or kill nene. Live-fire training will not occur or will cease if any nene are detected within the surface danger zone of any weapon to be used in the vicinity of Range 1 or if six or more nene are loafing on Range 1. Live-fire training will commence or resume once the nene have moved outside the line of fire or behind the line of departure. Live-fire training will result in increased noise, smoke, risk of mortality from increased stress, or a direct strike, or shrapnel. However, we have determined that since live-fire can recommence once the nene have moved from the line of fire, that there is a risk of killing six nene if they are in close proximity to the round or they take flight as the round is fired.

As described in the project description of this Biological Opinion, the Army will implement pre-training survey protocols and training restrictions to minimize the potential for direct mortality of nene in the vicinity of Range 1. The Army has agreed to minimize the potential impacts to nene by conducting sweeps of the range from the firing point and walking the outlined polygon as delineated on Figure 5. If nene are present within the line of fire, training will be postponed until the birds move out of the line of fire. While not directly in the line of fire (i.e., survey polygon), nene sign has been observed in the surface danger zone for the Known Distance Range and the Squad Live-fire Exercise Range (Figure 5). In these areas the Army biologists will use a spotting scope to scan the surface danger zones of weapons to be used in the vicinity of Range 1 to see if nene are present. If nene are detected within any surface danger zones for a weapon used in the vicinity of Range 1, training will not begin until the nene depart. Furthermore, impacts to nene beyond the survey area are unlikely due to topography (aa lava, which is unattractive to nene). Additionally, troops training on Range 1 are under close supervision by their Non-Commissioned Officers, Range Safety Officers, and Officer-in-Charge. Therefore, due to the close supervision of the troops, and after taking into account the distance from the firing points to these outlying areas and topography, the probability of a nene being hit or killed from ammunition in this area is very low.

Other potential project impacts to nene

There is some potential that nene might incidentally ingest debris that remains after training, such as bullet casings. However, the potential that nene might encounter these materials is minimized by the Army's agreement that Range Control staff will check the area after each training event is completed to ensure that the sites used by nene are clear of all refuse. In general, ingestion of foreign material is not known to be a problem for nene, although one bird on Kauai died because its gizzard was impacted as result of lead poisoning from an unknown source (Banko et al. 1999, p. 23).

Training actions in the vicinity of Range 1 are likely to result in nene being startled during pre-training area sweeps due to increased noise and movement during training exercises. Nene may respond to the presence and activity of troops, increased noise, and live-fire training in a number of ways as described above, including physiological changes that increase metabolism, increased activity, and taking flight to avoid noxious stimuli. Monitoring by biologists may provide sufficient information to quantify these responses. The conservation measures the Army is implementing at Range 1 will minimize potential training impacts to nene. Monitoring Range 1 for the presence of nene will help determine temporal use patterns at this site, thereby providing expected periods of time when nene are unlikely to occur at Range 1. This information could be used to help select non-conflict times for live-fire training. Personnel will be educated about nene and the Endangered Species Act, which is expected to increase the vigilance of troops for nene in the vicinity of training activities. Additionally, reports of the presence of nene throughout PTA and reports of dead birds are expected to increase because of awareness by troops. The Army is undertaking efforts to attract nene away from Range 1 to a nearby, but safer site. Potential impacts to nene from training at Range 1 will be reduced if the project is successful. Support of a satellite transmitter study conducted by the U.S. Geological Survey and the National Park Service, movements of nene on the island of Hawaii, and information collected from this study can be used to develop enhanced nene minimization measures through adaptive management, or in future consultations.

Impacts of Activities on the Keamuku Maneuver Area to Nene

On the Keamuku Maneuver Area, nene are known to forage, loaf, and nest. Aviation drop-zone and brigade task force maneuver, construction, and fire suppression are proposed for this training area. Fire management program weather stations and dip sites will be installed and utilized within Keamuku Maneuver Area. Training and construction in the Keamuku Maneuver Area is expected to alter habitat, increase noise, increase human disturbance, and increase the potential for nene to be struck by vehicles and aircraft.

Potential impacts to nesting nene in Keamuku Maneuver Area include disturbance of nesting pairs and their goslings. Studies of the impacts of military training to nesting nene have not been conducted. However, several studies have examined the impacts of human activity and training near nesting sites of other wildlife taxa. Training and other activities could result in increased gosling mortality and nest abandonment. Numerous

bird studies have documented that nestling predation increases when anthropogenic disturbances result in nest abandonment (Anderson 1988; Piatt et al. 1990; Tremblay and Ellison 1979). A study by Côté and Beaudoin (1997, 614-617) demonstrated that wildlife offspring survival decreases when they are impacted by disturbance. Their study documented lower survival rates of mountain goat (*Oreamnos americanus*) kids separated from their mother during disturbance events caused by helicopter overflights or all-terrain vehicles; and when kids were separated from mothers during encounters with grizzly bears (*Ursus arctos*). When a predator threatens offspring but not the parent, the parent may face a trade-off between energy gain and offspring protection. In the case of Seychelles warblers (*Foudia sechellarum*), nest guarding by males brings a seven-fold decrease in egg losses to predation, but time spent nest guarding is time not spent provisioning young or self-feeding. Such trade-offs may impact the parents' body condition and future reproduction (Komdeur and Kats 1999). To avoid and minimize some of these potential impacts to nesting nene, the Army Natural Resource Staff will survey for nests and establish a no-go area when a nest is located. The no-go area will include a buffer of approximately 200 m (600 ft) around the nest to prevent inadvertent troop movement in the nesting area. Threats from mammalian predators and grazing ungulates will also be minimized by trapping and nest monitoring to determine actions that need to be taken to minimize impacts to these nests.

Goslings and adult birds could be struck by vehicles, as discussed in the Range 1 analysis. Additionally, the construction of roads may potentially lead to habitat fragmentation between nesting sites and areas for gosling rearing. Areas for gosling nesting are not always ideal for gosling rearing (Banko et al. 1999, p. 4). If nene are unable to access prime browsing areas or are required to expend more energy to reach prime browsing areas, habitat fragmentation could lead to decreased food availability and fitness. Furthermore, increased roadways are likely to result in increases in vehicular strike as nene may traverse the roadways more frequently. However, the implementation of conservation measures will minimize impacts to nene. Furthermore, the Army intends to translocate family groups to a suitable location, with the assistance of nene experts. Based on the Army conservation measures, we believe the impacts of Army training actions on the Keamuku Maneuver Area are minimal.

Military training activities could potentially increase the risk of fire within the Keamuku Maneuver Area. Fire is especially dangerous during molting when juveniles and adults are flightless. Fire also poses a significant threat to goslings before they are flighted. The Army's Wildland Fire Management Plan is being updated to incorporate fire suppression resource staffing procedures, training restrictions based on calculated fire danger, and installation and maintenance of dip sites, fuel modifications, and weather stations within the Keamuku Maneuver Area to minimize fire impacts to nene. Most important, there is no live-fire within the Keamuku Maneuver Area so the risk of fire is greatly minimized. On the other hand, vegetation regeneration after a fire can provide ideal foraging and nesting opportunities for nene (Misajon 2008, pers. comm.).

In summary, training related activities on the Keamuku Maneuver Area could result in disturbance of nesting patterns due to training noise and activity, increased habitat

fragmentation from the creation of roads, and increased fire frequency. Thorough surveys of the Keamuku Maneuver Area for nesting nene will be the first systematic survey in this area. Results from the survey (number of pairs nesting) will help determine if this site has been used historically, and help determine its relative importance for nene recovery on the island of Hawaii. The implementation of predator control and ungulate control at nest sites will increase the likelihood of successful nesting. Nest monitoring by remote camera will help determine the date of nest failure, and also could be used to examine time budgets of nesting pairs at this site. Translocation of broods to sites with ongoing management will increase the likelihood that goslings will fledge, and will decrease the likelihood that they would select the Keamuku Maneuver Area nesting purposes in the future. Additionally, translocation of family groups will decrease any impacts that could occur after gosling hatching, such as family group separation, lack of suitable foraging habitat and mortality from fire.

Summary of impacts to Nene from Training and Construction at PTA

For the life of this Biological Opinion (2.5 years), for training actions at PTA, we anticipate up to six nene may be incidentally taken in the form of mortality or injury. Troop, aircraft and vehicle movement, along with weaponry fire and other training related noises, have the potential to startle and otherwise harass nene. As discussed previously for other wildlife species, nene may not habituate to training related actions. Because of their naïveté to predation, and reduced response to threats, nene may not react to training related activity in a manner that decreases the risk to them. Harassment from military training activities may lead nene to expend energy unnecessarily in reaction to the training activities. This harassment may lead to decreased nene fitness and reproductive potential.

Project Impacts to Hawaiian Hoary Bats

Currently, Army fences at PTA have a top strand of barbed wire which is known to entangle and kill Hawaiian hoary bats (Mansker 2008e, pers. comm.). There are 45 km (28 mi) of Natural Resource Program fences and 8.6 km (5.4 mi) of security fences with barbed wire at PTA. These fences traverse a variety of habitats including forested areas and open grasslands.

Existing data suggest bat mortality from barbed wire fences is low. For example, on Maui, 12 bats were caught on the 52 mi (84 km) Puu Pahu fence surrounding Haleakala Crater at Haleakala National Park, between 1986 and 2004 (1.3 bats/161 km (100 mi) of fence/year) (Jeffrey 2007, pers. comm.). Most of this fence was constructed in open grasslands and all of the bats were caught in open areas. No bats were caught in forested areas. In Hawaii Volcanoes National Park and in the Tri-Mountain Alliance areas of the island of Hawaii, between 1995 and 2007, two bats have been observed entangled in barbed wire along 47 km (29 mi) of fence (0.6 bats/161 km (100 mi) of fence/year) (Jeffrey 2007, pers. comm.). Recent bat surveys at Hakalau Forest National Wildlife Refuge by Frank Bonacorso U. S. Geological Survey-Biological Resources Discipline detected high densities of bats. Between 1987 and 2007, with monthly fence inspections, no bats were known to have been caught on 71 km (44 mi) of fence line (0.0 bats/161 km

(100 mi) of fence/year) (Jeffrey 2007, pers. comm.). For the three month period between August first and the end of October 2008, The Nature Conservancy reported three dead Hawaiian hoary bats on the top barbed wire strand on their hog wire fences at Kona Hema Preserve (Marshall 2008, pers. comm.).

On PTA, a chance detection during routine fence maintenance inspections resulted in the documentation of one Hawaiian hoary bat mortality as a result of barbed wire fence entanglement. Previously, this type of take was considered unlikely to occur and was not considered in the 2003 Biological Opinion. There is the possibility additional bats could become entangled. The fences at PTA have not been monitored consistently so the duration or total number of bats that potentially may be taken is unknown. Therefore, we based our take estimate on the most conservative estimates of known bat mortality due to barbed wire fences (see Haleakala National Park data above). We estimate one bat will be taken due to barbed wire fences at PTA during the 2.5 year duration of this Biological Opinion. We arrived at this estimate of take using the following formula: 53 km (33.4 mi) of barbed wire fence at PTA x 1.3 bats taken per 161 km (100 mi) of fence x 2.5 years.

In order to minimize the impact of existing barbed wire to Hawaiian hoary bats, the Army will implement the following actions:

- The Army maintains all existing Natural Resource Program fences. Many of these fences are in need of upgrades, repairs, or replacement. As the Army modifies these fences, they will remove any existing barbed wire.
- No new barbed wire will be installed.
- The fencing modifications will be completed by 2018.

We expect these actions will reduce take of the bat in the long-term (the projected fence completion date is 2018). However, we estimate one bat will be taken during the duration of this Biological Opinion because at least one bat has been entangled on a barbed wire fence on PTA and we do not expect take of Hawaiian hoary bat from other actions reviewed in this Biological Opinion. All other actions reviewed in the 2003 biological opinion remain the same.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur within the area of action subject to consultation. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed action. In 2008, as a result of being struck by vehicles, three nene deaths occurred on the Mauna Kea Access Road that leads to the summit of Mauna Kea. The Service is unaware of any other future State, local, or private actions that are reasonably certain to occur within the action area covered in this Biological Opinion and that would not be subject to consultation under Army section 7 of the Act.

CONCLUSION

After reviewing the current status, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the proposed action discussed herein is not likely to jeopardize the continued existence of any species (*Asplenium fragile* var. *insulare*, *Silene hawaiiensis*, *Solanum incompletum*, Hawaiian hoary bat or nene) covered in this Biological Opinion. This conclusion is based on the following factors:

1. The Service anticipates that the direct and indirect effects of the proposed action will result in take of nene in the form of death, injury and harassment. However, the adverse effects of the proposed actions will be minimized by avoidance and minimization measures, monitoring, research, attracting nene away from danger zones and protecting nesting nene and their goslings.
2. Eighty-six individuals of *Silene hawaiiensis* occur within the footprint of the Red Leg Road widening project and the plant occurs in 175 locations within the surface danger zone for convoy live-fire training in Training Area 21. The road improvement project is likely to adversely affect all 86 individuals; however, this impact was already analyzed in the 2003 Biological Opinion. At Training Area 21, a 6-m (20-ft) tall aa lava flow serves as a backstop for rounds which miss the targets, which may also help minimize the likelihood of a stray round hitting or killing a *S. hawaiiensis* plant during training. We have determined that in the worst case scenario, all plants occurring within the Training Area 21 surface danger zone may be lost as a result of training and plants may not regenerate in this location. The Army's fencing and ungulate removal project for Training Area 21 will benefit this species by removing grazing pressure from feral ungulates.
3. The Service anticipates that the direct and indirect effects of the proposed action will result in take of Hawaiian hoary bats in the form of death and/or injury of one Hawaiian hoary bat over the two-and-a-half-year term of this Biological Opinion. However, as stipulated in the 2003 PTA Biological Opinion, the adverse effects of the proposed actions will be minimized by such measures as the construction of 9,307 ha (23,000 ac) of new fence units, removal of ungulates, implementation of the Wild Land Fire Management Plan, inclusion of Hawaiian hoary bat conservation and management into the Implementation Plan, and monitoring Hawaiian hoary bat presence and abundance.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations promulgated pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

Over the 2.5-year term of this Biological Opinion, based on the proposed project description and the analysis of the effects of the proposed action provided above, the Service anticipates the following take may occur as a result of the proposed action:

1. As a result of training related activities on the installation, nene may be incidentally taken in the form of harassment; and up to six nene may be incidentally taken in the form mortality or injury.
2. One Hawaiian hoary bat may be incidentally taken in the form of form mortality or injury as a result of entanglement in barbed wire fences.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in extinction or a reduction of opportunity for Hawaiian hoary bat or nene.

Reasonable and Prudent Measures

The reasonable and prudent measures given below, with their implementing terms and conditions, are designed to minimize the impacts of incidental take that might otherwise result from the proposed actions. If, during the course of the action, the level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review the reasonable and prudent measures provided. In addition, the action that caused the taking must cease; the action agency must immediately provide an explanation of the causes of the taking; and must review with the Service the need for possible modification of the reasonable and prudent measures. The following reasonable and prudent measures are necessary and appropriate to minimize

the effect of take on nene and Hawaiian hoary bat. The measures described below are non-discretionary and must be implemented.

1. The Army shall minimize the potential for harassment, harm, or mortality of nene.
2. The Army shall minimize impacts to the Hawaiian hoary bat and its habitat.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Service and any subsequent project applicant must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following terms and conditions implement reasonable and prudent measure number one.

- 1.1 All biological and species status reporting will occur as described as stipulated in the Conservation Measures of this Biological Opinion. In addition, the Army will provide the Service with an annual report summarizing nene use of Range 1 and the Keamuku Maneuver Area.
- 1.2 A nene survey protocol for Keamuku Maneuver Area will be developed within 30 working days of the issuance of this Biological Opinion.
- 1.3 The Army will continue to work with the Service pursuant to the Pohakuloa Implementation Plan to adaptively manage and minimize impacts to nene from training at PTA and the Keamuku Maneuver Area.
- 1.4 Dead nene will be sent to Dr. Thierry M. Work at the National Wildlife Health Center, Honolulu Field Station (U.S. Geological Survey-Biological Resources Discipline) for a necropsy. The method of shipment and preservation will be determined in coordination with Dr. Work.
- 1.5 Should there be a take of a Hawaiian hoary bat, the depository designated to receive specimens that are found is the B.P. Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii, 96817 (telephone: 808/847-3511). If the B.P. Bishop Museum does not wish to accession the specimen, contact the Service's Division of Law Enforcement in Honolulu, Hawaii (telephone: 808/861-8525; fax: 808/861-8515) for instructions on disposition.

The following terms and conditions implement reasonable and prudent measure number two.

- 2.1 Monitoring fences for Hawaiian hoary bat entanglement will occur quarterly and will include a visual inspection of all fences with barbed wire.

2.2 The Army should prioritize removal of barbed wire from fences in open areas where bats are most likely to become entangled.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as suggestions from the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibilities for these species.

1. The Army is currently implementing a Hawaiian hoary bat habitat use study on the PTA. The study will be comparable with ongoing U.S. Geological Survey-Biological Resources Discipline studies on the island of Hawaii. These studies will better define bat movement between habitats. The Army should coordinate with the Service to work with local land owners and other conservation agencies to remove barbed wire from fences while still conducting ungulate control in areas that are determined to be important for bat movement, roosting, and foraging.
2. The Natural Resources Staff should work with appropriate Army individuals to design and install security fencing without barbed wire in areas that are determined to be important for bat movement, roosting, and foraging.
3. The Natural Resources Staff should complete a comprehensive survey of all habitat for the presence of nesting or flocking nene in the Keamuku Maneuver Area to fully evaluate nene use of the parcel.

REINITIATION-CLOSING STATEMENT

This concludes formal consultation on this action. As required in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation.

As stated in the Conclusion (above), the Service's finding of non-jeopardy is based in large part on the conservation measures built into the project by the Army. Should there be a failure to carry out any or all of the described measures, or if the measures are not effective, or if these measures are modified in any way without Service coordination, reinitiation of consultation will be required. If you have any questions regarding this Biological Opinion, please contact Dr. Jeff Zimpfer at (808) 792-9400.

Sincerely,

A handwritten signature in blue ink that reads "Patrick Leonard". The signature is written in a cursive style with a long, sweeping underline.

Patrick Leonard
Field Supervisor

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