

## 4.9 BIOLOGICAL RESOURCES

The methods and significance criteria used to determine the level of impact from proposed project scenarios on biological resources are described in this section. The analysis of the intensity and extent of impacts on listed or sensitive species that would result from routine training activities incorporates the results of past and present Section 7 ESA consultations with USFWS (USFWS 1999d, 2001a, 2003c, 2004, 2007b, and 2008). The Army consulted with NOAA Fisheries for Section 7 ESA consultations on the potential effects of routine training activities on marine species protected by the ESA and MMPA, and the movement of troops to PTA for SBCT training. The Army has received concurrence letters from NOAA Fisheries stating that the actions were not likely to adversely affect biological resources at MMR (NOAA Fisheries 2006, Appendix H-3) and during transport to PTA (NOAA Fisheries 2003). The Army has also completed Section 7 consultation with the USFWS on the effects of the preferred alternative on listed species and critical habitat. The USFWS concluded that implementing the preferred alternative was not likely to jeopardize the continued existence of any species or to adversely modify or destroy designated critical habitat covered in the BOs (USFWS 2007b and 2008, Appendix H-1, and Appendix H-2).

This section evaluates impacts on the biological resources within the ROIs of MMR and PTA, as described in Chapter 3, Affected Environment. These resources include vegetation communities and vegetation, marine and terrestrial wildlife, sensitive vegetation species, critical habitat, sensitive wildlife species, sensitive habitats, and BSAs.

Terms used in this document to describe vegetation and wildlife species that have been introduced to Hawai'i include nonnative and invasive. Invasive species are typically nonnative (introduced) species with biological characteristics that cause them to be particularly detrimental to native species and habitats.

A discussion of wildfires and wildfire impacts and an overview of the IWFMP are provided in Section 4.14.

### 4.9.1 Impact Methodology

Potential direct and indirect impacts on biological resources were analyzed for terrestrial and aquatic ecosystems within the ROIs. Biological resources include general vegetation and wildlife resources, along with sensitive species, biologically sensitive areas, designated critical habitat, and regulated habitats, such as the Hawai'i Natural Area Reserve System and forest reserves.

Direct impacts on biological resources result when biological resources or critical habitats are altered, destroyed, or removed during the project. Indirect impacts may occur when project-related activities result in environmental changes that indirectly influence the survival, distribution, or abundance of protected or native species (or increase the abundance of undesirable nonnative species). Examples of indirect impacts may include effects of noise, presence of chemical contamination, or incidence of human activity levels that may disturb or harm wildlife. It is also possible to have beneficial impacts. Potential impacts on biological resources were addressed by the following methods:

- Examining the types of training proposed in each location to determine the potential for impacts on these resources;
- Comparing biological resource locations to the physical locations of the proposed training to determine potential direct and indirect impacts on these resources; and
- Addressing existing biological resource management plans and practices and their relation to the proposed training activities.

The sensitivity of biological resources is a factor in impact analyses and significance evaluations. Sensitivity of a resource can be based first on its designation by federal and state resource agencies, such as USACE (designation of jurisdictional wetlands), USFWS, or NOAA Fisheries. It can also be based on any known or presumed regional sensitivity of the resource or on any known or presumed local significance of the resource (see Section 4.10 for a discussion of cultural significance). Sensitivity for certain bird species is also based on EO 13186 (66 FR 3853, January 10, 2001), which requires that all federal agencies taking actions that have or are likely to have a “measurable negative effect on migratory bird populations” to develop a memorandum of understanding with the USFWS to “promote the conservation of migratory bird populations.” The memorandum of understanding between the Army and the USFWS became effective on July 31, 2006.

Specific potential impacts on biological resources were based on the following considerations:

- Relative importance or value of the resource affected, such as its legal, commercial, recreational, ecological, or scientific value;
- Proportion of the resource that would be affected relative to its occurrence in the region;
- Sensitivity of the resource to the proposed training activities;
- Anticipated physical extent of the potential impact; and

- Anticipated duration of the ecological ramifications of the potential impact.

Analysis of potential impacts on marine wildlife in this section involved assessing acoustic and visual disturbance impacts on marine species in the MMR ROI and was based on scientific studies (where available), consultation, and results from a noise modeling study initiated by the Army (Marine Acoustics 2005). This study is found in Appendix G-5. It models MMR live-fire training and CALFEXs and assessed acoustic impacts on marine wildlife. The modeling study includes specific information on received noise levels of all the ordnance to be used at MMR. The modeling study was undertaken because it is known that marine animals react to additional noise in their environment, including impulse noise that may result from motorized aircraft engines (Richardson et al. 1995). Various studies have assessed (and some have quantified) the impact of nonlethal human-induced disturbance, such as that caused by acoustic noise, on the behavior and reproductive success of animals (Frid and Dill 2002).

Marine wildlife are also known to react adversely to visual intrusions from aircraft (Patenaude et al. 2002; Mullin et al. 1991, as cited in Richardson et al. 1995). Marine mammal species tend to startle at shadows, especially those from above (Mullin et al. 1991, as cited in Richardson et al. 1995). Hawaiian spinner dolphins are known to be more sensitive to aerial disturbance than other species (Norris 1991) and have been known to dive abruptly when aircraft are overhead (Wursig, as cited in Richardson et al. 1995).

The MMR modeling study quantifies site-specific received noise levels at various sites adjacent to MMR. The offshore sites were chosen to represent likely locations of spinner dolphins and other marine mammals. The noise levels were evaluated to determine the effects of discrete noise sources on marine wildlife. The noise sources considered were explosive detonations, explosive weapon firing, and helicopter overflights. As detailed at length in Appendix G-5, the study compared the received noise levels from these various sources to criteria established to represent Level A and Level B harassment, which is defined by the MMPA. Appendix G-5 includes a discussion and explanation of the thresholds used to define harassment and provides additional details on the analysis. The impact assessments in this EIS are based also on the information provided in this addendum.

The acoustic modeling study found that marine wildlife in the project area would not be subject to Level A or Level B harassment from noise generated by project actions. Neither the in-water explosive nor the in-air

harassment threshold for pinnipeds used by NOAA Fisheries was ever approached by the modeled noise levels that would be generated during military training. Additionally, the model found that all helicopter activity would generate noise only slightly above ambient levels, whether the receptors were on the beach or in the water.

The in-water noise levels for each of the three major sources assessed had the following maximum dB levels: 143 dB from explosive detonations, 129 dB from weapon firing, and 88 dB from helicopter overflights (Marine Acoustics 2005). These findings will be reassessed and compared to the results of the direct hydrophonic noise study when it is completed.

The Army conducted a marine resources study at MMR in 2006/2007. Based on the collected data, the study determined that the marine resources (fish, limu, shellfish, and other resources) near Mākua Beach and in the Mākua *muliwai* on which area residents rely for subsistence are not contaminated by substances associated with training at MMR (US Army 2007c).

The marine portion of the PTA ROI involves the nearshore and offshore Pacific waters between O‘ahu and the Island of Hawai‘i, the Pearl Harbor area of O‘ahu, the Kawaihae Harbor area of the Island of Hawai‘i, and adjacent coastlines to the harbors (US Army and USACE 2004). Marine habitat was considered because there would be a small increase in vessel transport of troops back and forth from O‘ahu and the Island of Hawai‘i that would be specifically for CALFEX training and not in conjunction with SBCT training. Portions of this route are within the Hawaiian Islands Humpback Whale National Marine Sanctuary waters.

In 2003, informal ESA consultation was initiated with NOAA Fisheries regarding the transformation of one of the two Legacy brigades of the 25th ID(L) to a SBCT. NOAA Fisheries concurred with the Army that slow speeds (less than 11 knots) of the LSV would make collisions with protected species unlikely, and therefore, not likely to adversely impact such species. Based on their assessment, a small increase in LSV requirements would not pose a risk to protected species as long as vessels adhere to the slow speeds.

#### **4.9.2 Conservation Programs**

The management of natural resources on MMR and PTA is mainly based on the MIP and PIP and the requirements of the existing BOs. These implementation plans have been developed in cooperation with the USFWS and others. These plans are discussed in further detail below.

The INRMP, IWFMP, MIP, and PIP establish measures reducing the magnitude of impacts on biological resources from training activities and operations. Under the No Action Alternative, the INRMP, IWFMP, and MIP would be implemented at reduced levels.

### ***Mākua Implementation Plan***

The MIP is a comprehensive species and habitat conservation plan for species relative to military training activities in Mākua Valley. The goal was to develop a biologically based plan for stabilizing specific species that occur at MMR. The plan outlines protective measures so that these species are not jeopardized by military training following USFWS consultation. The recently completed Section 7 consultation with the USFWS included an analysis of the MIP, which prioritizes the management of habitat and populations with the greatest likelihood of success for achieving stabilization. The completed 2007 ESA Section 7 consultation with the USFWS included an analysis of the MIP, with which the USFWS concurred. The MIP includes provisions for 28 federally listed plants and one listed land snail, *Achatinella mustelina*. The Mākua Implementation Team (MIT) is in charge of writing and overseeing implementation of the plan using an adaptive management strategy, which allows the plan to be modified based on monitoring results on an ongoing basis.

The objectives for species stabilization are as follows:

- Establishing three (or in a few cases, four) wild on- and/or off-site populations of each species with an adequate number of mature reproducing individuals and juvenile age classes, sustained over time;
- Achieving expedited stabilization of 12 plant taxa that are at greatest risk from training impacts;
- Controlling major threats to the populations; and
- Collecting viable and genetically diverse off-site backup storage for select species.

The MIP contains the following:

- Summary of the current distribution and status of the target species;
- Identity of population units that can be successfully stabilized;
- Strategies to reduce or eliminate impacts of nonnative species and other threats on target species and their habitats;

- Methods to stabilize species;
- Step-down narrative of process to decide when and how to supplement target species and populations through outplanting (relocating propagated plants to native-dominated or natural habitat);
- Protocols to eliminate the introduction of pathogens or pest species when outplanting;
- Measures to evaluate short-term, medium-term, and long-term success of the stabilization efforts; and
- Schedule for completion of implementation actions and a cost estimate for implementation of each identified action.

The Army is in the process of developing and implementing a comprehensive monitoring program to assess the biological and compliance goals of the MIP.

The MIP focuses its action on groupings of species called population units (PUs) and priority management units (MUs). Population units are individuals of a target species that occur at a discrete site and are believed to function as a single biological population. Priority MUs contain at least one PU and are designated for active management of habitat. MUs are sites of intensive management and include management strategies to minimize harmful effects of human activity. Most MUs (21) are in the Wai‘anae Mountains, and two are in the Ko‘olau Mountains. These MUs are on land held by the state, the federal government, and various corporations or individuals. The total area proposed for priority management is 2,307 acres (933.6 hectares). Within these MUs, at least 92 populations will be stabilized. Included in the management approach are actions such as fencing for ungulate control, weed control, fuel management, seed or cutting collection, management of pest species (rats, cats, slugs), outplanting, and monitoring.

The MUs themselves are diverse areas of high-quality habitat. Each MU is designed to provide sufficient area for stabilizing all in situ and reintroduced PUs within the MU. Some of the MUs are large (‘Ōhikilolo, Mount Ka‘ala, Central and East Makaleha) and contain numerous species for stabilization, while others are small units (Kea‘au) that contain only one or two target species. The larger MUs were designated to include the following:

- Relatively high densities of in situ PUs of target species;
- Large areas of relatively intact native-dominated vegetation as habitat for both *in situ* populations and reintroductions; and
- Locations in areas accessible for management.

The largest MUs are divided into subunits for easier monitoring, and the smaller MUs were designated to assist more isolated PUs or to provide reintroduction sites that meet the distance and habitat criteria outlined in the MIP.

Many of the MUs occur at elevations below 2,500 feet (762 meters), where most native ecosystem loss has occurred, and so include some areas of nonnative-dominated habitat that will require selective habitat restoration. Some of the MUs are geographically discrete and border land not included in the management actions, while others are immediately adjacent to each other and separated by boundary fences (Figure 4.9-1). These MUs provide a large contiguous landscape of habitat for the endangered species, but each MU is managed independently.

MU management strategies include actions to eliminate threats and to encourage regeneration of target species. While each species has specific habitat needs and threats, the threats often apply to all or most of the species requiring stabilization; for example, browsing by feral pigs, goats, and cattle (large feral mammals), competition with nonnative weeds, seed predation by rats, and nonnative insect infestation. Initial MU management includes surveys and assessment of threats to determine the level of management actions to be applied. The Army must develop, and the MIT and USFWS must approve, separate management plans for each type of threat in each MU. The MIP outlines a series of actions to control weeds and to remove feral mammals in the MUs. Weeds generally are controlled or removed; large feral mammals often are removed by fencing and eradication. This applies to all levels of PU management, except the lowest baseline management. PUs with the lowest baseline management are managed as collection sites for genetic storage. Baseline management includes monitoring, ungulate management (as needed), weed management (as needed), control of other threats (as needed), and collection of genetic material for storage. The highest level of PU management designation determines the level of weed control in an MU or MU subunit.

In addition to large feral mammals and weeds, other threats are small mammals, snail predators, other nonnative invertebrates, human impacts, fire, and erosion. Small mammals are usually controlled with toxicants and trapping. This type of threat management will be concentrated in the PU



The Mākuā Implementation Plan includes provisions for 27 federally listed plants and one listed animal located within 23 priority management units.

**Legend**  
 - - - Existing Fence Line  
 ■ Priority Management Unit  
 — Major Road  
 □ Ownership and/or Land Use Boundary

**Mākuā Implementation Plan Priority Management Units**  
 Mākuā Military Reservation  
 O'ahu, Hawaii

**Figure 4.9-1 Mākuā Implementation Plan Management Units**

areas and in reintroduction sites where the species has displayed sensitivity to small mammal predation. *Euglandina rosea* is the primary threat to the native snail (*Achatinella mustelina*), and monitoring and controlling this pest is important wherever it is found. Similar monitoring and control protocols are proposed for slugs and a nonnative predatory flatworm. Specific management tools are not yet determined for insect pests that are particularly damaging to native plant species. These pests include the two-spotted leafhopper (*Sophonia rufofascia*), black twig borer (*Xylosandrus compactus*), and Chinese rose beetle (*Adoretus sinicus*). Control methods may include applying a systemic pesticide to individual plants, but more research is needed to determine the effects of these pesticides on native invertebrates. The MUs must tolerate some level of human presence, but signs will be used to identify the locations of in situ and reintroduced populations, and some areas will be restricted.

Fire is the most devastating of the threats facing the MUs and target species (MIT et al. 2003). The goal of fire control is to reduce the threat to zero or to minimize the threat in fire-prone areas. For those MUs designated as high risk, fire planning and management programs are crucial to ensure the success of the stabilization efforts. A comprehensive fire management plan (similar to the IWFMP) will be developed to cover issues common to all MUs, although separate supplements will be included to address issues specific to the high-risk units. These wildfire management supplements are separate from the IWFMP, which concerns only fire management activities on Army training lands.

Erosion control options are limited and will be carried out only when target species are imminently threatened. Removing the large feral mammals will significantly reduce erosion.

Negotiations for managing and reintroducing the target species on private, federal, and state property are ongoing. Landowner responsibility includes allowing access to Army personnel to conduct stabilization actions. Landowners would not be responsible for maintaining any of the fences or enclosures on their properties. In return, the Army is responsible for funding and undertaking all actions outlined in the MIP, including preparing all appropriate legal documents, honoring lease or land agreements between the landowner and lessees, and assuming liability for actions associated with management actions.

Creation of the MIP has been achieved only through cooperation among federal and state agencies and landowners. Implementing this plan would comply with the USFWS directives established in the 2007/2008 BOs 1999 BO and would lead to stabilization of the affected species.

***Pōhakuloa Implementation Plan***

The draft PIP, which was completed in May 2008, outlines the management actions necessary to ensure the long-term survival of endangered species at PTA and is designed to assure proper conservation of species as construction and use of ranges and facilities occur. The PIP was prepared to guide conservation efforts that will result in the conservation of federally listed threatened and endangered plant and animal species and Palila Critical Habitat that could be affected by military training activities at PTA on the Island of Hawai'i. In addition, monitoring protocols were developed for each species to evaluate success of these management actions. Major management actions identified in the PIP include propagation and outplanting, weed control, survey protocols for flora and fauna, rodent control, ungulate control, large-scale fencing, invasive invertebrate control, and an incipient weed program. The majority of actions are planned on Army lands.

Objectives and tasks of the PIP include:

- Management and monitoring protocols for the conservation, augmentation, and reintroduction of listed plant species on PTA;
- Invasive plant, rodent, and invertebrate management to reduce and control the threats from nonnative species and enhance habitat quality;
- Survey methodology for the three endangered bird species that occur at PTA including the 'io, nēnē, and the Hawaiian dark-rumped petrel;
- Hawaiian hoary bat conservation plan to include survey and monitoring methodology, and enhancement and restoration of habitat; and
- Feral ungulate removal and establishment and maintenance of ungulate-proof fencing.

***Integrated Training Area Management***

The ITAM program is the Army's formal strategy for ensuring the sustainable use of training and testing lands. The intent of the ITAM program is to systematically provide uniform training land management capability across USARHAW and to ensure that the carrying capacity of the training lands is maintained over time. The Army manages its lands to minimize loss of training capabilities in order to support current and future training and mission requirements. The integration of stewardship principles into training land and conservation management practices

ensures that the Army's lands remain viable to support future training and mission requirements. ITAM integrates elements of operational, environmental, master planning, and other programs that identify and assess land use alternatives.

The ITAM program also supports sound natural and cultural resources management practices and stewardship of its land assets, while sustaining land attributes to support training, testing, and other installation missions. These management requirements are as follows:

- Integrate training requirements with training land management;
- Annually monitor and analyze resources and ranges;
- Repair and maintain training land;
- Enhance mobility, maneuverability, access, and availability in training areas; and
- Train Soldiers in sustainable range awareness to minimize training land damage.

These requirements apply to all training areas.

#### ***Integrated Natural Resource Management Plan***

Guidance on biological resources includes conservation and restoration measures. The USARHAW Natural Resource Environmental Management Program fosters responsible management of Army lands to ensure long-term natural resource productivity, helping the Army achieve its mission. The program is described in the INRMP (USARHAW and 25th ID[L] 2001b & 2001c). These documents outline the steps the Army has taken and continues to take to fulfill its obligation as a federal agency to help in the management of natural resources, and recovery of ESA species and other species and habitat recognized by federal regulations.

#### ***Integrated Wildland Fire Management Plan***

An IWFMP has been developed for O'ahu and PTA that would greatly reduce the likelihood of fire outbreak as a result of training. For PTA, the IWFMP SOPs include, but are not limited to the following actions: establishment and maintenance of fuel breaks, fire breaks, and fuel management corridors; dip tanks; suppression measures; and implementation of a Fire Danger Rating System. Implementation of the IWFMP is a requirement per PTAs 2003 BO. The MMR and PTA SOPs of the IWFMP is being revised and will outline the Fire Danger Rating System, revised weapons restrictions, new NWCG qualifications standards and helicopter staffing requirements, fire equipment requirements, new firebreak and fuelbreak installation and maintenance standards, fire

reporting responsibilities, and fire prevention, detection, and suppression standards. This will minimize the risk of resource damage from training-related wildland fires at MMR, as outlined in the project description of the 2007/2008 BOs. According to the requirements of the 2007 BO, the Army would coordinate with the USFWS if a fire due to military activities or actions occurs outside of any of the firebreak roads established at MMR.

### **Army Compatible Use Buffers**

Another program that is applicable to all alternatives is the continued use of the ACUB program to support the acquisition and protection of lands and resources throughout Hawai‘i.

The conservation of natural resources associated with the purchase of properties may contribute significantly to offsetting cumulative impacts on natural resources. The development of a management plan and implementation of conservation and management measures to benefit listed species and other native species and critical habitat provide an unprecedented contribution to the recovery of listed species and the sustainability of natural resources to support all native wildlife and plant species.

The areas purchased on O‘ahu to date include Waimea Valley, Moanalua Valley, and Pupukea Paumalu. The Army may continue to fund the ACUB program and to conserve additional significant natural resources. For example, Waimea Valley will be used for offsite storage of rare tree species found at MMR and Moanalua Valley will be used for management of the O‘ahu Elepaio.

### **4.9.3 Factors Considered for Determining Significance of Impacts**

Most impacts on highly sensitive resources are considered significant by definition, while determining significance for impacts on resources of moderate and low sensitivity depends more on site-specific factors (such as the habitat quality and population size), as well as the nature, local significance, and extent of the anticipated impact. For example, impacts on moderately sensitive resources may be considered significant if the anticipated impact were to reduce the population or distribution of a species of special concern.

Factors considered in determining whether an alternative would have a significant impact on biological resources for plants, terrestrial wildlife, and ESA-listed marine wildlife species include the extent or degree to which its implementation would result in the following:

- Cause the “take” of a highly sensitive resource, such as a threatened and endangered or special status species, where take of

an ESA-listed species is defined under the ESA as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (50 CFR 17.3). The term “harass” is defined as an “intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering” (50 CFR 17.3). “Harm” is defined as an act “which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering” (50 CFR 17.3);

- Result in a jeopardy BO by the USFWS or NOAA Fisheries;
- Reduce the population of a sensitive species, as designated by federal and state agencies, or a species with regional and local significance. This can happen with a reduction in numbers, alteration in behavior, reproduction, or survival, or by loss of or disturbance to habitat;
- Have an adverse effect on a wetland or riparian habitat regulated by the local, state, or federal government, or on another sensitive habitat (such as designated critical habitat) identified in local or regional plans, policies, or regulations or by the USFWS or NOAA Fisheries;
- Interfere with the movement of any native resident or migratory wildlife species (including aquatic species) or with established native resident or migratory wildlife corridors;
- Alter or destroy highly valuable to moderately valuable habitat and prevent biological communities in the area from reestablishing themselves after habitat is disturbed;
- Introduce or increase the prevalence of undesirable nonnative species; or
- Cause long-term loss or impairment of a substantial portion of local species-dependent habitat.

Factors considered in determining whether an alternative would have a significant impact on marine mammal species protected under the MMPA but not the ESA include the extent or degree to which its implementation would result in the following:

Cause a take of an MMPA-protected species as defined under the FY 2004 Defense Authorization Act (HR 1588), where an animal is taken if it is harassed, and where harassment is defined as “(i) any act that injures or

has the significant potential to injure a marine mammal or marine mammal stock in the wild or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered” (section 315(f) PL 107–314; 16 USC 703 note);

- Reduce the population of an MMPA species, which can happen with a reduction in numbers, abandonment of the habitat, alteration in behavior, reproduction, or survival, or loss of or disturbance to habitat;
- Interfere with the movement of any native resident or migratory marine wildlife species or with migratory marine wildlife corridors;
- Alter or destroy highly valuable to moderately valuable habitat and prevent marine biological communities utilizing this habitat from reestablishing themselves after the habitat is disturbed; or
- Cause long-term loss or impairment of a substantial portion of local marine species-dependent habitat.

An impact is considered significant but mitigable if the result of the proposed project would have a significant impact on biological resources, but mitigation measures associated with the project would reduce the level of impact to below significant levels.

#### **4.9.4 Summary of Impacts**

Military training at MMR would have an overall adverse impact on biological resources. Impacts would include the spread of nonnative species and the degradation of habitat as a result of fire, as well as direct and indirect impacts from training.

Generally, as the level and frequency of training increases across the four MMR alternatives so does the magnitude of impacts on biological resources. The proposals progress from no live-fire training under the No Action to training at reduced capacities under Alternative 1 to training at full capacity under Alternatives 2 and 3, and from some live-fire restrictions under Alternatives 1 and 2 to fewer restrictions under Alternative 3. Under the No Action and Alternatives 1, 2, and 3, the significant impacts on sensitive species and habitat are mitigable, except for those resulting from wildfires and from the spread of nonnative species. Noise, runoff, and disturbance to sensitive terrestrial and marine species from activities conducted under the No Action would be less than significant or have no effect. As the frequency of wildfires and the

potential for wildfire increases, ranging from Alternative 1 through Alternative 3, so does the potential for wildfire-related impacts on biological resources and sensitive species. Impacts on sensitive terrestrial species and habitat from aircraft remain less than significant. Also significant and mitigable under Alternatives 1, 2 and 3 are impacts on sensitive terrestrial species and habitat from ground training. Less than significant impacts are expected to marine wildlife and coral ecosystems from runoff under Alternatives 1 through 3. Based on the acoustic modeling conducted (see Appendix G-5) and based on the use of the most current thresholds (as discussed with and approved by NOAA Fisheries), there would be no noise-related impacts on any marine species, either ESA-listed or MMPA-protected, from the proposed activities analyzed in this EIS. Impacts on marine wildlife from aircraft and from ground training are less than significant under Alternatives 1 through 3.

Alternative 4 at PTA is a unique situation regarding potential impacts. The impact analyses for the SBCT at PTA were addressed in NEPA documents and ESA Section 7 formal consultation. The ROI for the SBCT encompasses the ROI for the Alternative 4. However, the additional impacts on the land that would result from CALFEX training pose threats to sensitive resources that were not addressed and separate ESA Section 7 analysis would be required.

Under NEPA, the Army would employ the following mitigation measures for PTA to minimize the impacts of the SBCT, which would also prove beneficial within the ROI of Alternative 4:

- Prevent any weeds brought in from becoming established by rigorously monitoring using transects, roadside surveys, and eradicating new weeds using the most effective means for each specific invasive species;
- Provide USFWS-approved education regarding cleaning vehicles and field gear;
- Wash vehicles in wash rack facilities prior to returning from the training areas, to minimize the spread of weeds (e.g., fountain grass); and
- Train and require Soldiers to clean their gear and vehicles when first arriving in Hawai‘i and prior to moving from installation to installation, as well as when moving from island to island.

These measures, coupled with the requirements for invasive plant and animal control pursuant to the PIP and BO, would significantly reduce the potential impacts of invasive species that could result from mission activities within the Twin Pu‘u range and associated SDZ. The greatest

threat for enhancing the spread of invasive plant species within the PTA ROI is fire.

Fire control and prevention measures are thoroughly discussed in the IWFMP and the PTA SOP of the IWFMP. Implementation of the IWFMP and associated PTA SOP are requirements of the 2003 USFWS BO. Fire prevention, suppression and control, and potential impacts on ESA listed species have been addressed for the SBCT ROI, which encompasses the PTA Alternative ROI. However, implementation of the action within the proposed Twin Pu'u area on PTA would increase the potential for fire ignition within the western portion of PTA, but more specifically, the Kīpuka Kālawamauna Endangered Plants Habitat. Additional ESA Section 7 consultation with the USFWS would likely result in additional conservation measures for this area. The Kīpuka Kālawamauna is rich in listed plants and is part of the PTA ROI because of the potential for a fire within the SDZ to spread into the area.

In its 2003 PTA BO, the USFWS concluded that implementation of the Proposed Action (SBCT) was not likely to jeopardize the continued existence of any species covered in the BO or adversely modify or destroy PCH. The USFWS recognized that because the impact area is unsafe for human activity, surveys for listed species cannot be conducted, and the magnitude of habitat loss for the Hawaiian hoary bat cannot be accurately determined. They concluded that over time, all treeland habitat within the impact area would be lost, and impacts to the Hawaiian hoary bat and a number of species of listed plants would occur. The construction of the Twin Pu'u range and the SDZ for the range all fall within the impact area; therefore, potential impacts on listed species are unknown. In addition, all potential impacts within the PTA impact area have been addressed in the SBCT consultation and EIS.

In summary, invasive plant species pose a threat to listed species and habitat. Movement of troops and equipment, construction, and fires would all be expected to promote the introduction and spread of invasive species. These impacts would be significant, and not mitigable to less than significant. Fire poses the greatest risk to sensitive species and habitat. Live-fire exercises within the proposed Twin Pu'u would increase the risk of fires in the Kīpuka Kālawamauna Endangered Plants Habitat and other areas containing listed plants. Implementation of the IWFMP would considerably reduce wildfire risk, but the impacts from a wildfire would not be reduced to a less than significant level.

The USAG-HI would initiate ESA Section 7 consultation with the USFWS prior to any actions associated with the implementation of Alternative 4.

### Summary of Potential Biological Resources Impacts

Impact Issues	No Action Alternative	Alternative 1 MMR (Reduced Capacity Use with Some Weapons Restrictions)	Alternative 2 MMR (Full Capacity Use with Some Weapons Restrictions)	Alternative 3 MMR (Full Capacity Use with Fewer Weapons Restrictions)	Alternative 4 PTA (Full Capacity Use with Fewer Weapons Restrictions)
Impacts from fire on sensitive terrestrial species and sensitive habitat	⊗	⊗	⊗	⊗	⊗
Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species	⊗	⊗	⊗	⊗	⊗
Impacts on marine wildlife and coral ecosystems from runoff	⊙	⊙	⊙	⊙	⊙
Disturbance to marine wildlife from aircraft*	⊙	⊙	⊙	⊙	○
Disturbance to marine wildlife from ground training*	○	⊙	⊙	⊙	○
Disturbance to sensitive terrestrial species and habitat from ground training	○	⊗	⊗	⊗	⊗
Disturbance to sensitive terrestrial species and habitat from aircraft	⊙	⊙	⊙	⊙	⊙

**LEGEND:**

- ⊗ = Significant impact      ⊗ = Significant impact mitigable to less than significant  
 ⊙ = Less than significant impact      ○ = No impact      + = Beneficial impact

\* = The Army plans to conduct a hydrophonic noise study during a future CALFEX. If this study is completed before the Final EIS is published, the final levels of disturbance to marine wildlife from aircraft and ground training would incorporate data from that study.

**No Action Alternative****Significant Impacts**

Impact 1: Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species. Under No Action, there would be no live-fire training at MMR. Implementing the No Action Alternative would increase the presence of nonnative species in both the short term and long term in the ROI, which would have a significant impact. In general, nonnative plant and animal species pose a threat to Hawaiian native ecosystems.

The introduction of new or the spread of existing aggressive, nonnative plant species would alter native plant habitat and create competition with native and sensitive plants for space, nutrients, and light (Wagner et al. 1999). Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the novel environment created through human activity (Wagner et al. 1999). The continued use of MMR would mean nonnative species would continue to be introduced to the ROI. Soldiers would come to MMR from military installations on O‘ahu and other more distant locations, such as Japan and Thailand. Soldiers are likely to carry seeds from nonnative plants on their clothing or possessions.

The increase in nonnative plants would alter vegetative type and cover amount, particularly if invasive plants are introduced into the ROI, leading to habitat-level modification. This change in vegetation would adversely affect native wildlife that have evolved alongside native plants and habitats by removing food sources, shelter, and breeding areas. Native wildlife would also be threatened by the introduction of nonnative wildlife, which prey on native species, compete for resources, and carry diseases.

In conclusion, No Action would significantly impact sensitive species at MMR through spread of invasive species because of the following: causing long-term loss or impairment of a substantial portion of local species-dependent habitat; introducing or increasing the prevalence of undesirable nonnative species; and reducing the population of a sensitive species, as designated by federal and state agencies. Any loss of valuable habitat or listed species increases the threat to Hawai‘i’s biological diversity. Due to the limited effectiveness of controlling invasive species once a habitat has been severely disturbed, along with the potentially large area directly and indirectly affected, mitigation measures, including revegetation efforts, may not be sufficient to reduce this impact to less than significant.

*Regulatory and administrative mitigation 1.* Continue with invasive species control and prevention measures as outlined in the INRMP and USFWS biological opinions. Such efforts would include surveying for weeds along roads to evaluate the degree of threat and to prioritize control efforts and implement manual, mechanical, and chemical treatment programs; construct fencing to exclude ungulates from priority management units; and control non-native predators of the *Achatinella* snails.

*Additional mitigation 2.* Potential mitigation measures considered include requiring Soldiers to clean their boots and other equipment directly prior to utilization of MMR to minimize the potential introduction of nonnative species.

*Impact 2: Impacts from fire on sensitive terrestrial species and sensitive habitat.* Under No Action, there would be significant impacts from fire on sensitive terrestrial species and sensitive habitat. Under this alternative, there would be no live-fire training at MMR, and therefore fewer training-related ignition sources. Based on this significant decrease in potential fire hazards, there would be reduced fire prevention and control actions and activities on MMR.

There would be no threat of wildfire from lasing training due to the nature of the training activity, which entails no potential source for fire ignition. With respect to unmanned aerial vehicles (UAVs), as stated in the 2007 MMR BO (USFWS 2007), UAVs may take off at Makua and fly over the MMR ROI without on-site or standby wildland fire suppression staffing. In the event that one of these unmanned aerial vehicles crash within the MMR ROI, there would be no fire-fighting capabilities onsite to extinguish any resulting fire. Even though the size of the aircraft, amount of fuel contained within it, and the low likelihood of a crash poses little potential for a fire event, the lack of fire suppression staffing would mean a minor fire could go out of control and have devastating impacts on sensitive species within the MMR ROI.

Under this alternative, fuel and fire breaks would continue to be managed at MMR. The likelihood of fire under the No Action Alternative would be much lower than under Alternative 1 through 3, and would be less than if no military training occurred on MMR.

With no training at MMR, there would be a reduction in vegetation management that would actually increase the fuel load of the grasses, increasing the potential damage from an accidental wildfire. A fire that starts outside of the installation could quickly and easily spread through MMR if the fuel load was not regularly managed. Even under ideal

management conditions, fires have been known to spread outside the installation boundary. A reduction in stewardship measures would increase the potential for a fire to damage sensitive terrestrial species and habitat at MMR.

Wildland fire and invasive species management will continue to occur on MMR and the proposed training under this alternative has low fire ignition potential. However, the Army has made a conservative determination that even with the implementation of these measures, a wildfire could result in an irretrievable loss of individuals of a sensitive species. Therefore, implementation of the No Action Alternative could have significant impacts related to wildland fire that could not be mitigable to less than significant.

*Regulatory and administrative mitigation 2.* The Army would continue to implement the INRMP and fire prevention measures contained within the IWFMP.

*Additional mitigation 2.* Potential mitigation measures for this impact include having standby wildland fire suppression staffing available for the non live-fire events.

#### Less than Significant Impacts

*Impact 3: Impacts on marine wildlife and coral ecosystems from runoff.* Under No Action, there would only be lasing and UAV activity occurring on MMR. Preparation and implementation of these activities would cause only negligible impacts to the soil and have no impacts on marine wildlife or coral ecosystems. There are few ignition sources associated with these training activities, so there would be a reduction of onsite fire fighting forces. However, with minimal fire control capabilities, there could be substantial consequences if a fire were to ignite on or adjacent to MMR. Runoff following any large-scale fire event could result in sediment being transported to the ocean and harming coral ecosystems. Sedimentation and turbidity would obstruct respiration, lower photosynthesis of symbiotic organisms, and impede the filter feeding of coral polyps. Coral is adapted to changes in water clarity and sediment deposition that occurs during storms and would survive but would suffer a period of decreased productivity.

*Disturbance to marine wildlife from aircraft.* Under Alternative 1, there would be daytime and nighttime helicopter support and assault activities. Some helicopter operations could be conducted at very low altitudes over the water surface. Night flying may take place during these exercises.

Impacts from aircraft disturbance (visual or auditory disturbance from helicopters) were assessed specifically for ESA-listed marine wildlife considered to be “identified species of concern” for this EIS (see Appendix G-5 for more detail). That is, these species are either known to occur with regular frequency in the ROI and are ESA-listed, or their ESA status, combined with their low population numbers or overall threats to the species, warrant special attention, even if they are known to occur only rarely. Impacts were also assessed for spinner dolphins (which are MMPA-protected) because they are known to occur regularly in the ROI. The only ESA-listed marine mammal species that regularly occurs in the ROI is the humpback whale, which is found regularly in the ROI between January and April. The ESA-listed Hawaiian monk seal and various ESA-listed sea turtle species would rarely be found due to habitat conditions in the ROI and the species’ natural history requirements; however, impacts from aircraft disturbance on these species were also assessed.

Under the FY 2004 Defense Authorization Act, take or harassment of MMPA-protected marine mammals from helicopter or UAV overflights would only occur if the animals were disturbed to a point where they abandoned or significantly altered their natural behavioral patterns.

Although the modeling study determined that helicopter noise would not reach the thresholds necessary to be considered harassment, the Army recognizes that there could be a direct visual impact from helicopters. The Army will be flying helicopters from Dillingham and Wheeler Army Airfields around the coastline and entering Mākua Valley from Mākua Bay. These flights will take place all year long at both nighttime and during the day. During these flights, the helicopters often fly below 1,000 feet (305 meters) elevation.

Aircraft activities and overflights discussed above are expected to have less than significant impacts on any marine wildlife in the ROI, including humpback whales. Whales are in the area only seasonally, predominantly January through April, and regulations forbid any aircraft from passing within 1,000 feet (305 meters) of a humpback whale in Hawaiian waters (60 FR 3775). Humpback whales in the ROI are expected to be few in number and would be able to move to another area if disturbed by aircraft; any disturbance would be short term. However, altering an animal’s behavior could be considered a take via harassment under the ESA. Since humpbacks are protected under the ESA there is a potential for an animal to have a take if aircraft were within 1,000 feet (305 meters) of the species. Mitigations and regulations are in place to ensure that there are no flights within 1,000 feet (305 meters) of any humpback whale.

Helicopters at low altitudes are not expected to have significant noise impacts on marine wildlife, including the identified species of concern, because modeled noise levels at in-water locations would not exceed assumed MMPA Level B harassment criteria (Marine Acoustics 2005). Note that there is no specific harassment criterion for a broadband signal, like the noise generated by a helicopter. However, for this document, a maximum received level of 160 dB re 1  $\mu$ Pa is assumed as a conservative threshold for Level B harassment for this type of broadband signal. This is consistent with the 160 dB root-mean-squared (rms) received level threshold that the seismic community to measure airgun operations. Airguns also produce a broadband signal that can be transmitted every ten seconds or so for days at a time. The airgun signal is impulsive in nature, so it does not have the duration of a continuously operating helicopter, but the helicopter's noise only affects animals that are almost directly beneath it. Beyond this limited area, noise levels of helicopters in the water are greatly reduced.

Spinner dolphins are known to rest regularly in the ROI (Lammers 2003a, 2003b), including in a portion of the helicopter overflight pathways. Therefore, the potential for helicopters to have impacts on the residential spinner dolphin population is greater than the potential for overflights to affect whales (humpback whales, or other rarely occurring whale species), monk seals, or sea turtles that may occur in the ROI. Spinner dolphins could be affected either by visual or acoustic disturbance from helicopters. However while the potential for impacts on spinner dolphins exists, most helicopter noise occurs at frequencies below 400 Hz, where spinner dolphins have reduced hearing sensitivity. A take on spinner dolphins includes a change in the animals to a point where, when disturbed, they abandon or significantly alter their natural behavioral pattern of resting, which they are known to do in this area.

Spinner dolphins may be adversely affected by visual impacts from helicopter overflights. If animals are at the surface during a flight, they may be affected by the shadows caused by the helicopter or UAV overflights. However, less than significant impacts are expected from visual disturbance because the animals are not expected to be disturbed by flights to the point where they abandon or significantly alter their natural behavioral patterns in the area. If affected, they would most likely undergo only a short-term change in behavioral pattern, not a change that would cause them to abandon or significantly alter their natural behavioral pattern of resting; that is, they might be affected but it would not meet the definition of a take under FY 2004 Defense Authorization Act criteria.

In a meeting on June 28, 2006, the Army and NOAA Fisheries agreed that the standard methods used for previously published FEISs (DoN 1998,

2001) were applicable for use in this EIS, even though all of the explosions covered in this MMR EIS occur on or over land, rather than over water. This decision was based on the fact that the received signals are expected to have the characteristics of the acoustic signals generated by underwater explosions as in the above examples. This decision also relied on the noise study report (Appendix G-5), which essentially predicted that only approximately two to six (or fewer) of the explosions in any CALFEX event were of sufficient magnitude to be heard by marine mammals in the water. Effectively, the conservative modeling performed predicted that only two types of explosives that occur in the CALFEX exercises slightly exceeded in-water received sound pressure levels of 140 dB. Therefore, only a few of the explosions that take place on land would probably be heard offshore of MMR. This is in keeping with the intent of the previous FEISs (DoN 1998, 2001), where only one explosion would occur during a 24-hour period, and Level B harassment levels are based on temporary threshold shift, not behavior.

#### *In-Water Helicopter Levels*

For helicopter activities over Site C (see Appendix G-5), it was determined that the maximum received level at the two in-water sample sites was within 5 dB of the expected in-water ambient noise. Therefore, there would be no impacts on any Hawaiian monk seals, humpback whales, and spinner dolphins at the in-water sites from helicopter activities. In addition, because of their less-sensitive hearing, there would be no impact on any sea turtle species from helicopter activities. No auditory impacts from helicopter overflights are expected on spinner dolphins, as the MMR modeling study determined that the noise levels produced would be below the thresholds that are expected to cause auditory impacts on dolphins (Marine Acoustics 2005). The results of the study indicate that the in-water noise levels from helicopter overflights would be a maximum of 90 dB, which is far below the level (160 dB) discussed above for MMPA Level B harassment (Marine Acoustics 2005).

#### *In-Air Helicopter Levels*

For helicopter activities over Site C (see Appendix G-5), it was also determined that the maximum received level at the two beach sites was within 5 dB of the expected local ambient noise. Therefore, there would be no impact on any of the Hawaiian monk seals on the beach from helicopter activities. Again, because of their less-sensitive hearing, there would also be no impact on any sea turtle species on the beach from helicopter activities.

Note that all levels that have been set as standards or criteria for harassment are under consideration, NOAA Fisheries is expected to redefine them using results from current scientific studies. New criteria or

thresholds were expected in Fall 2005, when a draft EIS was to be issued delineating more detailed acoustic thresholds for marine mammals (FR Vol. 70, No. 7 January 11, 2005). To date, release of the new thresholds has been delayed.

Presently, the modeled data indicate it is unlikely that there would be any noise impacts on marine wildlife (Marine Acoustics 2005). There is not sufficient direct information to make a scientifically defensible case for the likely short-term or long-term effects of military exercises on spinner dolphins from impacts occurring near Mākua Valley (Lammers 2003b).

The potential of flights daily on up to 242 training days a year is expected to cause less than significant adverse impacts on spinner dolphins, although the intensity of these impacts could vary if flights repeatedly took place at low altitudes and if the dolphins were consistently present at these times.

*Regulatory and administrative mitigation 3.* The Army would continue to observe and implement the following measures:

- Use a second “command and control” aircraft to monitor the training aircraft. This aircraft flies at altitudes of 300 to 400 feet (91 to 121 meters) to monitor the training aircraft. Personnel observe the ocean surface from this command and control aircraft for signs of marine wildlife. During nighttime training, night vision equipment is used to observe marine mammals. In all cases, this second aircraft is used during training operations to observe for whales and to inform training aircraft of the need to move should a whale be spotted.
- Observe USARHAW SOPs to protect marine wildlife when pilots or other aircraft personnel spot the animals. Among these SOPs, the Local Flying Rules (see letter from February 11, 2003, Appendix H-3) prohibit flying within 1,000 feet (305 meters) of whales, monk seals, and dolphins. The SOPs also require altering flight paths once wildlife is observed. These SOPs are followed when marine life is present within the exercise ROI.

*Additional mitigation 3a.* Potential mitigation measures for this impact include the following Army actions:

- Emphasize to all personnel that the mobile nature of marine wildlife mandates constant observation because marine wildlife can and do appear suddenly and may surface in an area or at the ocean surface at any time;

- Limit low-altitude flying (200 feet [61 meters] or less) over areas likely to harbor marine mammals;
- Practice “search and avoid” techniques during the day by performing a pass-by flight at 1,000 feet (305 meters) before training to assess the presence of marine wildlife. NOAA Fisheries recommendations include conducting overflights of the beach before training operations begin to search for monk seals on the beach;
- NOAA Fisheries requirements include if a seal is hauled out, training operations would be altered and flights directly over the beach would be prohibited. In addition, munitions use would be limited in order to avoid affecting the seal(s). These training restrictions would also be implemented immediately anytime a seal is observed during training. The training would be altered to allow the animal to leave the beach;
- Stop training near and over sea turtles if they are present on the beach. The Army would inspect Mākua Beach immediately before a training exercise, either from the ground or by air or both, and would not begin a CALFEX or other training if sea turtles were present. In addition, the Army would periodically check the beach for sea turtles during training. If a sea turtle were spotted, there would be no direct flights over the sea turtle, and munitions use would be limited that day. The training would continue to be altered until the sea turtle leaves the beach;
- Limit low flying at night when visibility is limited;
- Use night vision goggles on nighttime flights to enhance spotting and avoiding humpback whales or other identified species of concern. Include practice and training in use of night vision goggles for all spotters to increase the likelihood that they would be able to observe marine mammals in low light or darkness;
- NOAA Fisheries requirements include use of OH-58D Kiowa Warrior thermal imaging scans during nighttime operations before training. These scans should occur over the ocean, a quarter mile (0.4 kilometer) offshore before training begins. These scans are to be completed every two hours during training;
- NOAA Fisheries requirements include avoiding overflights of humpback whales by requiring pilots to use search and avoid techniques. To mitigate direct visual or noise impacts from helicopters, helicopter pilots would practice these techniques, which would further ensure they maintain the required 1,000-foot (305-meter) distance required for humpback whales. These techniques involve moving horizontally and vertically away from

an observed whale to ensure that the 1,000-foot (305-meter) buffer is maintained and attained as quickly as possible, once a whale is spotted;

- As part of ESA Section 7 consultation with NOAA Fisheries (NOAA Fisheries 2006, Appendix H-3), the Army would develop and implement a comprehensive reporting and monitoring program. The Army would submit annual reports to NOAA Fisheries documenting sightings of ESA- or MMPA-listed animals in the action area during training. The Army would report to NOAA Fisheries in a timely manner the location information for any animals sighted, particularly if it is an ESA-listed species. Monk seal sightings would be reported immediately. The report would detail the Army's mitigation measures in accordance with the commitments made during ESA Section 7 consultation with NOAA Fisheries; and
- The Army would continue informal consultation with NOAA Fisheries.

*Disturbance to sensitive terrestrial species and habitat from aircraft.*

Under the No Action, aircraft activity would have a less than significant impact on sensitive terrestrial species and habitat. Increased noise and visual disturbance from the aircraft could affect bird species. The impact of aircraft on sensitive species would be less than significant because the distance between aircraft and these species would be sufficient enough to avoid visual impacts and to minimize noise effects. Records indicate that seabird activity offshore of the Ka'ena Point Natural Area Reserve has not resulted in bird strikes with Army helicopters in this area of the ROI since 1990, the earliest date such records were kept. Under the proposed training, there would be no change to flight altitudes or flight patterns in this area, so there would be no increase in the likelihood of bird and aircraft strikes. Current flight patterns include take-offs and landings from shore, and the aircraft fly out to generally one quarter of a nautical mile (.46 kilometer) offshore and back, at a general altitude of 1,000 feet (304 meters). Seabirds known to occur in the ROI do occur both at this altitude and distance offshore.

The military has ongoing bird aircraft strike hazard programs in place to reduce the risk of bird and wildlife strikes. If a strike were to occur, the event would be recorded and the US Army Pacific, Federal Aviation Administration, and USFWS would be notified, as part of existing procedures. The Wai'anae Mountains that separate MMR from SBMR support many sensitive terrestrial wildlife species and the coastal region of Ka'ena Point NAR supports Laysan albatross and wedge-tailed shearwaters. Noise produced by human activity is known to have an

adverse effect on various wildlife resources, although habituation can occur with certain species. Many studies have documented the effects of noise on numerous terrestrial species (Bleich et al. 1990; MacArthur et al. 1982; Foster and Rahe 1983; Cassirer et al. 1992). Aircraft-generated noise could disturb bird species in the ROI, especially early in the breeding season when individuals may be more easily deterred from starting a nest in the area or may be flushed from an existing nest. Aircraft disturbance also could interfere with calling and mating behaviors between individuals of the same species.

These impacts would be largely avoided as a result of the aircraft flight patterns. Around Ka'ena Point, aircraft would fly at least 1,000 feet (305 meters) offshore. In addition, aircraft remain a minimum of 700 feet (213 meters) above ground and 300 feet (91 meters) above the ocean. Because noise levels and wind velocity attenuate with distance, noise and wind generated by aircraft at this distance would be relatively minor at ground or canopy level. As discussed in Section 4.5, helicopters at these distances are not likely to flush bird species from a roost. In addition, no aircraft landing zones are located near sensitive habitat or in immediate proximity to areas known to support sensitive species, such as the 'elepaio, Laysan albatross, and O'ahu tree snails, so there is little concern regarding the wind and noise generated as a result of helicopter landing and take-off.

None of the factors discussed in Section 4.9.3 would be exceeded as a result of aircraft impacts on sensitive terrestrial species and habitat. This impact is therefore considered less than significant.

#### No Impact

Disturbance to marine wildlife from ground training. Under the No Action, there would be minimal ground training and no live-fire weapons training at MMR with no anticipated impacts on marine wildlife. There would be no noise or concussive impacts on marine wildlife.

Disturbance to sensitive terrestrial species and habitat from ground training. Under No Action, based on the proposed non-live fire training that would occur, there would be no noise from land-based weapons firing and explosions or concussive (impulse/shock) waves that originate on land from ordnance detonation live-fire training at MMR and therefore no impacts on sensitive terrestrial species and habitat. The sensitive species and habitat would be under no greater threat than they are under the baseline, and so there is essentially no impact from the proposed level of ground training.

### **Alternative 1 (Reduced Capacity Use with Some Weapons Restrictions)**

#### **Significant Impacts**

Impact 1: Impacts from fire on sensitive terrestrial species and sensitive habitat. Under Alternative 1, impacts from training-related fire on sensitive species and habitat at MMR are considered significant. Live-fire training could start wildfires outside the firebreak road and would increase from no training under baseline conditions to 242 days per year under Alternative 1. Live-fire training increases the threat of wildfires within the ROI. Fires could result from training or from associated management activities (fire sources are discussed in detail in Section 3.14). The likelihood of a training-related fire is moderate to high during live-fire activities. The main factor in determining the significance of this threat is the ever-present potential that a single wildfire could escape control and destroy sensitive species or habitat.

Wildfire poses a major threat to the Hawaiian ecosystem because native plants and animals are not well adapted to fire (USARHAW and 25th ID[L] 2000). Fires could destroy native plants and slow-moving animals, such as snails, and could displace other animals. The area known as Lower 'Ōhikilolo has populations of endangered plant species, including *Hibiscus brackenridgei* ssp. *mokuleianus*, *Chamaesyce celastroides* var. *kaenana*, and *Spermolepis hawaiiensis*. Individuals of these species narrowly escaped perishing in the July 2003 fire at MMR. A population of *Chamaesyce celastroides* var. *kaenana* was also found on the left-hand side of MMR; these were lost in the July 2003 fire. Army Natural Resource Center (NRC) personnel are controlling weeds around this population of plants, resulting in the recruitment of natives, such as 'ilima and 'a'ali'i, and the reduction of guinea grass in the immediate vicinity (Kawelo 2003).

Wildfires that burn into native communities or sensitive habitats could destroy listed plant and animal species and sensitive habitats. BSAs within the ROI that could be affected by a wildfire are discussed in Section 3.9; threatened and endangered species known to occur or that could occur within the ROI are listed in Tables 3.9-3 through 3.9-5. In addition, the following sensitive habitats are found within the ROI:

- Ka'ena Point Natural Area Reserve;
- State Forest Reserve;
- Federally designated critical habitat for O'ahu 'elepaio; and
- Critical habitat for plants and habitat used by numerous species of native Hawaiian land and tree snails.

Wildfires that burn into native communities or sensitive habitats could destroy listed plant and animal species and sensitive habitats. Fires started as the consequence of proposed training activities could reach populations of listed species within the ROI.

The Hawaiian hoary bats are not known on O‘ahu, though they have been documented historically. No impacts are expected because none are considered to occur in the ROI. No hoary bats have been sighted on O‘ahu since 1998. In addition, the USFWS determined that the Army was not required to consult on the Hawaiian hoary bat because the presence of that species as a resident species was determined to be historical and not current.

‘Elepaio are also recorded in the ROI and would be adversely affected by the loss of trees, which would mean a loss of potential roosting and nesting sites. Should a fire start or spread outside the firebreak road during the breeding season (January to June), it would be particularly harmful to this species.

Pueo foraging grounds and roosting and nesting trees could be affected by an outbreak of fire. Although no nesting areas have been confirmed in the ROI, protective behaviors exhibited in ‘Ōhikilolo and the presence of a fledgling along the ridge between the north and south lobes of the training area have led NRS personnel to believe it is likely present (PCSU 2002). The loss of a nesting tree would be particularly damaging to pueos and could result in the immediate or eventual loss of a nestling.

The impact of wildfire on listed species and habitat would be greatly reduced by implementing the MIP, INRMP, IWFMP, ITAM, and ACUB programs, which would greatly diminish the overall significance of fire and invasive species impacts on the natural resources at MMR. However, because there is a risk that a wildfire could result in an irretrievable loss of individuals of a sensitive species, the Army has made a conservative determination that although the mitigation will considerably reduce the impacts on sensitive terrestrial species and habitat, the impacts may not be reduced to a less than significant level.

*Regulatory and administrative mitigation 1.* USARHAW protocols have been designed to minimize the potential for training-induced fires and their impacts. Army wildland fire fighting activities are guided by the 25th ID and USARHAW IWFMP. Implementing the MMR IWFMP would greatly reduce the probability of fire and increase the Army’s fire containment capability. Using the O‘ahu Training Areas IWFMP management directives would avoid and minimize fire impacts on sensitive species (USARHAW and 25th ID[L] 2001b) by limiting training

to times of low fire risk. Army personnel would continue to use BMPs during operations. The INRMP and MIP would ensure that sensitive species and conservation and restoration projects are monitored as long as training occurs at MMR. The Army would also follow measures outlined in the MIP to monitor for introduced species and to eradicate any newly introduced ones.

*Additional mitigation 1a.* Potential mitigation measures include habitat restoration following a fire. Efforts would be focused on the native forest edges to ensure that the area does not recede after each fire. Revegetation efforts would be implemented in any sensitive habitat destroyed by fire to ensure no net loss of sensitive species or habitat.

*Additional mitigation 1b.* Potential mitigation measures include replacing the 5,577 feet of fencing that have been burned. Replacing this fencing, which had been constructed to keep out feral pigs and goats, would reduce impacts on native plants.

*Impact 2: Impact on sensitive terrestrial species and habitat resulting from the spread of nonnative species.* These impacts are the same as those fully described under the No Action Alternative but are more likely to occur because of an increase in the number of training days and corresponding increase in human presence. Implementing Alternative 1 would further increase the presence of nonnative species in both the short term and long term in the ROI, which would have a significant impact. Compared to the baseline of the No Action Alternative at MMR, an increase in the number of troops and training days would also increase the frequency of transporting people to and from the range, which increases the potential for nonnative species to be brought in from outside locations.

Activities at MMR are expected to have the following effects on the introduction and spread of nonnative species (CEMML no date):

- Troops and equipment moving into Hawai‘i from other countries, states, or islands and between subinstallations within Hawai‘i could increase the likelihood of introducing nonnative plants;
- Training in and marching through sensitive habitat could increase the spread of invasive species; and
- The use of various types of ammunition and weapons systems during military training could increase the risk of wildland fire.

The use of various types of ammunition and weapons systems during military training could increase the risk of wildland fire. Sensitive species potentially occurring within the MMR ROI that could be affected under

this impact are listed in Tables 3.9-3 and 3.9-4; confirmed sensitive species within the ROI are identified in Figures 3.9-5 and 3.9-7.

The activities above would have a significant impact on vegetation and wildlife species and habitats for several reasons.

The introduction of new or the spread of existing aggressive, nonnative plant species would alter native plant habitat and create competition with native and sensitive plants for space, nutrients, and light (Wagner et al. 1999). Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the novel environment created through human activity (Wagner et al. 1999). The continued use of MMR would mean nonnative species would continue to be introduced to the ROI. Soldiers would come to MMR from military installations on O‘ahu and other more distant locations, such as Japan and Thailand. Soldiers are likely to carry seeds from nonnative plants on their clothing or possessions.

The increase in nonnative plants would alter vegetative type and cover amount, particularly if invasive plants are introduced into the ROI, leading to habitat-level modification. This change in vegetation would adversely affect native wildlife that have evolved alongside native plants and habitats by removing food sources, shelter, and breeding areas. Native wildlife would also be threatened by the introduction of nonnative wildlife, which prey on native species, compete for resources, and carry diseases.

Wildlife expected to be affected by the spread of nonnative species include federally listed species, such as the O‘ahu tree snail and O‘ahu ‘elepaio. Other nonlisted species that could be affected by this impact are Amastrid land snails, Achatinellid land snails, the Endodontid land snail, pueo, O‘ahu creeper, wedge-tailed shearwater, and Laysan albatross. These wildlife species are threatened by loss and alteration of their habitat due to an increase in nonnative wildlife species.

In addition, 3,930 acres (1,590 hectares) of federally designated ‘elepaio critical habitat and 2,128 acres (861 hectares) of plant critical habitat within the ROI would be further threatened by encroaching nonnative organisms. BSAs within the ROI that may be affected by the spread of nonnative species are presented in Figure 3.9-12.

The use of various types of ammunition and weapons systems during military training could increase the risk of wildfire. Fire-related disturbance to terrestrial habitats and species could create a situation in which nonnative species adapted to fire ecology and human disturbance

would have a distinct advantage over native species and would ultimately displace many of those species. This could result in the irretrievable loss of individuals of a sensitive species. Due to the limited effectiveness of controlling invasive species once a habitat has been severely disturbed, along with the potentially large area directly and indirectly affected, mitigation measures, including revegetation efforts, may not be sufficient to reduce this impact to less than significant.

*Regulatory and administrative mitigation 2.* INRMP activities would continue to be implemented under Alternative 1. These include surveying for weeds along roads and landing zones to evaluate the degree of threat and to prioritize control efforts and regularly implementing manual, mechanical, and chemical treatment programs. The Army is following guidance from the USFWS to manage and protect listed species and habitat. Certain urgent action items have already been implemented or are in progress (outlined in Section 3.9). The IWFMP would further reduce the impact of nonnative species by using fuel management techniques. Implementing the MIP would also control and minimize introduction and spread of nonnative species. The ACUB program has provided, and would continue to provide, conservation benefits to a number of the listed plant and animal species on MMR, which would help mitigate the impacts of this alternative.

These training-related environmental management actions would mitigate the overall impacts from spread of nonnative species, but not to less than significant.

*Additional mitigation 2.* Potential mitigation measures considered include requiring Soldiers to clean their boots and equipment directly prior to troop marches to eliminate nonnative species.

*Significant Impacts Mitigable to Less Than Significant*

*Impact 3: Disturbance to sensitive terrestrial species and habitat from ground training.* Routine military ground training, as proposed under Alternative 1, would have significant impacts on sensitive terrestrial species. Ground training would disturb sensitive terrestrial species and habitats identified in Tables 3.9-4 and 3.9-5 as occurring or potentially occurring within the ROI. Ground training would adversely affect biological resources by the following actions:

- Introduction of noise into the terrestrial environment;
- Direct trampling and disturbance to sensitive habitat in the Ka'ena Point and Kuaokalā Trail areas from military personnel;
- Troop marches; and

- Increased erosion.

Wildlife species use portions of the ROI for foraging, shelter (resting), and nesting and would be disturbed by increased erosion, contamination, trampling, noise, and other effects of the proposed training.

Noise impacts from this alternative could deter some species or individuals from using the ROI. Noise produced by humans is known to have an adverse effect on various wildlife resources, although habituation can occur with certain species. Many studies have documented the effects of noise on numerous terrestrial species (Bleich et al. 1990; MacArthur et al. 1982; Foster and Rahe 1983; Cassirer et al. 1992). While the authors of a study done at Schofield Barracks concluded that “artillery noise was judged to have a negligible effect on the behavior of ‘elepaio” (VanderWerf et al. 2000), they note that previous research found conflicting results. Delaney and Pater et al. in 1999 (as cited in VanderWerf et al. 2000) determined that louder and closer noises resulted in more intense responses from terrestrial wildlife. Although research on this issue is not conclusive at this point, it is possible that louder artillery noises or the closer proximity of ‘elepaio to artillery could result in more intensive disruption (VanderWerf et al. 2000). Training under Alternative 1 would generate training-related noise in the ROI and is expected to disturb ‘elepaio that occur in close proximity to training exercises. For example, ‘elepaio situated by the side of a trail may be flushed from their roosts by the sound of approaching soldiers marching and by their cadence. This disturbance to ‘elepaio is expected to be low due to the low level of noise produced and its short duration. Artillery noise within the range expected for this alternative is not expected to affect nesting behavior, affect the health of individuals, or cause population level effects based on a 2000 study of similar actions and noise levels (VanderWerf et al. 2000). Artillery could deter potential nesting in the ROI and cause non-nesting individuals to flush their roosts, but this potential has not yet been studied for this species.

The northern ridgeline of MMR, Ka‘ena Point, and portions of Kuaokalā Access Road and Trail are included in the critical habitat for plants on O‘ahu (Figure 3.9-9) (USFWS 2003b). Portions of these areas are also part of NARS on O‘ahu. NARS are first and foremost areas of refuge and not recreation, so their use is restricted by the State of Hawai‘i. Kuaokalā Access Road is a steep paved road that leads to an old Nike missile site now used as an endangered plant nursery and hardening facility. Other plant critical habitat areas exist outside the MMR boundary to the south, but because no maneuvers are designated to take place there, they were not analyzed for this EIS.

The surrounding area supports a variety of common native plants and habitats, as well as nonnative vegetation communities. Public use of these areas is conditional, and permits are awarded by the state DLNR on a case-by-case basis (Lowe 2003). Trails and access roads are already established in these locations, and Army troop marches would increase the human impacts by increasing the level of activity on trails and the disturbance of surrounding vegetation. The State of Hawai‘i does not have estimates of the public use of Ka‘ena Point or Kuaokalā Access Road and Trail (Lowe 2003).

The Army estimates that a maximum 150-Soldier company would march once a month on Kuaokalā Trail and twice a month on Ka‘ena Point Trail. This is an additional maximum of 1,800 people per year using Kuaokalā Trail and 3,600 people per year hiking around Ka‘ena Point. While the Army conducts occasional troop marches around Ka‘ena Point, increasing use of Ka‘ena Point Trail to this extent is expected to result in a significant impact. The Army would conduct troop marches any time of day or night. The state DLNR restricts public access to Ka‘ena Point to reduce the amount of human impact on the surrounding natural areas.

The Laysan albatross, a bird of conservation concern, and the wedge-tailed shearwater, both MBTA-protected species, would be adversely affected by increased use of Ka‘ena Point Trail for military marches. The Laysan albatross breeding site at Ka‘ena Point is close to the trail, and more than 1,000 burrows used by the shearwaters for nesting are in the same vicinity (Liesemeyer 2003). The breeding season is a sensitive portion of these species’ life cycles, and disturbance due to noise or visual presence could alter the behavior of individuals, even causing them to abandon their nests. Troop marches on Ka‘ena Point Trail could also crush shearwaters, which are known to nest in burrows directly under the trail. These activities would lessen reproductive success and would likely result in a take of an MBTA species, conflicting with the provisions of EO 13186. However, the rule on the Take of Migratory Birds by the Armed Forces authorizes the Armed Forces to incidentally take migratory birds during military readiness activities (USFWS 2007a). If the Armed Forces action proponent determines that a proposed or ongoing action may result in a significant adverse effect on a population of migratory bird species, then it must confer and cooperate with the USFWS to develop conservation measures to minimize or mitigate the significant effect. For this proposed action, the Army has determined that direct take of any migratory bird species would not be to the degree of a significant impact on a population level.

Also, along the trail within the Ka‘ena Point NAR are several populations of the federally listed endangered plant species ‘akoko (*Chamaesyce*

*celastroides kaenana*) and 'ohai (*Sesbania tomentosa*) that could easily be affected by any off-trail movement. If Soldiers were to stray off the trail in certain sensitive areas, they would be likely to trample and possibly kill individuals of these species.

Training would have long-term impacts on sensitive terrestrial wildlife, such as the 'elepaio, and sensitive habitat, such as 'elepaio federally designated critical habitat. Troop marches proposed on trails through Mākua Valley would increase human presence and noise in this area, deterring reclusive species such as the 'elepaio.

Troop marches also would cause increased erosion along Kuaokalā Trail and Ka'ena Point Trail. This could have an adverse effect on 'elepaio critical habitat and plant critical habitat in the NAR.

The estimated level of use along Kuaokalā Trail (particularly in portions where the trail narrows) would lead to a decrease in vegetation and ultimately to a reduction in suitable habitat for sensitive species, such as the 'elepaio (VanderWerf 2003).

Sensitive native snails, such as the federally listed O'ahu tree snail and Amastrid land snail (*Leptachatina* spp., *Amastra rubens*) and the Achatinellid land snails, which are federal species of concern, inhabit portions of the Wai'anae Mountains where marches are proposed. Snails would be threatened directly by trampling during marches and indirectly by habitat degradation and decline of their food source if Soldiers were to stray off the trails.

Visual disturbance from night training is not expected to affect night-flying birds, such as the wedge-tailed shearwater. Shearwater species are known to fly at night, and fledglings are easily disoriented by light sources when they fly from their nests out to sea (Kubota 1998; TenBruggencate 2003). The known shearwater nesting area in the ROI is outside the training area and along the coast, so night training would be less likely to affect their night flying activities unless illumination is used for activities within the NAR.

*Regulatory and administrative mitigation 3.* The Army committed in an agreement with USFWS to manage specific species and habitat at MMR for stabilization. Certain urgent actions have already been implemented or are in progress, as discussed in Section 3.9.

The INRMP and the IWFMP would continue to be applied as long as training occurs at MMR. Programs in the INRMP that would help to mitigate this impact include managing, protecting, and monitoring existing

sensitive species communities (both flora and fauna), as well as surveying potential habitat for new occurrences of sensitive species. USARHAW would continue its strict adherence to the Division of Forestry and Wildlife/DLNR/NARS regulations outlined in the special use permit (Appendix H-4). Permit conditions may change depending on management issues, time of proposed training, and frequency of use. These measures would help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementing Alternative 1.

MIP actions included as stewardship measures include controlling large feral mammals, selected weeds, predators, insect pests, and diseases and managing habitat quality levels. Some of these measures are already underway. The main threat determining level of management is the risk to species from training-related fire; the MIP was prepared to address the fire threat from tracers, which would not be used under this alternative. The Laysan albatross, wedge-tailed shearwater, and 'ohai are not included in the current MIP; separate conservation measures for these species are being coordinated with USFWS.

The Army would reinitiate ESA Section 7 consultation with the USFWS for training activities on the Ka'ena Point Trail. The Army would implement this alternative only after receiving a no jeopardy biological opinion from the USFWS.

*Additional mitigation 3a.* Potential mitigation measures for this impact include the Army limiting marches at Ka'ena Point during the Laysan Albatross breeding season (November to July) to at most one march per month and conducting monitoring at the beginning of the wedge-tailed shearwater breeding season (April to June) to determine whether burrows are present along the trail. If burrows are found in close proximity to the trails, then measures would be taken to avoid impacts on these nests. Measures considered include keeping a minimum distance from the nest as approved by USFWS, DLNR, and DPW biologists and monitoring to ensure that noise vibrations and erosion do not hamper reproductive success within these nests. Additional measures may be taken pending results of monitoring and consultation with USFWS.

*Additional mitigation 3b.* Potential mitigation measures for this impact include the following Army measures:

- BMPs, such as no lights or cadence, would be observed within the marked areas of the trails; and

- Soldiers would be briefed on the state permit regulations before the march.

### Less than Significant Impacts

Impacts on marine wildlife and coral ecosystems from runoff. Less than significant impacts from potential runoff are expected for marine biological resources at MMR, which is on the leeward side of the island, where precipitation is low and storm runoff is minimal. The Army's 7th Dive Detachment found no evidence of any contamination on the ocean bottom just off Mākua Beach (Figure 3.11-2). Divers looked for metal globules reportedly covering the ocean floor in the area but found nothing resembling that description (see related scoping comment in Appendix B-2, Public Meeting Summaries). Thus, there is no evidence of any contamination on the ocean bottom just off Mākua Beach (see Chapter 3, Section 3.11, and Figure 3.11-2).

Training could erode soil because the activities reduce vegetation and disturb the soil, which might increase sediment loading to the sea from streams during periods of high runoff. However, these periods of high runoff are usually short in duration and infrequent. The expected increase in erosion from current training activities, described in Section 4.8, would be within the natural range due to rainfall and runoff variation and is not expected to be significant. Conducting live-fire activities would increase the likelihood of toxins or sediment entering the marine habitat. There is potential for runoff following a large-scale fire if followed by a rainstorm. This scenario would result in a large increase in soil erosion and sediment being transported to the ocean. This could harm coral ecosystems by blanketing them in sediment and causing turbidity in the water column. Sedimentation and turbidity would obstruct respiration, lower photosynthesis of symbiotic organisms, and impede the filter feeding of coral polyps. Coral is adapted to changes in water clarity and sediment deposition that occurs during storms and would likely survive but would suffer a period of decreased productivity.

*Regulatory and administrative mitigation.* USARHAW would continue to implement land management practices and procedures in the ITAM work plan to reduce erosion impacts on soils from live-fire training to less than significant.

*Additional mitigation.* No additional mitigation measures have been proposed.

Disturbance to marine wildlife from aircraft. Impacts are expected to be less than significant and similar to those described under the No Action Alternative. Mitigation measures are the same as those described for the

No Action Alternative, except for the inclusion of an additional mitigation measure.

*Regulatory and administrative mitigation.* Additional NOAA Fisheries requirement include having the Army conduct an underwater noise study using hydrophones (underwater microphones) during the next CALFEX. This would provide direct quantitative noise levels generated by the exercise and provide additional data to more accurately assess impacts. The Army has committed to reviewing these noise levels and to reinitiating consultation with NOAA Fisheries should the noise levels exceed the local NOAA Fisheries standards or levels that would exceed MMPA or ESA harassment standards;

*Disturbance to marine wildlife from ground training.* Noise from land-based weapons firing and explosions or concussive (impulse/shock) waves that originate on land from ordnance detonation could have short-term adverse significant impacts on either sea turtles or seals if they are on the beach, or on marine mammals such as spinner dolphins and possibly humpback whales if impulse waves penetrate the marine habitat. The possibility of this type of sound transmission into marine habitat is not known. If they reach a sufficient level, noise or concussive waves could cause a take of marine wildlife directly through harassment or by affecting habitat.

While no scientific data measuring noise or concussive levels in the marine environment exist for ground training at MMR, results from noise modeling conducted by the Army found that noise levels from military training sources do not approach the criteria for Level A or Level B harassment of marine mammals at locations where they are likely to be present, even for the largest noise sources (Marine Acoustics 2005, 2006). Neither type of harassment is expected under project actions at MMR, according to the modeling study. Many of the modeled received levels were less than the background (ambient) natural noise level estimates for the MMR area (actual ambient noise levels will be recorded during the hydrophonic study when it occurs). Therefore, it is considered highly unlikely that marine mammals potentially present offshore of MMR would be affected by noise sources from military training activities (Marine Acoustics 2005). The modeling study supports finding that there would be less than significant impacts on marine wildlife from ground training.

It is known that parameters relating to transmission of sound in coastal areas vary considerably from location to location, and thus it is generally not considered sufficient to extrapolate data collected from one location and apply it to another (National Research Council of the National

Academies 2003). Therefore, a direct measurement of sound and noise in the MMR area is expected to be undertaken at the next CALFEX.

Available scientific research shows that marine mammals are susceptible to disturbance and may react to explosions, either from the sudden increases in noise, or from the shock or concussive impulse waves that explosions transmit under certain conditions (Richardson et al. 1995). Most often the latter occurs from in-water detonations or from seismic activity or construction work on land. Studies on captive animals have shown that animals react to impulsive underwater sounds (Finneran et al. 2000). Exposure to intense sound may produce an elevated hearing threshold (a threshold shift [TS]) following cessation of the intense sound. If the threshold returns to the pre-exposure level after a period of time, the TS is known as a temporary threshold shift (TTS).

Few studies have been done on TTS in marine mammals. Results of these studies are not necessarily comparable to the type of noise sources that would be present at MMR, but they do provide a reference, as they are the only available literature on the subject. These studies have shown that animals can experience a TTS in hearing as a result of being exposed to loud or impulsive sounds (Au et al. 2000; Schlundt et al. 2000; Finneran et al. 2002; Nachtigall et al. 2001); or, they can show alterations in behavior as a result of exposure (Finneran et al. 2000).

Au et al. (2000) and Nachtigall et al. (2001) have measured TTS in bottlenose dolphins exposed to noise; Schlundt et al. (2000) measured temporary shifts in bottlenose dolphins and belugas exposed to certain tones. A study done on the California sea lion (Finneran et al. 2003) showed behavioral reactions to underwater impulses, primarily consisting of attempts to avoid the site where exposure to impulse had previously occurred. Hearing abilities of wild animals are not always known. Audiograms have been done for some species. Among these are the striped dolphin (Kastelein et al. 2003) and the bottlenose dolphin (Johnson 1967; Nachtigall et al. in press), but none have been done for the spinner dolphin. Striped dolphins can hear between 500 Hz and 160 kHz, although the range of most sensitive hearing is between 30 and 120 kHz (Kastelein et al. 2003). Dolphins are not likely to hear low frequencies produced by explosions some distance away (Nachtigall et al. 2000).

In-water detonations in proximity to marine wildlife can cause impacts ranging from severe (mortality or injury) to less acute (TTS) (Richardson et al. 1995). No in-water detonations would occur as part of this alternative. Explosions occurring adjacent to beach habitat where seals and sea turtles are located can have impacts ranging from severe (mortality or

injury) to acute (TTS, flushing the animals, flight alarm reactions) (Richardson et al. 1995).

Impacts from blasts as a result of concussive energy may or may not transmit from the detonation locations at MMR to the beach. Noise energy from blasts would not transfer into the water habitat due to the impedance of the air-water interface and the fact that the explosions take place on land. The transmission of concussive energy depends on a variety of factors, some of which are variable. Concussive energy transmission depends on ambient conditions caused by wind and sea conditions. It also depends on geologic factors, the intensity, proximity, and number of explosions, and the rate of recurrence of the explosions. Impacts from concussive energy depend on the level of transmission, which varies, as shown above, and by the behavior of the animals; for example, animals reproducing or resting would be more likely to be disturbed than animals feeding or traveling. Thus, without empirical data, it is difficult to assess sound levels or in-air shock wave levels at MMR accurately. However, it is possible to state that if animals were present during noise or concussive events, and if they were able to hear or feel the sounds, and if the sounds were close enough to the animals, impacts could occur.

Blast noise in natural conditions is known to elicit a startle response from animals (Richardson et al. 1995), and a startle or alarm reaction would disturb dolphins at rest. Pressure pulses from explosions have higher peak noise levels than those from any other human-made source (Richardson et al. 1995). Noise does not easily penetrate below the air-water interface, so most likely, noise transmission from land to water is not an issue. This is supported by the results of the recent noise modeling study (Marine Acoustics 2005). Additionally, no underwater shock wave, such as underwater explosion energy traveling at supersonic speeds, would be generated by the proposed training. That is, explosive detonations in this project action occur either on or over land, so in-water shock waves are not a concern.

#### *In-Water Explosive Levels*

The maximum predicted in-water received level for any explosive used at MMR was assessed at 142.6 dB re 1  $\mu$ Pa (Marine Acoustics 2005), which is equivalent to 0.002 psi. These values and the equivalent/appropriate energy levels are significantly below any of the in-water explosive Level A or B criteria for marine mammals (see Appendix G-5 for more info on Level A or B harassment). Therefore, there would be no impact on ESA-listed humpback whales and Hawaiian monk seals or MMPA-protected spinner dolphins from the use of explosives. Additionally, because sea turtle hearing is less sensitive than that of marine mammals, there would

be no impact on any ESA-listed sea turtle species, which are also identified species of concern.

#### *In-Air Explosive Levels*

As stated in Appendix G-5, the maximum received level at Site 4 (Mākua Beach), which is the only likely haul-out spot for Hawaiian monk seals, is 90.2 dB re 20  $\mu$ Pa. This value is approximately 10 dB below the thresholds identified and detailed at length in Appendix G-5 for the criteria established to represent Level A and Level B harassment. Therefore, there would be no impact on ESA-listed monk seals, if any were on the beach. In addition, as with the in-water analysis above, any sea turtles that could be on the beach would have hearing which is less-sensitive than the Hawaiian monk seal, so there would be no impact on any sea turtles species.

While no empirical data exist on current stress levels and on noise levels at the dolphin resting site, the modeling study calculated received noise levels for all of the explosive sources at levels significantly below the MMPA Level B criteria for harassment. Additionally, many of the less powerful sources are below ambient noise levels and probably cannot be heard by the animals in situ (Marine Acoustics 2005). The Army plans to conduct a direct hydrophonic noise study at an upcoming CALFEX to collect empirical data for analysis of noise levels above and below the water surface (see the Chapter 3 introduction for a description of this study). Monitoring data are to be collected at two locations offshore of Mākua Beach in marine mammal habitat areas, and at one beach location that also serves as marine mammal and sea turtle habitat. The impact analysis will be revised, if warranted, based on the results of this study. If the study cannot be conducted prior to completion of this EIS, the EIS would be supplemented, if appropriate or necessary, after the hydrophonic data is collected and the results are analyzed.

The likelihood of impacts from sound or pressure waves on either sea turtles or seals is considered negligible under this alternative. The chance of these species being collocated with training activities is minimal. Additionally, sea turtles are less-sensitive to acoustic signals than marine mammals, and if marine mammals are expected to have no significant impact, then turtles are even less at risk.

An individual humpback whale or pod could not be considered to have a take, even if they were in the nearshore environment when an explosion occurred, based on the definitions of Level B harassment detailed for the USS *Seawolf* and USS *Churchill* FEISs (DoN 1998, 2001). Humpback whales are in the nearshore environment only seasonally and prefer depths of 100 fathoms (Mobley 2001b). Spinner dolphins are expected to be

consistently present in the ROI, but for the reasons described above, impacts from noise on dolphins are not considered likely. However, note that if one dolphin reacts, because of the social nature of the animals, the entire group could be affected by this alarm reaction (Norris 1991, 2003).

The potential addition of noise and blast impacts from either 19 or 28 CALFEX exercises, if transmitted into the marine habitat, could cause stress in marine mammals. However, impacts are expected to be less than significant, and the modeled and predicted low received noise levels support this conclusion. Training activities are not expected to cause significant behavioral changes, and the conclusions of the modeling study support the finding that noise levels would be below the USS *Seawolf* and USS *Churchill* FEISs thresholds cited as causing harassment of marine wildlife (DoN 1998, 2001).

*Regulatory and administrative mitigation.* The Army would continue to observe and/or implement the following measures:

- Use a second command and control aircraft to monitor the training aircraft. This aircraft flies at altitudes of 300 to 400 feet (91 to 121 meters) to monitor the training aircraft. In addition to having personnel observe the ocean surface from this command and control aircraft for signs of marine wildlife, they would observe the beach as well. During nighttime training, night vision equipment is used to observe marine mammals.
- As required per consultation with NOAA Fisheries, complete a hydrophonic noise study in Makua Bay during the first full CALFEX exercise to validate the noise model.

*Additional mitigation.* Potential mitigation measures for this impact include the following Army actions:

- Emphasize to all personnel that the mobile nature of marine wildlife mandates constant observation because marine wildlife can and do appear suddenly and may occur on Mākua Beach;
- Stop training if sea turtles or Hawaiian monk seals are present on Mākua Beach. The Army would inspect Mākua Beach just before a training exercise, either from the ground or by air or both, and would not begin a CALFEX or other training activity if monk seals or sea turtles were present. In addition, the Army would periodically check the beach for seals and sea turtles during training. If any were spotted, training would stop until the seals or sea turtles were no longer present; and

- Continue informal consultation with NOAA Fisheries.

*Disturbance to sensitive terrestrial species and habitat from aircraft.*

Impacts are expected to be less than significant and similar to those described under the No Action Alternative.

***Alternative 2 (Full Capacity Use with Some Weapons Restrictions)***

***Significant Impacts***

*Impact 1: Impacts from fire on sensitive terrestrial species and sensitive habitat.* Military training, particularly live-fire training and use of tracer ammunition, could start wildfires, which is considered a significant impact under this alternative. Both live-fire and nonlive-fire training increase the threat of wildfires within the ROI. Although live-fire training is considered the greatest fire risk under Alternative 2, fires could also result from training or associated management activities. Because there is a risk that a wildfire could result in an irretrievable loss of individuals of a sensitive species, the Army has made a conservative determination that, although the mitigation will considerably reduce the impacts on sensitive terrestrial species and habitat, the impacts may not be reduced to a less than significant level.

*Regulatory and administrative mitigation 1.* The INRMP, the MIP, and the IWFMP would be implemented for Alternative 2. These program actions would involve monitoring sensitive species and conducting conservation and restoration projects as long as training occurs at MMR. The Army has undergone Section 7 consultation for training at MMR (USARHAW and 25th ID[L] 1998; USFWS 1999d, 2001a, 2007b, 2008), and USFWS-approved conservation actions would be implemented. The Army is working to increase the baseline number of individuals according to the criteria stipulated in the MIP for 29 species. Actions to be taken include stabilizing populations of listed plant species and snails, controlling feral ungulates, rats, selected weeds, predators, insect pests, and diseases, and managing and restoring habitat. The Army would also follow measures outlined in the MIP and 2007 BO 1998 BA to monitor for introduced species and to eradicate any newly introduced ones. The conservation and mitigation benefits of the ACUB program would also apply to this alternative.

*Additional mitigation 1a.* Revegetation efforts would occur in any sensitive habitat areas affected by fires, especially along edges of sensitive habitat to ensure no net loss of sensitive habitat acreage or species.

*Additional mitigation 1b.* Potential mitigation measures include replacing the 5,577 feet (1,700 meters) of fencing that have been burned. Replacing

this fencing, which had been constructed to keep out feral pigs and goats, would reduce impacts on native plants.

*Impact 2: Impact on sensitive terrestrial species and habitat resulting from the spread of nonnative species.* Implementing Alternative 2 would increase the presence of nonnative species in both the short term and long term in the ROI. In general, nonnative plant and animal species threaten Hawaiian native ecosystems. These impacts are the same as those fully described under Alternative 1 but are more likely to occur because of an increase in the number of training days and corresponding increase in human presence. Alternative 2 would also have a greater potential for large-scale fires than Alternative 1 due to the use of tracers and an increase in the number of CALFEXs.

*Regulatory and administrative mitigation 2.* Regulatory and administrative mitigations are the same as those described for Alternative 1.

*Additional mitigation 2.* Additional mitigations are the same as those described for Alternative 1.

*Significant Impacts Mitigable to Less Than Significant*

*Impact 3: Disturbance to sensitive terrestrial species and habitat from ground training.* Routine military ground training as proposed under Alternative 2 would have significant impacts mitigable to less than significant. The use of Ka'ena Point NAR as a location for troop marches would have a significant but mitigable impact on the Laysan albatross, wedge-tailed shearwater, 'akoko, and 'ohai. Additionally, portions of Kuaokalā Trail overlap with designated plant and 'elepaio critical habitat and Amastrid land snail habitat. This disturbance is discussed fully under Alternative 1.

Impacts on sensitive terrestrial species and habitat from ground training would be similar to those under Alternative 1, but under Alternative 2, training would be conducted with the use of tracer ammunition. The Army has completed consultation with the USFWS and received a BO concluding that use of these weapons systems would not jeopardize listed species or adversely modify critical habitat (see Section 3.9.2). Operating the range at full capacity use with up to 50 company-level CALFEXs per year would adversely affect biological resources within the ROI.

During these training events, Stryker vehicles would be used to fire 120mm mortars and MK 19 and .50-caliber machine guns from the road into the CCAAC and the ordnance impact area. Cratering and shape charges would also be used during demolitions training, as described under Alternative 1.

Nighttime ground training is unlikely to interrupt or adversely affect the activities of wildlife.

The increased noise and nighttime illumination that would occur as a result of implementing Alternative 2 are not expected to affect the O‘ahu ‘elepaio substantially. This determination is based on the ‘elepaio’s demonstrated tolerance of ammunition and training-induced noises (VanderWerf 2000), as well as a discussion with ‘elepaio expert Eric VanderWerf (VanderWerf 2003). Shearwaters nesting along the coast are unlikely to be affected by illumination and noise coming from the training areas within Mākua Valley, so night training would be unlikely to affect their night-flying activities unless the training is carried out within the Ka‘ena Point NAR.

*Regulatory and administrative mitigation 3.* The IWFMP, INRMP, and MIP would be implemented for Alternative 2. These plans ensure monitoring of sensitive species and conducting conservation and restoration projects as long as training occurs at MMR. USFWS-approved actions include controlling feral ungulates, selected weeds, predators, insect pests, and diseases and managing habitat levels. The 1998 BA also outlines the Army’s plan to monitor for introduced species and to eradicate any newly introduced ones. The Laysan albatross, wedge-tailed shearwater, and ‘ohai are not included in the current stabilization activities, and separate mitigations to account for impacts on these species would be coordinated with the USFWS. Impacts are fully detailed under Alternative 1.

The Army would reinitiate Section 7 consultation with the USFWS for training activities on the Ka‘ena Point Trail. The Army would implement this alternative only after receiving a no jeopardy biological opinion from the USFWS.

*Additional mitigation 3.* The additional mitigation measures for this impact would be the same as those discussed under Alternative 1.

#### Less than Significant Impacts

Impacts on marine wildlife and coral ecosystems from runoff. Impacts would be the same as those described for Alternative 1 but would occur at a higher level due to a greater level of training. These impacts would remain less than significant.

*Regulatory and administrative mitigation.* USARHAW would continue to implement land management practices and procedures in the ITAM work plan to reduce erosion impacts on soils from live-fire training to less than significant.

*Additional mitigation.* No additional mitigation measures have been identified for this impact.

*Disturbance to marine wildlife from aircraft.* Impacts are expected to be less than significant and similar to those described under Alternative 1. Mitigation measures are the same as those described for Alternative 1..

*Disturbance to marine wildlife from ground training.* This impact would be similar to that discussed under Alternative 1, with the potential of a greater magnitude of impacts due to increased training events. An increase in the number of CALFEX events would potentially increase the frequency of disturbance, and operating the range at full use (with up to 50 company-level CALFEXs per year) would increase the severity of adverse impacts on marine wildlife resources if they occur. When it is complete, data from the hydrophonic noise study will be evaluated and included in this EIS. Impact levels will be revised if warranted by the results of this study. If the study cannot be conducted prior to completion of this EIS, the EIS would be supplemented, if appropriate or necessary, after the hydrophonic data is collected and the results are analyzed. The findings of the noise modeling study support the fact that in-water noise levels are expected to be below those known to cause impacts on marine wildlife (Marine Acoustics 2005). Through informal consultation between the Army and NOAA Fisheries, new mitigation measures, in addition to those previously proposed, may be included.

*Disturbance to sensitive terrestrial species and habitat from aircraft.* Under Alternative 2, impacts would be the same as those described under the No Action Alternative.

### ***Alternative 3 (Full Capacity Use with Fewer Weapons Restrictions)***

#### ***Significant Impacts***

*Impact 1: Impacts from fire on sensitive terrestrial species and habitat.* Impacts under this alternative would be higher in intensity and magnitude than the impacts described under Alternatives 1 or 2. The same fire impacts discussed under Alternative 2 would occur as a result of this alternative. However, the intensity of the impacts would be greater due to use of inert TOW missiles, 2.75-caliber rockets, and illumination munitions. Use of these devices would create a greater risk of a wildfire compared to Alternatives 1 and 2. The 2.75-caliber rockets would be deployed from airborne aircraft and could land outside the ordnance impact area in the event of problems, such as pilot error or air turbulence. The increase in fire potential and probability of outbreak of fire in high-value habitat would increase the likelihood for loss of sensitive terrestrial species, including federally listed species confirmed within the ROI

(Section 3.9, Figures 3.9-5 and 3.9-7), critical habitat (Section 3.9, Figures 3.9-9 and 3.9-11), and BSAs and sensitive snail habitat (Section 3.9, Figure 3.9-12).

There would be an increase in impacts from fire on sensitive terrestrial species and habitat as a result of increased training with fewer restrictions, and the potential for the irretrievable loss of these species and habitats. Impacts under this alternative are expected to be significant and could not be mitigated to less than significant.

*Regulatory and administrative mitigation 1.*

Although this impact under Alternative 3 is not considered mitigable, mitigation measures described under Alternative 2 would be incorporated to reduce the severity of impacts. Incorporated into this proposed training action are measures to control, minimize, and mitigate impacts from mission-related wildfires. The Army is working on increasing the baseline number of individuals according to the criteria stipulated in the MIP for 29 species to minimize the severity of any catastrophic fire.

The protection and conservation of listed plants and critical habitat within ACUB lands would help minimize and mitigate the impacts of any fire outbreaks in areas where similar species and critical habitat occur. Further implementation of the ACUB program could mitigate for the loss of listed species on MMR and support the recovery of these species.

The Army would reinitiate Section 7 consultation with the USFWS on the following:

- Addition of illumination munitions; and
- Additional training acreage.

The Army would implement this alternative only after receiving a no jeopardy biological opinion from the USFWS.

*Additional mitigation 1a.* Potential mitigation measures would involve Army revegetation efforts in any sensitive habitat areas affected by fires, especially along edges of sensitive habitat, to ensure no net loss of acreage or species.

*Additional mitigation 1b.* Potential mitigation measures include replacing the 5,577 feet (1,700 meters) of fencing that have been burned. Replacing this fencing, which had been constructed to keep out feral pigs and goats, would reduce impacts on native plants.

Impact 2: Impacts on sensitive terrestrial species and habitat resulting from the spread of nonnative species. Impacts from the spread of nonnative species would be similar to those described under Alternatives 1 and 2. Alternative 3 would further increase the intensity and magnitude of the impacts described under Alternative 1 or 2 because it increases the potential for large-scale fires due to the use of inert TOW missiles, 2.75-caliber rockets, and illumination munitions.

*Regulatory and administrative mitigation 2.* Mitigation measures described under the previous alternatives would be incorporated to reduce the severity of the impacts. The INRMP, IWFMP, and MIP would also be implemented for Alternative 3. The Army would monitor for introduced species and eradicate any newly introduced ones as outlined in the 1998 BA. These minimization and mitigation efforts would greatly reduce the impact but not to less than significant. Federally listed species likely would be injured or destroyed as a result of Alternative 3. ACUB parcels could provide sites for augmenting/reintroducing listed plants or animals if efforts to control nonnative species are not successful.

*Additional mitigation 2.* Additional mitigations are the same as those described for Alternative 1.

#### Significant Impacts Mitigable to Less than Significant

Impact 3: Disturbance to sensitive terrestrial species and habitat from ground training. Impacts from ground training would be similar to those described under Alternative 1 and are considered significant mitigable to less than significant. Alternative 3 would increase the intensity and magnitude of the impacts already described due to fewer weapons restrictions. Stryker vehicles would be used to fire MK 19 grenade launchers and .50-caliber machine guns into the CCAAC and the ordnance impact area but would be limited to roads and existing trails. The Stryker vehicle also would be used as a firing platform for the 120mm mortar.

In the 2007 BO, the USFWS stated that it does not expect permanent hearing loss in O‘ahu ‘elepaio to result from the proposed action. Should monitoring identify impacts from noise associated with training, the Army would reinitiate consultation with the USFWS. Nighttime ground training is unlikely to interrupt and adversely affect the activities of wildlife.

Additional land area on the ridge between the north and south lobes of the training area (see Figure 2-2) is proposed for use under this alternative. This area is not currently used for training. Its use as a training area would expose vegetation to damage from trampling and invasive species competition. It would also create an additional pathway for invasive species to take hold and modify habitat.

Troop marches around Ka'ena Point NAR and on Kuaokalā Trail would have significant but mitigable to less than significant impacts on the Laysan albatross, 'elepaio, 'elepaio designated critical habitat, wedge-tailed shearwater, 'ohai and 'akoko, and Amastrid land snail habitat, as detailed under Alternative 1.

*Regulatory and administrative mitigation 3.* Mitigation measures under Alternative 2 would be incorporated to reduce the severity of the impacts under this alternative. The IWFMP and the INRMP would be applied for Alternative 3.

Federally listed species and their habitat could still be destroyed as a result of training-induced fires, depending on the location and severity of the fire.

*Additional mitigation 3.* The additional mitigation measures for this impact would be the same as those discussed under Alternative 1.

#### Less than Significant Impacts

*Impacts on marine wildlife and coral ecosystems from runoff.* Impacts would be the same as those described for Alternative 1 but would occur at a higher level due to a greater level of training. Changes in sedimentation or toxins from any increase in erosion from training would be within the natural range that exists due to rainfall and runoff variation. This impact is not expected to be significant.

*Regulatory and administrative mitigation.* USARHAW would continue to implement land management practices and procedures in the ITAM work plan to reduce erosion impacts on soils from live-fire training to less than significant.

*Additional mitigation.* No additional mitigation measures have been proposed.

*Disturbance to marine wildlife from aircraft.* Impacts are expected to be less than significant and similar to those described under Alternative 1. Mitigation measures are the same as those described for Alternative 1..

*Disturbance to marine wildlife from ground training.* Impacts from ground training would be similar to those described under Alternative 1, with the potential of a greater magnitude of impacts due to increased training events. If available, data from the hydrophonic noise study will be evaluated and included in this EIS. Impact levels will be revised if warranted by the results of this study. If the study cannot be conducted prior to completion of this EIS, the EIS would be supplemented, if appropriate or necessary, after the hydrophonic data is collected and the

results are analyzed. The findings of the noise modeling study support the fact that in-water noise levels are expected to be below those known to cause impacts on marine wildlife (Marine Acoustics 2005). Through informal consultation between the Army and NOAA Fisheries, new mitigation measures, in addition to those previously proposed, may be included.

Disturbance to sensitive terrestrial species and habitat from aircraft. Under Alternative 3, impacts would be the same as those described under the No Action Alternative.

#### **Alternative 4 (Full Capacity Use with Fewer Weapons Restrictions), Pōhakuloa Training Area**

##### **Significant Impacts**

Impact 1: Impacts from fire on sensitive terrestrial species and sensitive habitat. Under Alternative 4, impacts from training-related fire on sensitive species and habitat at PTA would be considered significant. The addition of a CALFEX range at the PTA Twin Pu‘u location would increase the use of larger caliber munitions in an area where there are currently no established ranges, thus requiring the construction of a new range. The surface area of the Twin Pu‘u range area is quite rough and covered primarily by invasive fountain grass. In establishing a range within the Twin Pu‘u area, UXO would need to be cleared. This process includes conducting prescribed burns to expose the UXO. If a prescribed burn were to go out of prescription it could impact the adjacent Kīpuka Kālawamauna Endangered Plants Habitat to the west of the Twin Pu‘u area. Wildland fires could also result from management activities to support military or other activities on the range (i.e., prescribed burning), and a prescribed burn could go out of control and pose a threat to sensitive plants adjacent to the proposed range footprint. Live-fire training at the Twin Pu‘u could start wildfires in high fire spread rate areas that could move into sensitive plant areas within the ROI. The likelihood of a training-related fire is moderate to high during live-fire activities depending on weather and moisture conditions. The main factor in determining the significance of this threat is the ever-present potential that a single wildfire could escape control and destroy sensitive species and/or their habitat.

Wildfire poses a major threat to the Hawaiian ecosystem because native plants and animals are not well adapted to fire. Fires could destroy native plants and slow-moving animals, such as snails, and could destroy habitat of the endangered Hawaiian hoary bat and other animal species. The Kīpuka Kālawamauna Endangered Plants Habitat is to the west of the proposed Twin Pu‘u range footprint. This area contains seven endangered and one threatened plants. Of greatest concern is the *Tetramolopium*

*arenarium* ssp. *arenarium*, which is located in close proximity to the proposed Twin Pu‘u range site and is the last remaining population of the species. This area is fenced to protect the plant from ungulate browsing and trampling.

Wildfires that burn into native communities or sensitive habitats could destroy listed plant and animal species and sensitive habitats. Threatened and endangered species known to occur or that could occur within the ROI are listed in Tables 3.9-4 and 3.9-5.

The Hawaiian hoary bat is known to occur within the ROI. Per the requirements of the USFWS 2003 PTA BO, PTA must implement the terms and conditions of the Incidental Take Statement to minimize the impacts of SBCT on the bat. CALFEX activities at the proposed Twin Pu‘u range would put a portion of bat foraging and potential roosting habitat at greater risk of fire impacts.

The impact of wildfire on listed species and habitat would be reduced by implementing the BO, PIP, INRMP, IWFMP, and ITAM programs, which would diminish the overall significance of fire and invasive species impacts on the natural resources at PTA. However, because there is a risk that a wildfire could result in an irretrievable loss of individuals of a sensitive species, the Army has made a conservative determination that although mitigation would reduce the impacts on sensitive terrestrial species and habitat, the impacts may not be reduced to a less than significant level.

*Regulatory and administrative mitigation 1.* USARHAW protocols have been designed to minimize the potential for training-induced fires and their impacts. Implementing the IWFMP would greatly reduce the probability of fire and increase the Army’s fire containment capability. Implementation of PTA’s IWFMP SOP would avoid and minimize the potential for fire ignition by limiting training to times of lower fire risk. Army personnel would continue to use BMPs during operations. PTA would ensure that sensitive species and conservation and restoration projects are monitored as long as training occurs at PTA. The Army would reinitiate consultation with the USFWS if the PTA Alternative is selected since the SBCT ESA consultation did not address the actions and increase of fire and invasive species threats within and around the Twin Pu‘u area. The Army would also follow measures outlined in the 2003 BO to monitor for introduced species and to eradicate any newly introduced ones.

*Additional mitigation 1a.* Within the PTA ROI, certain prevention measures would greatly reduce the potential spread of wildland fires. However, the existing fire 15-foot (4.5-meter) fire break along the MPRC

access road bordering the Twin Pu‘u area and Kīpuka Kālawamauna may not be sufficient to control the spread of wildland fires. The 2003 PTA BO identified research that found that “Fast spreading grass fire fanned by strong winds” can be stopped by a firebreak only if the firebreak is at least 98 feet (30 meters) wide. Research in Australian grasslands found that a 33-foot (10-meter) fire break would be breached only 1 percent of the time under the most severe conditions observed and where trees were absent. The 2007 MMR BO states, “[164 feet] 60 meters of mown grass inside the perimeter of the south lobe of the firebreak road is expected to prevent all fires from slopping over the firebreak road and prevent most short-range spot fires from igniting fires outside the impact area.” Therefore, potential mitigation for activities at the proposed Twin Pu‘u training range area would include establishing the maximum fire break (30 feet [9 meters]) and fuel break (82 feet [25 meters] through grass fuels and 148 feet [45 meters] through shrub or forest fuels) dimensions, as identified in the IWFMP, along the MPRC access road. These measures would greatly reduce the potential for fires to reach the Kīpuka Kālawamauna Endangered Plants Habitat area and protect the *Tetramolopium arenarium* ssp. *arenarium* and other listed plants.

*Additional mitigation 1b.* Potential mitigation measures include habitat restoration following a fire. Efforts would be focused on the native forest edges to ensure that the area does not recede after each fire. Revegetation efforts would be implemented in any sensitive habitat destroyed by fire to ensure no net loss of sensitive species or habitat.

*Additional mitigation 1c.* Potential mitigation measures include the eradication of fountain grass, a major fire ignition source, in and around the fire break and fuel break areas and within the Kīpuka Kālawamauna area.

*Impact 2: Impact on sensitive terrestrial species and habitat resulting from the spread of nonnative species.* Implementing Alternative 4 would increase the presence of nonnative species in both the short term and long term in the ROI, which would have a significant impact on sensitive species. In general, nonnative plant and animal species pose a threat to Hawaiian native ecosystems. An expansion in the amount of area available for training increases the potential for nonnative species to be introduced onto the installation.

Activities at PTA would be expected to have the following effects on the introduction and spread of nonnative species:

- Troops and equipment moving into Hawai'i from other countries, states, or islands and between subinstallations within Hawai'i could increase the likelihood of introducing nonnative plants;
- Training in and marching through sensitive habitat could increase the spread of invasive species;
- The use of various types of ammunition and weapons systems during military training could increase the risk of wildland fire, thereby creating more habitat vulnerable to invasive species; and
- Construction of facilities and training support structures within the Twin Pu'u range footprint could increase the spread of invasive species.

The use of various types of ammunition and weapons systems during military training could increase the risk of wildland fire. Fires open areas to the spread of nonnative and invasive plant species. Invasive plants have an advantage in becoming established in an environment that is stressed and can often outcompete native species that are not adapted to the novel environment created through human activity. The introduction of new or the spread of existing aggressive, nonnative plant species would alter native plant habitat and create competition with native and sensitive plants for space, nutrients, and light. Invasive plants such as fountain grass also alter the fire regime, thus increasing the potential for ignition and spread of wildland fires. The use of the Twin Pu'u area would increase the potential for nonnative species to be introduced into the ROI.

The increase in nonnative plants would alter vegetative type and cover, leading to habitat-level modification, as well as alter the fire regime. This change in vegetation would adversely affect native wildlife that have evolved alongside native plants and habitats by removing food sources, shelter, and breeding areas. Native wildlife would also be threatened by the introduction of nonnative wildlife, which prey on native species, compete for resources, and carry diseases. Due to the sensitivity of the area to wildland fires and invasive species, the impacts may not be reduced to a less than significant level.

*Regulatory and administrative mitigation 2.* As discussed in Section 4.9.4, the mitigation measures identified in the SBCT EIS ROD and the 2003 PTA BO would help reduce the spread and impact of nonnative/invasive species caused by training and construction. However, because the impacts of invasive species could be significant to sensitive species and habitats, the identified measures would not mitigate the overall impact from spread of nonnative species to less than significant level.

*Additional mitigation 2a.* Additional potential mitigation measures considered include requiring Soldiers to clean their boots and equipment directly after ground training exercises to eliminate the potential to spread nonnative species in the Kīpuka Kālawamauna area adjacent to the range.

*Significant Impacts Mitigable to Less Than Significant*

*Impact 3: Disturbance to sensitive terrestrial species and habitat from construction and ground training.* As proposed under Alternative 4, there would be less than significant impacts on sensitive terrestrial species caused by routine military ground training in the PTA ROI. The footprint of the Twin Pu‘u range is all contained within the impact area. Due to UXO hazards, very limited surveys have been conducted within the impact area. Construction and ground training could disturb currently unknown sensitive terrestrial species and habitats within the Twin Pu‘u range footprint. Construction and ground training would adversely affect biological resources by the following actions:

- Introduction of noise into the terrestrial environment;
- Increased erosion;
- Ground disturbance from construction, vehicles, and trampling; and
- Increased wildland fire potential as a result of prescribed burns for exposing UXO and the potential for fire when clearing UXO.

Wildlife species use portions of the ROI for foraging, shelter (resting), and nesting and could be disturbed by erosion, contamination, noise, and other effects of the proposed training. Grading during construction would involve turning up the ground, moving topsoil and vegetation, and staging the heavy machinery area, which would cause intensive short-term disturbance to vegetation. Although a moderate to large portion of vegetation within the range footprint would be affected during construction, the impacts would be minimal because the Twin Pu‘u area is mainly comprised of fountain grass, an invasive species. However, prescribed burning would be required to expose UXO for removal prior to any construction activities in the area. This action poses a significant risk of fire spreading to sensitive areas and impacting listed species. However, this action is covered under the Wildfire VEC.

Native mammals and birds capable of escaping the area would be expected to vacate during construction and less mobile creatures, such as small mammals (nonnative) and invertebrates, could be killed during or as a result of construction, ground training, and/or fire.

Noise impacts from this alternative could deter some species or individuals from using the ROI. Noise produced by humans is known to have an adverse effect on various wildlife resources, although habituation can occur with certain species. Because no listed vertebrate species other than the Hawaiian hoary bat are known to be residents on PTA, the effect of noise on these species would not be significant.

The bats at PTA are already exposed to noise from Legacy Force training, which would increase with SBCT training. However, due to the distribution of the Hawaiian hoary bat on PTA, noise generated by CALFEX training in the proposed Twin Pu‘u range could affect the bats. The 2003 PTA BO states that, “Noise may startle bats from their roosts, disrupting sleep patterns or torpor. Lethargic or torpid bats may not be able to respond rapidly to the need to abandon the roost, increasing the risk they would be injured or killed by heat, flames, and smoke. Bats also could be crushed in falling trees or struck by branches and foliage broken or blown by helicopter downdrafts. Bats dislodged from their roosts may not be able to fly due to injury or depleted energy reserves, and grounded bats would be vulnerable to fire, vehicle strikes, trampling, and predators... Nothing is known about the response of Hawaiian hoary bats to noise generated by different intensities and durations of military activities, or the extent to which bats may become habituated to noise disturbances. Bats possibly would be deterred from using daytime roosting or nighttime foraging areas because of intense levels of noise associated with human activity.” In the BO, the USFWS cited research where a maternity roost of Indiana bats in close proximity to an airport tolerated noise from aircraft and highway traffic. The USFWS also stated that they consider habitat loss, and not noise, to be the major factor affecting bats on PTA.

Construction and CALFEX training within the Alternative 4 could lessen reproductive success and result in impacts to MBTA species. A number of the resident native birds on PTA are not MBTA species such as the ‘apapane, ‘elepaio, and ‘i‘iwi. Other species that are MBTA species are not native to the Hawaiian Islands, such as Northern Cardinal, Mourning Dove, and House Finch. Given the wide spread occurrence of these and other nonnative MBTA species on the Island of Hawai‘i, the limited unintentional take that could result from activities within the proposed Twin Pu‘u range Alternative would have minimal impacts on populations of these birds. Of greatest concern are those native species that could be impacted by Alternative 4, such as the Hawaiian Short-eared Owl (pueo), Hawaiian Solitaire (‘oma‘o), and Pacific Golden-Plover (kōlea). The habitat of the proposed PTA Alternative site may be suitable for the pueo (open habitats such as grasslands and shrublands), and kōlea (winters in varied habitats including grassy fields and roadsides). The occurrence of

these species within the Twin Pu‘u range footprint is unknown. The MOU between DoD and the USFWS, established per the requirements of EO 13186, promotes, in part, the conservation of migratory birds through efforts to minimize and/or mitigate the direct and indirect impacts of military non-readiness activities on migratory birds. During range construction activities, birds would most likely abandon the area if disturbed. Therefore, the potential for unintentional take of adult and fledged birds would be minimal. However, active nests could be destroyed thus resulting in unintentional take. Any take of the kōlea would not be anticipated because they are only winter residents on PTA. Habitat loss or modification would be the most significant impact from range construction, and this type of indirect impact does not constitute “take” under the MBTA.

Although take may occur during authorized military readiness activities, the Army has determined that such take would not occur to the degree of a significant impact on a population of any migratory bird species. The most significant impact of training to migratory birds would be the ignition and spread of fire that alters or destroys preferred habitats.

Visual disturbance from night training is not expected to affect night-flying birds, such as the endangered Hawaiian Dark-rumped Petrel. No petrels are known to use or nest within the proposed Twin Pu‘u range area, but they are known to have used, and may still be using, PTA for nesting. Night training is not anticipated to affect petrel night flying activities. If petrel activity is discovered in or around the PTA ROI, the Army would initiate consultation with the USFWS.

The loss of habitat and sensitive species within the impact area have been mitigated and/or minimized through NEPA and ESA consultation for the SBCT action. The impact area is off limits to unauthorized personnel because of the UXO hazards, so surveys for sensitive species could not be conducted. In the USFWS 2003 BO, the USFWS stated that they consider that all potential available bat roosting and foraging habitat in the impact area eventually would be impacted over time, and that these impacts could result in a cumulative loss of all available roosting habitat in this area. However, separate consultation will still be required for Alternative 4, if selected. Although the INRMP, IWFMP, SBCT EIS ROD, and terms and conditions of the 2003 PTA BO are applicable to the ROI for Alternative 4, they would not prevent potential impacts associated with CALFEX training within the proposed ROI. ESA Section 7 consultation would be required before this alternative could be implemented. The INRMP helps to mitigate impact through managing, protecting, and monitoring existing sensitive species communities (both flora and fauna), as well as surveying potential habitat for new occurrences of sensitive species.

PIP actions include/will include controlling large feral mammals, selected weeds, predators, insect pests, and diseases and managing habitat quality levels. The main threat that determines the level of management is the risk to species from training-related fire; the PIP and IWFMP address fire threats from mission activities occurring on PTA. Implementation of the PIP, 2003 PTA BO, SBCT EIS mitigation measures, along with the mitigation measures proposed for this alternative, reduces the impacts of this action to a less than significant level.

*Regulatory and administrative mitigation 3.* The conservation measures identified in the 2003 PTA BO for SBCT activities could be used as potential mitigation to minimize and avoid impacts of construction and maintenance projects associated with Alternative 4. These measures include the following:

- All construction vehicles and earth-moving equipment would be thoroughly cleaned and inspected (to remove all soil and seeds) before moving on to PTA construction sites.
- All construction equipment would be confined to the PTA area or subject to subsequent cleaning and inspection if moved offsite during construction.
- Construction employees would be educated on the need to wear clean clothes and maintain clean vehicles.
- If a construction site were within 246 feet (75 meters) of a listed plant occurrence, then construction grading or earth moving operations would be sprayed with water to reduce airborne dust.
- Natural Resources personnel would be consulted and approve all auxiliary construction support sites. Natural Resources personnel would inspect construction and auxiliary sites quarterly for alien species. If alien species are found, then appropriate eradication measures would be immediately implemented.
- Night-time construction activities would be coordinated with the USFWS.
- The construction crews would follow the established Army protocols for proper use and disposal of petroleum, oils, and lubricants when refueling or working on any construction equipment or vehicles.

*Additional mitigation 3a.* Potential mitigation for construction and military activities could include conducting limited surveys of the range footprint area, if safe and practicable, for listed plant species. If such a survey

discovered listed species, the following conservation measures could be proposed during the required ESA Section 7 consultation:

- Seeds would be collected from plants prior to construction. Plants would be propagated in greenhouses and would be transplanted to other sites containing the same listed species to possibly enhance genetic mixing.
- Listed plants would be removed from site and translocated to other sites with species to supplement populations.
- Enough material would be collected, grown, and established to adequately replace all of the plants lost from the construction and military activities.
- Construction activities would be timed to avoid periods when listed species are utilizing the area.

*Additional mitigation 3b.* Potential mitigation measures to reduce impacts on migratory birds during range construction and maintenance would include avoiding activities near active nest sites of native bird species until birds have fledged. If active nests cannot be avoided, then the eggs and/or chicks would be transferred to a permitted migratory bird rehabilitator. Independent juvenile birds could be released back on PTA. PTA would initiate consultation with the USFWS if any listed bird species were found to be nesting or foraging within the proposed Twin Pu‘u range area.

#### Less than Significant Impacts

Impact 4. Disturbance to marine wildlife from aircraft. Less than significant impacts on marine wildlife would be expected from CALFEX helicopter activity between O‘ahu and the Island of Hawai‘i. Over the ocean, the aircraft normally fly at least 1,000 feet (305 meters) above sea level. There is no change in helicopter activity expected from existing conditions at PTA. The Aviation Brigade of the 25th ID has local flying rules SOPs that include a 1,000-foot (305-meter) vertical limit over marine mammals. The February 11, 2003 addition to the local flying rules (Appendix H) states that forthcoming changes would prohibit flights within 1,000 feet (305 meters), vertically or laterally, of any marine mammal.

*Regulatory and administrative mitigation 6.* The Army would continue to implement SOP flying rules.

Impact 5. Disturbance to sensitive terrestrial species and habitat from aircraft. Increased noise and visual disturbance from the aircraft could affect bird species and the Hawaiian hoary bat. However, under

Alternative 4, aircraft activity would be anticipated to have a less than significant impact on sensitive terrestrial species and habitat. The impacts associated with noise from aircraft would be similar to those discussed under Impact 3 of this alternative.

Fixed-wing aircraft and helicopter activity would occur in and around the proposed Twin Pu‘u range site. This would include nighttime training, which would involve about 45 percent of the ongoing basic training of new pilots. Such activities could have an impact on foraging and commuting bats, the Hawaiian Dark-rumped Petrel and other birds.

In the 2003 PTA BO, USFWS acknowledged that helicopters are more likely to affect both bird and bat behavior than fixed-wing aircraft, and that low-flying, fixed-wing aircraft are more likely to impact birds and bats than those at high flight altitudes. Bat occurrence within the proposed range footprint is unknown, but they have been recorded along the MPRC access road and within the Kīpuka Kālawamauna Endangered Plant Habitat. In the PTA BO, the USFWS cites research that foraging Hawaiian hoary bats often fly 100 feet (30 meters) and more above tree canopy height and commuting bats fly 495 feet (150 meters) or more above the ground. Other research cited claims that the mean flight altitude for Hawaiian hoary bats observed at PTA ranges from 33 to 495 feet (10 to 150 meters), with an overall mean of  $103 \pm 96$  feet ( $31 \pm 29$  meters) ( $n=37$  bats).

The USFWS stated that the efforts identified by the Army to minimize impacts of aircraft on listed species were the only practical measures available to avoid or minimize the incidence of aircraft strikes on Hawaiian hoary bats (USFWS 2003c). These measures include using dedicated landing and pickup zones at pre-approved firing points and ranges or requesting alternate sites from the Army Natural Resources Office (no helicopter insertion points in the Kīpuka Kālawamauna ), reporting all bird or bat strikes to the Natural Resources Office, and reinitiating consultation for any unauthorized take.

Little is known about the occurrence of petrels within or around PTA. PTA is exploring methods to adequately survey for the petrel throughout the installation.

Military readiness activities are exempt from take of migratory birds under MBTA, unless the Army determines that such take may have a significant adverse impact on a population of migratory bird species (see Section 3.9.5 for further information). A number of birds are known to occur within the proposed Twin Pu‘u range area, but the numbers of native migratory birds in the area have not been assessed. However, it is not

anticipated that any aircraft training within the proposed Twin Pu‘u range would take many birds, especially not to the degree of significant impact on a population level.

No birds or bat strikes have been reported at PTA. The USFWS stated in the 2003 PTA BO that the likelihood of such strikes by Army training would be low.

*Regulatory and administrative mitigation 7.* PTA will continue to implement it's BASH program that records all bird/bat/wildlife related strike data

*Regulatory and administrative mitigation 7a.* PTA would continue to implement the provisions of its INRMP that benefit migratory birds, other wildlife, and their habitat.

*Additional mitigation 7b.* A minimization measure that could be implemented is the use of bat detectors to determine bat activity in and around the training site. For aircraft activity, efforts would be made to avoid areas where bats are active.

### No Impacts

*Impact 6. Impacts on marine wildlife and coral ecosystems from runoff.* There would be no impacts on marine wildlife and coral ecosystems in the PTA ROI. No significant impacts from potential runoff are expected for marine wildlife resources or coral ecosystems. This Alternative can be accomplished in conjunction with SBCT training. Therefore, no additional LSV trips would be required to implement this alternative. The SBCT EIS (US Army and USAEC 2008) fully analyzed the impacts of LSV travel on marine wildlife and coral ecosystems. NOAA Fisheries consultation has already been completed. No further analysis is required for implementation of this alternative with regards to LSV and road vehicle travel to PTA.

The proposed Twin Pu‘u range under Alternative 4 is located quite a distance from the coastline. Due to lack of any permanent streams or water bodies, impacts from soil erosion caused by construction and training activities could only occur during periods of high runoff. However, these periods of high runoff on surface water are usually short in duration and infrequent and not expected to be significant. Due to the depth of groundwater beneath the PTA, activities within the proposed range site would not be expected to impact the groundwater. Therefore, the potential for soil and contaminant runoff to impact marine wildlife and coral ecosystems would be minimal and less than significant.

*Regulatory and administrative mitigation 4.* PTA would continue to implement land management practices and procedures in the ITAM work plan to reduce erosion impacts on soils from live-fire training.

*Impact 7. Vessel impacts on marine wildlife.* The Army PTA addressed the potential impacts from LSV trips between O‘ahu and the Island of Hawai‘i in the SBCT EIS and through consultation with NOAA Fisheries. As stated in Section 4.9.1 of this document, NOAA Fisheries concurred with the Army that slow speeds (less than 11 knots) of the LSV would make collisions with protected species unlikely, and therefore, not likely to adversely impact such species. With no additional LSV trips required to implement this alternative, implementation of this proposed Alternative would have no impacts on marine wildlife.

*Impact 8. Disturbance to marine wildlife from ground training.* Due to the substantial distance of the proposed Alternative 4 training site to the marine environment, noise and other disturbances associated with land-based weapons firing and explosions would not have an impact on marine wildlife.