

## 7.10 BIOLOGICAL RESOURCES

### 7.10.1 Affected Environment

Biological resources include plant and animal species and the habitats or communities in which they occur. This section is divided into discussions of general wildlife, vegetation, and habitat types common to KTA and KLOA (Figure 7-18). A discussion of the sensitive wildlife, vegetation, and sensitive habitats known to occur or with the potential to occur in this area is also included. Federal, state, and locally regulated species are included in this report, along with rare species, identified by rapid population decline or whose habitat has markedly decreased in recent years. Figure 7-18 shows the KTA ROI, which was based on the potential for fire damage and loss of land due to construction and trampling during SBCT training and the introduction of exotic species from soldiers moving throughout the installation. The extent of these impacts was determined by the type of vegetation present, human-made and topographic barriers, and buffers in the areas around the proposed actions. The ROI includes SBCT actions occurring on KTA, KLOA, Drum Road, and a buffer area, the size of which depends on the type of training or proposed activities that would occur and the fire risk imposed by vegetation and topography.

In addition to defining the ROI by the firebreak potential, a smaller portion of the ROI is based on the extent of habitat degradation imposed by trampling and by the effect of introducing exotic species associated with human activities. This is because in some areas vegetation is very moist, making the risk to fire extremely low. Changes to the present ROI, depicted in Figure 7-18, could alter the qualitative and quantitative analyses within the biological resources affected environment section.

#### ***Recovery Plan***

There are 11 plant and 1 animal species with recovery plans that are known to occur or have the potential to occur within the ROI. These species are listed in Appendix I-1a.

#### ***Vegetation***

KTA, a total of 9,409 acres (3,807.7 hectares), is at the end of the Ko'olau Mountains, on the northern tip of O'ahu. Private, agricultural, and additional Army training lands border it. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP surveys in 1989, 1993, and 1994 provided the foundation for much of the botanical information used in this EIS.

KLOA is to the north of SBER and to the south of KTA in the Ko'olau Mountains. It consists of 23,348 acres (9,448.6 hectares). KLOA was surveyed in 1976 and 1977 by the Environmental Impact Study Corporation and later by HINHP (1989 to 1993). Additional botanical and zoological information had been collected on KLOA and adjacent land. Kawailoa is an area of incredible biological richness, with areas of significance for protecting and managing these resources.

The vegetation communities identified in the KTA ROI are described below and are shown in Figure 7-19.

**Figure 7-18**  
Kahuku/Kawailoa Training Areas Biological Region of Influence

**Figure 7-19**

Vegetation Communities in the Kahuku/Kawailoa Training Areas Region of Influence

Portions of the KTA ROI contain valuable native vegetation communities, but much of the lower lying vegetation is composed of introduced and invasive plants. Several of these widespread species create dense single-species stands (Christmas berry, ironwood, strawberry guava) that shade out understory species. Two of the plants recently discovered in the ROI that are potentially devastating to the native communities of KTA are manuka (*Leptospermum scoparium*) and moho (*Heliocarpus popayanensis*). Disturbed moist forests are most at risk from these invasions, and efforts are needed to protect the native communities within these boundaries.

Native natural community types within the KTA ROI fall into six general categories: montane wet, lowland wet, lowland forest, lowland moist, lowland dry, and intermittent aquatic natural communities, none of which contain known wetlands (USARHAW and 25th ID [L] 2001a).

Within the montane wet communities there are three community types. The mixed fern/shrub community is a fairly restricted community in the topmost reaches of the Ko'olau Mountains, and rainfall generally exceeds 150 inches (381 centimeters) (USARHAW and 25th ID [L] 2001a). Common fern species in the area include *Sadleria* spp., *Cibotium* spp., and *Dicranopteris* spp. Common shrub species include *Hedyotis* spp., 'ōhi'a (*Metrosideros polymorpha*), 'ōhelo (*Vaccinium* spp.) and kōpiko (*Psychotria* spp.). Rare plants listed within this community are ha'iwale (*Cyrtandra viridiflora*), *Myrsine fosbergii*, and kōlea (*M. juddii*). The wet cliff habitat provides effective protection from wild pigs.

The 'ōhi'a mixed bog community is also restricted to the upper elevations (above 2,800 feet [853.4 meters]) of the Ko'olau Mountains. Annual rainfall exceeds 150 inches (381 centimeters), and the soils are poorly drained, acidic, and part clay. 'Ōhi'a is the dominant species, whether as dwarf form in open shrubland or as dense shrub thicket. The herbaceous understory is composed of sedges, grasses, and mosses, including *Oreobolus*, kuolohia (*Rhynchospora*), *Dichanthelium*, 'uki (*Machaerina*), and *Racomitrium*. Rare plants listed within this community include nohoanu (*Geranium*), hōwaiaulu (*Lagenifera*), silversword (*Argyroxiphium*), 'ākia (*Wikstroemia*), na'ena'e (*Dubautia* spp.), kama'hala (*Labordia*), and 'alani (*Melicope*). This community is critically imperiled.

'Ōhi'a shrubland falls between 2,400 and 2,800 feet (731.5 and 853.4 meters). The steep windswept ridges have shallow soil, and rainfall is generally between 100 and 200 inches (254 and 508 centimeters) per year. Dwarfed native trees and shrubs thrive here. In addition to 'ōhi'a, this community frequently consists of manono (*Hedyotis terminalis*), 'alani, kōlea (*Myrsine*), and other plants. Common herbaceous species in this community include *Trematolobelia* spp. and *Clermontia* spp., and ferns are represented by *Cibotium* spp. and 'ama'u (*Sadleria* spp.). Documented rare plants in this community include *Cyrtandra viridifolia*, *Lycopodium nutans*, *Hesperomania arborescens*, kōlea (*Myrsine* spp.), wāwae'iole (*Zanthoxylum oahuense*), and O'ahu violet (*Viola oahuense*).

The lowland wet community type in KTA is 'ōhi'a shrubland. It is found between 1,640 and 2,000 feet (500 and 610 meters). The steep windswept ridges have shallow soil, and rainfall is generally between 100 and 200 inches (254 and 508 centimeters) per year. Dwarf native tree

and shrub species thrive here. In addition to ‘ōhi‘a, this community frequently consists of manono (*Hedyotis* spp.), ‘alani, and kōlea (*Myrsine*). Common herbaceous species in this community include *Trematolobelia* spp. and *Clermontia* spp., and ferns are represented by *Cibotium* spp. and ‘ama‘u (*Sadleria* spp.). Documented rare plants in this community include hāhā (*Cyanea koolauensis*) and *Gardenia mannii*.

Within the lowland forest zone is the native ‘ōhi‘a forest. The general conditions are warm, moist to wet, and wind sheltered in this area below the Ko‘olau summit (1,900 to 2,000 feet [579 to 610 meters]). In addition to the dominant ‘ōhi‘a, other common tree species include manono (*Hedyotis terminalis*), mehame (*Antidesma platyphyllum*), and kōlea (*Myrsine* spp.), as well as the possible codominant species *Cheirodendron*. *Cibotium* species are the dominant ferns. Herbaceous plants are māmaki (*Pipturus albidius*), naupaka kuahiwi (*Scaevola* spp.), and na‘ena‘e. The only rare plant documented in this area is *Gardenia mannii*.

Also within the lowland forest zone is the uluhe shrubland, which is widespread on many of the Hawaiian Islands, usually in wet lowland areas below 2,200 feet (671 meters). The dominant plants in this community include two ferns, *Dicranopteris linearis* and uluhe lau nui (*Diplopterygium pinnatum*). No rare plants were observed in this community.

The KTA ROI contains two lowland moist communities. Koa/‘Ōhi‘a forest is below 2,100 feet (640 meters) and in leeward areas of good drainage; the annual rainfall is between 35 and 75 inches (84 and 191 centimeters). Besides the dominant koa (*Acacia koa*) and ‘ōhi‘a, native trees in this community include kōpiko, mehame (*Antidesma platyphyllum*), ‘ōhi‘a hā (*Syzygium sandwicensis*), ‘ahakea (*Bobea elatior*), and halapepe (*Pleomele halapepe*). Uluhe (*Dicranopteris linearis*) is the dominant understory species, but naupaka kuahiwi (*Scaevola gaudichaudiana*), alahe‘e (*Canthium odoratum*), and ‘ākia are common. Also documented are ferns, such as pala‘ā (*Odontosoria chinensis*, *Elaphoglossum crassifolium*, and *Nephrolepis exalta*), vines, such as maile (*Alyxia oliviformes*) and ‘ie‘ie (*Freycinetia arborea*), and sedges (*Carex wahuensis*, *C. meyenii*, and *Gabnia beechyi*). Rare plants in the KTA community are kaulu (*Pteralyxia macrocarpa*) and ‘ohe‘ohe (*Tetraplasandra gymnocarpa*). Rare plants in the KLOA community are nā‘ū (*Gardenia mannii*), heau (*Exocaropus gaudichaudii*), and ‘alani (*Melicope hydgatei*).

‘Ōhi‘a lowland mesic forest is an additional community dominated by ‘ōhi‘a. Annual rainfall averages about 75 inches (191 centimeters), and though ‘ōhi‘a makes up about 70 percent of the canopy layer, many other native plants are included in the community. ‘Ahakea (*Bobea elatior*), halapepe (*Pleomele halapepe*), kōlea (*Myrsine* spp.), and lama (*Diaspyros sandwicensis*) are all represented. The rare plant in this community is nīoi (*Eugenia koolauensis*).

Lama forest is the only lowland dry community type in the KTA ROI. It is confined to cliffs and harsh ‘a‘ā lava flows in the Hawaiian Islands, and threats from pigs and exotic plants are low. KTA has small stands of this community type between 600 and 900 feet (183 and 274 meters). The canopy is dominated by *Diaspyros sandwicensis*, though other native trees are common. The understory is commonly made of alahe‘e (*Canthium odoratum*), ‘ākia, pūkiawe (*Styphelia tameiameia*), and ‘akoko (*Chamaesyce multiformis*). Native vines are maile and huehue (*Cocculus trilobus*). Rare plant species in this community in KTA are nīoi (*Eugenia koolauensis*) and keahi (*Nesoluma polynesianum*).

The intermittent streams and gulches that run through the KTA ROI are Pākūlena Stream, Kālunawaika‘ala Stream, Kalele‘iki Stream, Paumalū Stream, Kaunala Stream, Elehāhā Stream, Kamananui Stream, Kaiwiko‘ele Stream, Kawainui Stream, Kawai‘iki Stream, ‘Ōpae‘ula Stream, Helemanō Stream, Poamoho Stream, North Fork Kaukonahua Stream, Waiale‘e Gulch, ‘Ō‘io Stream, ‘Ō‘io Gulch, Kawela Stream, Pahipahi‘ālua Gulch, Ho‘olapa Gulch, Kalaeokahipa Gulch, ‘Ōhi‘a Gulch, Kea‘aula Gulch, Lamaloa Gulch, and Hina Gulch.

Drum Road begins at HMR and continues through the Ko‘olau Mountains to various sites in the KTA via KLOA. The trail generally follows the western border of KLOA. The vegetation alongside this trail is composed mainly of nonnative species in the lower elevations with the native plants (‘ie‘ie, ‘ōhi‘a, uluhe, koa) increasing in distribution toward the upper elevations. Rainfall and cloud cover is not uncommon along this trail. There are occasional cleared, flat grassy areas along the trail. These areas have been subjected to grazing pressure from cattle for many years and are either still in use or are maintained as helicopter landing zones.

The Army seeks to preserve and expand the populations of federally listed plants on lands under their management. The pest management and endangered species management programs overlap and reduce the negative impacts of introduced species on the landscape (USARHAW and 25th ID[L] 2001a). Control of noxious weeds is required by the State of Hawai‘i Noxious Weed Rules (USDA, no date) and is supported by the AR 200-5 *Pest Management* (HQDA 1999).

Invasive and noxious weeds that are proposed for control in the KTA ROI include *Acacia confusa*, hāmākua pāmakanī (*Ageratina riparia*), *Aleurites moluccana*, broomsedge (*Andropogon virginicus*), Oriental vessel fern (*Angiopteris evecta*), shoebuttton (*Ardisia elliptica*), pink fringe (*Arthrostepma ciliatum*), daisy fleabane (*Erigeron karvinskianus*), Kāhili ginger (*Hedychium gardnerianum*), heirba del solado (*Melochia umbellata*), fountain grass (*Pennisetum setaceum*), and Chinese violet (*Azystasia gangetica*). Widespread weed species would be controlled where they threaten native plants and communities. Current control methods have focused on palm grass (*Setaria palmifolia*), strawberry guava (*Psidium cattleianum*), princess flower (*Tibouchina urvilleana*), manuka, teatree (*Leptospermum flavescens*), and holly (*Ilex cassine*).

Native plants are directly affected by populations of feral pigs (*Sus scrofa scrofa*), which contribute to numerous ecological problems (Juvik 1998). The effects of these wild pigs include trampled and grazed native plants and advanced erosion and landslides (USARHAW and 25th ID[L] 2001a; PCSU 1999, 2000, 2001). Water collects in the rutted ground, providing a perfect breeding place for mosquitoes, which can carry avian malaria (HINHP 1994). Browsing and otherwise destroying the native vegetation encourages alien plants to become established, which can severely alter the habitat for native plants (Atlas 1998).

A possible additional threat to *Melicope hydgatei* is the nonnative black twig borer (*Xylosandrus compactus*). The pest burrows into branches and introduces a pathogenic fungus that often kills the host.

Introduced snails and slugs pose a threat to rare Hawaiian plants by preying on the seedlings, stems, and fruit, which reduces regeneration of the host. Rats (*Rattus rattus* and *R. exulans hawaiiensis*) also are known to eat the fruit of certain species of native plants, seriously affecting the reproduction of *Pritchardia kaalae* and plants in the *Campanulaceae* and *Gesneriaceae* families (Atlas 1998).

Habitat in the KTA ROI could be disturbed by military training activities, and trampling associated with training activities could affect populations of rare plants (R. M. Towill Corp. 1997b). Nonmilitary impacts on the area include cultivation of illegal plants along the KTA boundary, pig hunting, mountain biking, horseback riding, and motocross use. Schofield-Waikāne and Pūpūkea hiking trails are within the ROI, and hiking activities are monitored to reduce potential human impacts. Cigarette litter, campfires, arson, and vehicle activity are nonmilitary impacts that could affect the area.

Fire threat is high in KTA. Fire has been known to occur in the neighboring KLOA and is a threat to native plants and ecological communities. Areas along the lower boundary of the native plant zones are mostly highly flammable introduced species. Additionally the rugged terrain of the training area limits access for fire suppression and control. The Army has standard operating procedures meant to reduce the threat of fire in these remote areas.

One important component of Army resource management is ITAM and the individual projects that are assigned under that heading (see Chapter 2, Section 2.1.5 for an overview). The ITAM LCTA program has not been fully implemented at KLOA or KTA. KLOA is most often used for aviation training and is at a low priority for general monitoring. Vegetation surveys and erosion studies have been done on KTA. These data provided the LRAM program with priority areas for rehabilitation. KLOA also includes areas that are targeted by LRAM as needing improvement. TRI seeks to find the best most efficient uses of the training lands on KTA and KLOA, while being sensitive to the natural resources. Wildfire management plans are in production for KTA and KLOA.

### **Wildlife**

Most of the wildlife inhabiting the largely disturbed landscape that makes up the KTA ROI are nonnative. The Army has been conducting regular zoological field surveys on KTA and KLOA that have focused on special status invertebrates, mammals, and birds. There have been no specific reptile or amphibian surveys on KTA due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys conducted by the University of Hawai'i, Bishop Museum Hawaiian Heritage Program, and the HINHP (1994) are cited in the following section. These natural resource surveys have been used for the resource assessments in the *Biological Inventory and Management Assessment at KTA for USARHAW* (HINHP 1994), *Biological Inventory and Management Assessment at KLOA for USARHAW* (HINHP 1994) *Endangered Species Management Plan Report, O'ahu Training Areas* (R. M. Towill Corp. 1997b), as well as the more recent *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a). Zoological information on Drum Road is less extensive because there are few known surveys focused on wildlife in these areas. Information on this section was gathered in association with the environmental assessment for improvements to Drum Road, and a site visit by a Tetra Tech biologist on January 30, 2003. The following sections describe the

general presence of species within the invertebrate, mammal, bird, and fish species. Sensitive species are listed in Tables 7-20 and 7-21.

### Invertebrates

The following are native snails observed in the ROI: O'ahu tree snails (*Achatinella curta*, *A. dimorpha*, *A. sowerbyana*, and *A. livida*), achatinellid land snails (*Auriculella perpusilla*, *A. pulchra*, and *Tornatellides* spp.), and the subulinid land snail (*Lamellidea* spp.) (R. M. Towill Corp. 1997b). Other native invertebrates known to KTA include springtails (*Entomobyra* spp. and *Seira* spp.), flies (*Camsicnemus ornatus*, *Drosophila suzukii* group spp., *Forcipomyia hardyi*, *F. kaneobe*, *Limonia hawaiiensis*, *L. jacobae*, *L. perkinsi*, *L. stygipennis*, *Orthocladus* spp., and *Scaptomyza* spp.), and three species of true bugs (*Hyalopeplus pellucidus*, *Microvelia vagans*, and *Nabis keraspboros*) (USARHAW and 25th ID[L] 2001a). Also observed on KTA have been four native species of butterflies and moths (*Hyposmocoma* spp. undetermined, *Mestolobes minuscula*, *Schrankia* spp., and *Scotorythra rara*), native planthoppers (*Trioza* spp.), bees, wasps, and ants (*Enicospilus* spp.), and an undetermined member of the *Eucoilidae* family. There are three native species of dragonflies and damselflies found on KTA (*Anax strenuus*, *Megalgrion koelense*, and *Neogonia blackburni*). The common stream shrimp (*Atyoida bisulcata*) and freshwater sponge (*Heteromyenia baileyi*) are native aquatic invertebrates that occur on KTA (R. M. Towill Corp. 1997b; USARHAW and 25th ID[L] 2001a). Additional native invertebrate species known to KLOA include the O'ahu tree snails *A. livida* and *A. pulcherima*.

Zoological surveys of KTA have detected the following nonnative invertebrates: cannibal snail (*Englandina rosea*), beetles (*Diomus notescens* and *Orcas australasiae*), springtail (*Salina celebensis*), and flies (*Allograpta exotica*, *Atrichopogon jacobsoni*, and *Letoera* spp.). There are also nonnative planthoppers (*Heterpsylla mimosae*), bees (*Diadegma* spp.), grasshoppers (*Elimaea punctifera*), and the two-spotted leafhopper (*Sophonia rufofascia*) (R. M. Towill Corp. 1997b; USARHAW and 25th ID[L] 2001a). Flatworms, amphipods, isopods, and thairid snails were found in Paumalū Stream (USARHAW and 25th ID[L] 2001a). Humans have purposely or accidentally introduced these species to O'ahu. They now threaten the native invertebrate species through competition for resources, predation, and the spread of disease. The cannibal snail is especially destructive to the native snail population that it preys on.

### Amphibians

There are no native terrestrial amphibians on the Hawaiian Islands.

Nonnative amphibians found on O'ahu and potentially on KTA are the bullfrog (*Rana catesbeiana*), wrinkled frog (*R. rugosa*), giant toad (*Bufo marinus*), Cuban tree frog (*Osteopilus septentrionalis*), and green and black dart-poison frogs (*Dendrobates auratus*). These species were introduced into O'ahu from other countries and have inhabited areas where adequate aquatic habitat and surrounding vegetation exists.

### Reptiles

There are no native terrestrial reptiles on the Hawaiian Islands.

Nonnative reptiles found on O'ahu include the green anole (*Anolis carolinensis*), mourning gecko (*Lepidodactylus lugubris*), stump-toed gecko (*Gehyra mutilata*), tree gecko (*Hemiphyllodactylus*

*typus*), Indo-Pacific gecko (*Hemidactylus garnotii*), house gecko (*H. frenatus*), metallic skink (*Lampropholis delicata*), and gold dust day gecko (*Phelsuma laticauda laticauda*). There is only one known terrestrial snake occurring on the Hawaiian Islands, the island blind snake (*Ramphotyphlops braminus*).

#### Terrestrial Mammals

The Hawaiian hoary bat (*Lasiurus cinereus semotus*) has the potential to occur on KTA (USARHAW and 25th ID[L] 2001a). It is the only native terrestrial mammal on the Hawaiian Islands.

The following nonnative species may occur on KTA: feral pig (*Sus scrofa scrofa*), Indian mongoose (*Herpestes auro-punctatus*), feral dog (*Canis familiaris*), Norway rat (*Rattus norvegicus*), black rats (*R. rattus*), Polynesian rat (*R. exulans hawaiiensis*), and house mouse (*Mus musculus*).

#### Birds

The following indigenous forest bird species have been recorded on KTA: O'ahu 'elepaio (*Chasiempis sandwichensis ibidis*), O'ahu 'amakihi (*Loxops virens chloris*), great frigatebird (*Fregata minor palmerstoni*), Pacific golden-plover (*Pluvialis fulva*), and the Hawaiian short-eared owl (*Asio flammeus sandwichensis*).

Nonnative bird species known to occur in KTA include the red-billed leiothrix (*Leiothrix lutea*), white-rumped shama (*Copsychus malabaricus*), Japanese bush warbler (*Cettia diphone*), spotted dove (*Streptopelia chinensis*), zebra dove (*Geopelia striata*), common myna (*Acridotheres tristis*), red-vented bulbul (*Pycnonotus cafer*), and the Japanese white-eye (*Zosterops japonicus*). Introduced species on KTA are nutmeg manikin (*Lonchura punctulata*), red-crested cardinal (*Paroaria coronata*), common waxbill (*Estrilda astrild*), house finch (*Carpodacus mexicanus*), white cockatoo (*Cacatua galerita*), barn owl (*Tyto alba*), ring-necked pheasant (*Phasianus colchicus*), and northern cardinal (*Cardinalis cardinalis*).

#### Fish

The aquatic natural communities in the KTA ROI are mostly intermittent streams. Mālaekahana Stream is not intermittent, but it goes underground before reaching the ocean. HINHP conducted biological assessments of selected streams in 1997, and the USGS collects data from stream gages at 'Ōpae'ula and Kamananui streams. Fish identified as part of the Anahulu River, Waimea River, and Paukauila Stream survey include endemic gobies (*Awaous guamensis*, *Lentipes concolor*, and *Stenogobius hawaiiensis*), Sandwich Island sleeper (*Eleotris sandwichensis*), Hawaiian flagtail (*Kublia sandvicensi*) and 'o'opu nōpili (*Sicyopterus stimpsoni*) (AECOS 2002; USARHAW and 25th ID[L] 2001a).

One introduced fish, *Geotomus*, was observed at Paumalū Stream (USARHAW and 25th ID[L] 2001a).

#### **Sensitive Species**

Potential sensitive species on KTA were identified by USFWS, the State of Hawai'i DLNR (2002a), USARHAW biologists and surveys, and the HINHP (1994).

A current list of all sensitive vegetation and wildlife and any critical habitat in the region is found in Tables 7-20 and 7-21. An assessment of the likelihood of a species occurring on KTA was made based on the habitat requirements and geographic distribution of the species, existing on-site habitat quality, and the results of biological surveys. Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, can be found in Appendix I-1 (Recovery Plans 1-1a; Plants: I-1b; Wildlife I-2c; Critical Habitat I-1d).

#### Sensitive Plant Species in the KTA ROI

KTA and KLOA have twenty-four species of endangered plants, four species of concern and eight candidate species for federal listing. Sensitive plants listed as occurring within the training area include *Pteralyxia macrocarpa* (a federally recognized species of concern), *Myrsine juddii*, *Viola oahuensis*, *Gardenia mannii*, and *Zanthoxylum oahuense* (federally recognized endangered species).

Although the native vegetation on O'ahu's central plateau has been almost completely replaced by agriculture, the KTA ROI hosts a very important cache of endangered species and natural communities. The terrain is characterized by deep gulches and high cliffs covered with dense vegetation. Sensitive plants and their likelihood of occurrence in the KTA ROI are shown in Table 7-21; documented occurrences of sensitive plant species in the KTA ROI are shown in Figure 7-20.

#### Sensitive Wildlife Species

The following discussion includes a profile of only those sensitive wildlife species that are considered likely to be found in the project area. This information is based heavily on information from the O'ahu INRMP (USARHAW and 25th ID[L] 2001a), ESMPR (R.M. Towill Corp. 1997b), and the biological inventories of KTA and KLOA (HINHP 1994). HINHP biologists and qualified individuals conducted surveys of KTA in 1993 and 1994. Shallenberger conducted special status species surveys of O'ahu training areas, including KTA, in 1977. The latest USFWS and survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources. Sensitive terrestrial wildlife and their likelihood of occurrence at the KTA ROI are listed in Table 7-21. Figure 7-21 shows the locations of documented sensitive terrestrial wildlife identified in the KTA ROI. Sensitive species outlined in the table below are most likely to occur in the higher elevations in the Ko'olau Mountains and are unlikely to occur in the disturbed lowland areas that make up a large portion of the ROI.

Nine federally listed endangered species and five species globally or locally threatened have been recorded in KTA or its vicinity (R.M. Towill Corp. 1997b). These species are listed on Table 7-21 and are described further below. This includes eight invertebrates, five birds, and an endangered terrestrial mammal (USARHAW and 25th ID[L] 2001a).

**Table 7-20**  
**Sensitive Plant Species Occurring or Potentially Occurring in the KTA and KLOA ROI**

Scientific Name	Hawaiian Name/Common Name	Federal Status <sup>1</sup>	State <sup>2</sup> /Global Status <sup>3</sup>	Habitat	Date Last Observed	Likelihood of Occurrence
<i>Bobea timonioides</i>	‘ahakea/-	SOC	-/G2	Ridges and gulch slopes of dry to moist lowland forests	2002	C
<i>Chamaesyce rockii</i>	‘akoko, koko, kōkōmālei/-	E	-/G1	Cloud-swept summit and deep wet gulches	2000	C
<i>Cyanea acuminata</i>	‘ōhā, hāhā, ‘ōhāwai/-	E	-/G1	Moist to wet forest	2000	C
<i>C. crispa</i>	‘ōhā, hāhā, ‘ōhāwai/-	E	-/G1	Moist to wet forest	2000	C
<i>C. humboldtiana</i>	‘ōhā, hāhā, ‘ōhāwai/-	E	-/-	Moist to wet forest	2000	C
<i>C. koolauensis</i>	‘ōhā, hāhā, ‘ōhāwai/-	E, CH	-/G1	Moist to wet forest	2000	C
<i>C. lanceolata</i>	‘ōhā, hāhā, ‘ōhāwai	C	-/G1	Moist to wet forest	2000	C
<i>C. st.-johnii</i>	‘ōhā, hāhā, ‘ōhāwai/-	E, CH	-/G1	Cloud-swept ridges	2000	C
<i>Cyrtandra dentata</i>	ha‘iwale/-	E, CH	-/G1	Moist forest slopes	2000	C
<i>C. viridiflora</i>	NCN	E	-/-	Windy wet ridge tops	2000	C
<i>Eugenia koolauensis</i>	nōi/-	E	-/G1	Dry gulches and slopes	2002	C
<i>Exocarпус gaudichaudii</i>	heau/whiskbroom sandalwood	SOC	-/G1	Moist ridges and shrublands, wet forests, usually associated with ‘ōhi‘a	2000	C
<i>Gardenia mannii</i>	nānū, nā‘ū	E, CH	-/G1	Moist to wet forests	2000	C
<i>Hedyotis fluviatilis</i>	NCN	C	-/G1	Moist to wet forests	2000	C
<i>Hesperomannia arborescens</i>	NCN	E, CH	-/-	Moist to wet forest slopes and ridges	2000	C
<i>Lobelia gaudichaudii</i> ssp. <i>gaudichaudii</i>	NCN	SOC	-/-	Cloud-swept summit forest	2001	C
<i>Melicope hiiakae</i>	NCN	C	-/-	Native-dominated moist forest	2000	C
<i>M. hylgatei</i>	NCN	E	-/-G1	Native-dominated moist forest	2000	C
<i>Myrsine fosbergii</i>	NCN	C	-/-G2	High elevation Ko‘olau forests	2000	P
<i>Nesoluma polynesicum</i>	keahi	SOC	-/G2	Native-dominated moist forest	2000	C

**Table 7-20**  
**Sensitive Plant Species Occurring or Potentially Occurring in the KTA and KLOA ROI** *(continued)*

Scientific Name	Hawaiian Name/Common Name	Federal Status <sup>1</sup>	State <sup>2</sup> /Global Status <sup>3</sup>	Habitat	Date Last Observed	Likelihood of Occurrence
<i>Pblegmariarius nutans</i> ( <i>Lycopodium nutans</i> )	wāwae‘iole/	E, CH	-/-	Wet forests	2000	C
<i>Phyllostegia hirsuta</i>	NCN	E, CH	-/G1	Steep, shaded, moist to wet slopes	2000	C
<i>Platydesma cornuta</i> var. <i>cornuta</i>	pilo kea/-	C	-/G2	Moist forests	2001	C
<i>Psychotria hexandra</i> ssp. <i>oahuensis</i>	NCN	C	-/G4	Moist to wet forests	2000	C
<i>Pteris lidgatei</i>	NCN	E, CH	-/-G1	Steep banks in wet forest	2000	C
<i>Pteralyxia macrocarpa</i>	kaulu	NCN	-/G1	Native-dominated moist forest	2000	P
<i>Sanicula purpurea</i>	NCN	E, CH	-/-G1	Mossy slopes and open bogs	2000	C
<i>Stenogyne kaaka</i> e spp. <i>Sherfii</i>	NCN	E	-/-	Mesic forest	2000	U
<i>Tetraplasandra gymnocarpa</i>	‘ohe‘ohe/-	E	-/G1	Summit forests	2000	C
<i>Thelypteris boydiae</i>	NCN	C	-/G1	Moist forest slopes	2000	C
<i>Viola kanaensis</i>	NCN	E	-/-	Cloud-swept summits	Unknown	P
<i>V. oahuensis</i>	NCN	E, CH	-/G1	Cloud-swept summits	2000	C
<i>Zantboxylum oahuense</i>	NCN	C	-/G2	Mesic forest	2000	C

Sources: USFWS 2002a; USARHAW and 25th ID(L) 2001a and b

Notes:

NCN = No common name

Status:

**<sup>1</sup>Federal:**

E = Endangered

SOC = Species of concern

C = Candidate species for listing

CH = Critical habitat designated or proposed for designation

**<sup>2</sup>State**

-/- = No Status

**Likelihood of occurrence on the project site**

C = Confirmed

P = Potentially may occur

U = Unlikely

**<sup>3</sup>Heritage Global Rank:**

G1 = Species critically imperiled globally (typically 1-5 current occurrences)

G2 = Species imperiled globally (typically 6-10 current occurrences)

-/- = No Status

**Table 7-21  
Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring on KTA ROI**

Scientific Name	Hawaiian Name/ Common Name	Federal Status <sup>1</sup>	State <sup>2</sup> /Global Status <sup>3</sup>	Habitat	Date last observed	Likelihood of Occurrence
<b><u>Invertebrates</u></b>						
<i>Achatinella aperplexa</i>	pūpū kuahiwi, pūpū kaniōe, kāhuli/O‘ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters)	2001	C
<i>A. byronii/decipiens</i>	pūpū kuahiwi, pūpū kaniōe, kāhuli/O‘ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters)	2001	C
<i>A. curta</i>	pūpū kuahiwi, pūpū kaniōe, kāhuli/O‘ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters)	1986	C
<i>A. lila</i>	pūpū kuahiwi, pūpū kaniōe, kāhuli/O‘ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters)	2001	C
<i>A. livida</i>	pūpū kuahiwi, pūpū kaniōe, kāhuli/O‘ahu tree snail	E	E/GH	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters)	2001	C
<i>A. pulcherima</i>	pūpū kuahiwi, pūpū kaniōe, kāhuli/O‘ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters)	1974	P
<i>A. soverbyana</i>	pūpū kuahiwi, pūpū kaniōe, kāhuli/O‘ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters)	2000	P
<b><u>Birds</u></b>						
<i>Asio flammeus sandwichensis</i>	pueo/Hawaiian short-eared owl	SOC+	E*/G5T3	Pastures, grasslands, dry and wet forests that are dominated by either native or nonnative vegetation. Sea level to 7,900	1985	C
<i>Chasiempis sandwichensis ibidis</i>	O‘ahu ‘elepaio/-	E, CH	E/G4T1	Native Hawaiian forest	1977	P
<i>Himatione sanguinea sanguinea</i>	‘apapane/-	+	-/G4	Hardwood forest, primarily native ‘o‘hia and ‘o‘hia- koa and mixed native-exotic forest at high elevations.	1993	C
<i>Paroreomyza maculata</i>	‘alauahio/O‘ahu creeper	E	E/G1	Native Hawaiian shrublands, forests, and bogs	1985	C
<i>Vestiaria coccinea</i>	‘i‘iwi/Hawaiian honeycreeper	+	E*/G4	Native forests, especially ‘o‘hia forest	2000	C

**Table 7-21**  
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring on KTA ROI (continued)**

Scientific Name	Hawaiian Name/ Common Name	Federal <sup>1</sup> Status	State <sup>2</sup> /Global <sup>3</sup> Status	Habitat	Date Last Observed	Likelihood of Occurrence
<b><u>Mammals</u></b>						
<i>Lasiurus cinereus semotus</i>	-/Hawaiian hoary bat	E	E/G5T2	Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, and riparian habitats	1976	P
<b><u>Fish</u></b>						
<i>Lentipes concolor</i>	‘o‘opu ‘alamo‘o /-	-	-/G3	Freshwater, brackish, and marine habitats, depending on life stage	2000?	C

Sources: USARHAW and 25th ID(L) 2001a; HDLNR 2002a; HINHP 1994; R. M. Towill Corp. 1997; NatureServe 2001; Virginia Tech 1998

Notes:

NCN = No common name

\*The state endangered listing refers only to the populations on O‘ahu, Lana‘i, and Moloka‘i

Status:

/-/ = No Status

**<sup>1</sup>Federal:**

E = Endangered

SOC = Species of concern

CH = Critical habitat designated or proposed for designation

+ = Birds of Conservation Concern

**<sup>3</sup>Heritage Global Rank:**

G1 = Species critically imperiled globally (typically 1-5 current occurrences)

G3 = Species rare with restricted range (typically 21-100 current occurrences)

G4 = Species apparently globally secure

G5 = Species demonstrably globally secure

GH = Species known only from historical occurrences

T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)

T2 = Subspecies imperiled globally (typically 6-10 occurrences)

**<sup>2</sup>State**

E = Listed as endangered

**Likelihood of occurrence on the project site**

C = Confirmed

P = Potentially may occur

U = Unlikely to occur

**Figure 7-20**

Special Status Plant Species in the Kahuku/Kawailoa Training Areas Region of Influence

## ***Sensitive Habitats***

### *Critical Habitat*

There are 27515 acres of proposed plant critical habitat within the KTA ROI. The five plants for which critical habitat is proposed on KTA are listed in Appendix I-1d and are shown in Figure 7-22. There is no federally designated or proposed critical habitat for wildlife within the KTA ROI.

### *Ecologically Sensitive Areas*

There are two areas on KTA that have been determined by elevation, topography, and prevailing ecological conditions to be ecologically sensitive. They contain vegetation communities that are considered rare or threatened.

The wet summit crest zone is considered sensitive and exists in areas above 1,640 feet (500 meters), along the northern Ko‘olau summit. The relatively gentle ridges are cut by steep-sided gulches in this cool, wet cloud-swept region. The vegetation community in this part of the ROI is almost exclusively ‘ōhi‘a lowland wet shrubland; this community is not considered rare and has a Global Heritage ranking of G3. Loulu hiwa lowland wet forest had been labeled a rare natural community (Global Heritage ranking of G1) and occurs in one steep-sided drainage area within the ROI. An additional rare natural community known in this area is ‘ōhi‘a mixed montane bog, which has a Global Heritage ranking of G1.

The second sensitive area is the lowland forest zone. It exists from ridge tops to gulch bottoms at elevations of 590 to 2,200 feet (180 to 671 meters). This area is generally less windy, with conditions being warmer, and moisture ranging from moist to wet as rainfall diminishes increasingly with distance from the summit. ‘Ōhi‘a lowland wet forests are present in higher elevations, with gradation to koa/‘ōhi‘a lowland moist forest. Adjacent areas are generally a mosaic of moist forest types, with somewhat diverse canopy constituents, though they are generally dominated by ‘ōhi‘a. The drier zones are moist to dry shrublands dominated by *Dodonea viscosa* (‘a‘ali‘i). The steeper slopes at this elevation are dominated by uluhe (*Dicranopteris*) lowland wet shrubland. These natural communities represent relatively widespread vegetation types that occur on most of the main islands; none are considered rare (Global Heritage rankings of G3 and G4).

There is one aquatic natural community (Mālaekahana Stream) on KTA with a vegetation community rank of G4.

### *Biologically Significant Areas*

The Hawai‘i Natural Heritage Program has defined three types of BSAs for managing important natural communities. All are found in the KTA ROI and are shown in Figure 7-23.

BSA1: Contains a high density of federally listed endangered, proposed endangered, or candidate species.

**Figure 7-21**

Special Status Wildlife Species in the Kahuku/Kawailoa Training Areas Region of Influence

**Figure 7-22**

Proposed Plant Critical Habitat in the Kahuku/Kawailoa Training Areas Region of Influence

**Figure 7-23**

Biologically Significant Areas in the Kahuku/Kawailoa Training Areas Region of Influence

Approximately 1,000 acres (405 hectares) of the KTA ROI in KLOA are designated as BSA1. This includes much of the wet summit crest ecological zone and the two rare natural communities. Twenty-six of the 28 endangered plant species at KLOA are in this area.

BSA2 contains all or some of the following: lower densities of current occurrences of federally listed endangered or proposed endangered species, current occurrences of candidate species or other species of concern that are expected to be upgraded to federal protected status within the next few years, and areas judged likely to contain high densities of federally listed species based on habitat assessment, despite the lack of any record of such occurrence to date.

There are five BSA2 areas in KTA, three of which are in the northern portion of the training area and contain populations of *Eugenia koolauensis*. At the southern tip of KTA is a BSA2 that includes in its vegetative community populations of the federally listed as endangered *Gardenia manni*, *Cyanea koolauensis*, and *Hesperomannia arborescens*. In the northwest of KTA is an additional BSA2 that harbors the endangered tree *Tetraplasandra gymnocarpa*, as well as *Gardenia manni*. An additional BSA2 zone within the ROI is composed mostly of potential habitat for the endangered land snail, *Achatinella*. This area covers all the remaining wet summit crest zone that was not included in BSA1. Twelve endangered plant species are known to occur in this region: *Eugenia koolauensis*, *Cyanea longiflora*, *Delissea subcordata*, *Gardenia manni*, *Labordia cyrtandrae*, *Lycopodium nutans*, *Melicope hygatei*, *Myrsine juddii*, *Phyllostegia hirsute*, *P. parviflora* var. *parviflora*, *Platanthera holochila*, and *Viola oahuensis*.

BSA3 is stands of intact native vegetation with few or no known occurrences of rare elements.

KTA's BSA3 area is large and continuous and adjoins all but one of the BSA2 areas. The dominant vegetation types are 'ōhi'a lowland wet forest and uluhe lowland wet shrubland, which are potential habitats for endangered tree snails and native forest birds. As of 1997, seven plants in the BSA3 region were upgraded to federal status, and it is possible that boundary areas have been revised. Although there are no rare communities in the BSA3, the forests in these locations are native dominated and provide potential habitat for species reintroduction.

Also found within the ROI is sensitive snail habitat. Although this habitat has not been federally designated or proposed as critical habitat, it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on O'ahu. This area is shown with the BSAs in Figure 7-23

## 7.10.2 Environmental Consequences

### **Summary of Impacts**

Biological resources that have been considered include vegetation communities, wildlife, sensitive species, and sensitive habitats. Significant impacts mitigable to less than significant include impacts from fire on sensitive species and habitat, impacts on federally listed species and habitat from training activities, impacts on sensitive species from the spread of

nonnative species from troop movements and construction, and loss and degradation of sensitive species and habitat from use of Drum Road and other training activities. Less than significant impacts are expected on migratory birds from construction of FTI antennas and UAV use, on wildlife from noise and visual impacts of project activities, and on general vegetation and wildlife.

All biological resources have been assessed for potential impacts from project activities. For a full description of the impact methodology used to determine impact to a resource please refer to Section 4.10. Only the resources potentially affected are included in this chapter. If a resource was determined not to be impacted, it has not been included for discussion. A summary of impacts is provided in Table 7-22.

**Table 7-22**  
**Summary of Potential Biological Impacts at KTA/KLOA**

Impact Issues	Proposed Action	Reduced Land	
		Acquisition	No Action
Impacts from fire on sensitive species and habitat	⊗	⊗	⊗
Impacts on federally listed species and their federally designated or proposed critical habitat	⊗	⊗	⊗
Impact on sensitive species from the spread of nonnative species	⊗	⊗	⊗
Loss and degradation of sensitive species and habitat	⊗	⊗	⊗
TSV vessel impacts on marine wildlife and habitat.	N/A	N/A	N/A
Threat to migratory birds	⊕	⊕	⊕
Noise and visual impacts.	⊕	⊕	⊕
Impacts on general vegetation and wildlife	⊕	⊕	⊕
Runoff impacts on marine wildlife and coral ecosystems.	N/A	N/A	N/A

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

**LEGEND:**

⊗ = Significant	+ = Beneficial impact
⊗ = Significant but mitigable to less than significant	N/A = Not applicable
⊕ = Less than significant	
○ = No impact	

### ***Proposed Action (Preferred Alternative)***

#### *Significant but Mitigable to Less than Significant Impacts*

*Impact 1: Impacts from fire on sensitive species and habitat.* SBCT activities within the KTA/KLOA ROI would increase the likelihood of wildland fire. There are direct and indirect ways in which SBCT-associated fires would adversely affect sensitive species and habitat.

Sources of fire include cigarettes, vehicles, and training. Cigarettes discarded during mounted and dismounted training would be a risk with the increase in soldiers and training at KTA and KLOA. Use of the roads by military vehicles would increase with the proposed renovation and construction. An increase in the traffic flow from Drum Road would increase the potential for fire that could affect sensitive species. Specifically, the proposed Drum Road alignment traverses lowland wet and lowland moist forests and shrublands. Lastly, the increase in intensity in training, including the proposed SRTA live-fire training at KTA, would increase the probability that fire could originate in the ROI. The increased likelihood of wildfires and the potential SBCT risk factors are discussed in more detail in Section 7.12.2, Impact 5.

Because natural sources of fire ignition are relatively rare in Hawai'i, many native Hawaiian plants are not adapted to fire and are adversely affected by it. Alien species, particularly alien grasses and shrubs, typically invade areas after they have burned. This inhibits the regeneration of native plants. The removal of native species and the spread of alien species are potential impacts associated with wildland fires. In general, most fires in Hawai'i are caused by humans and are fueled primarily by nonindigenous grasses. If native species withstand an initial fire, they are often destroyed by later fires influenced by the invasion of highly flammable grasses. The potential spread of alien species resulting from wildfires is considered a significant impact because alien species often out-compete native species and destroy native communities. Wildfires that burn into native communities or sensitive habitats could take listed animal species and destroy listed plant species and sensitive habitats. There is no assurance that fires or other threats associated with the Proposed Action would not reach or otherwise threaten populations of listed species on KTA.

Vegetation communities within the ROI include the following:

- Nonnative vegetation communities (approximately 7,534 acres [3,049 hectares]);
- Lowland mesic forest and shrubland (approximately 379 acres [154 hectares]); and
- Lowland wet forest and shrubland (approximately 1,496 acres [605 hectares]).

The rare plants found in these communities are *Hesperomannia arborescens*, *Phyllostegia parviflora*, *Lycopodium nutans*, *Doodia lyonii*, *Pteris lidgatei*, *Lindsea repens* var. *macraeana*, *Lobelia hypoleuca*, *Cyanea longiflora*, *Pritchardia martii*, *Gardenia manni*, *Exocarpus gaudichaudii*, and *Melicope lydegatei*. There are areas of highly flammable alien plants (such as *Andropogon virginicus*) along the lower boundaries of areas dominated by native plants (R. M. Towill Corp. 1997b, 6-27; USARHAW and 25th ID[L] 2001a, 290). BSAs that occur within the ROI and that could be affected by a wildfire are BSA2, at 214 acres (87 hectares), and BSA3, at 2,747 acres (1,112

hectares). The rugged terrain can limit the suppression and control of fires, and they can easily spread unchecked into areas that contain sensitive species.

Fires started as a result of any of these SBCT-proposed actions could adversely affect sensitive wildlife by killing them directly or indirectly by destroying their habitat. The sensitive wildlife species listed in Impact 1 and all those listed in Table 7-22 as potential or confirmed in the ROI could be affected by a wildfire, depending on its extent and duration.

In conclusion, sensitive species and habitat occurring within the ROI would be negatively affected by the likely increase in fires that would result from the Proposed Action. Although most sensitive species and sensitive habitats found on KTA and KLOA occur at high elevations, where fire vulnerability is relatively low because of higher levels of rainfall and less fire-prone vegetation, these areas are still considered at risk from fire. The outbreak of fire in portions of the ROI where sensitive species and habitat exist would be a significant impact that would be mitigated to the less than significant level by regulatory and administrative mitigation, along with additional mitigation measures described below.

Regulatory and Administrative Mitigation 1. The following USARHAW standards and measures previously agreed to with USFWS would minimize the impact of fire on sensitive species and habitats:

- Implementation of the WFMP, which, upon its completion in August 2003, will detail fire avoidance systems and response strategy. General fire protection measures are described in the wildfire section within Section 7.12.2, Human Health and Safety Hazards, of this document.
- The ecosystem management directives and Army stewardship, described in Section 2.2.4, would minimize fire impacts on sensitive species by protecting and restoring sensitive species and habitat.
- USARHAW is considering implementing an environmental management system to further improve the identification and reduction of environmental risks inherent in mission activities. This would include ecosystem level management for all rare species, pest management, land rehabilitation and maintenance, and fire prevention and suppression.
- Section 7 Consultation and Regulatory and Administrative Mitigations 2, 3, and 4 would apply to this impact and would help reduce the impact to a less than significant level.
- USARHAW would notify the USFWS if a fire were to escape the firebreak roads within the ROI.

Additional Mitigation 1. Potential mitigation measures for this impact include:

- Providing resources to help adjacent private landowners and organizations manage their properties to minimize potential impacts of fire or other threats that may result

from USARHAW activities or that may originate on private property and affect USARHAW activities.

- Replanting any area damaged by fires with plants similar to those destroyed. Native species would be used in areas where their establishment seems likely. Plants known to be invasive or noxious would not be used

Additional Mitigations 2, 3, and 4 would apply to this impact and would help reduce the impact to a less than significant level.

Impact 2: Impacts on federally listed species and their federally designated or proposed critical habitat. The Proposed Action would have a significant but mitigable impact on federally listed species and their proposed critical habitat in the KTA ROI.

The effects of fire, along with the increase of mounted and dismounted training within the KTA/KLOA ROI would cause direct and indirect negative impacts on listed species and would disturb the habitat that supports listed species. A byproduct of increased activities in the KTA/KLOA ROI is the spread of nonnative species by soldiers and equipment. All of these effects would negatively affect listed species and habitat by the direct and indirect take of listed wildlife, the direct and indirect destruction of listed plants, and the direct and indirect adverse modification of critical habitat. Dozens of federally listed and sensitive species are known to occur or have the potential to occur within the KTA ROI (Figures 7-20 and 7-21). This includes the *Chamaesyce rockii*, *Cyanea acuminata*, *C. koolauensis*, O'ahu creeper, Hawaiian hoary bat, and O'ahu tree snails (Tables 7-20 and 7-21). There is also proposed plant critical habitat within the KTA/KLOA ROI (Figure 7-22), which would be negatively affected by training, as well as training-induced wildfires and introduction of nonnatives.

The significant impact on listed species and habitat would be mitigated to the less than significant level at KTA/KLOA by adhering to mitigation measures.

Regulatory and Administrative Mitigation 2. The effects of SBCT actions on listed species and federally designated critical habitat in the ROI are being evaluated as part of Section 7 consultation with USFWS. The USARHAW would consult about the proposed plant-critical habitat when it receives its federal designation. USARHAW would carry out all reasonable and prudent measures determined during this consultation, which would help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementing the Proposed Action.

Additional Mitigation 2. No additional mitigations have been identified.

Impact 3: Impact on sensitive species resulting from the spread of nonnative species. In general, both plant and animal alien species pose a threat to Hawaiian native ecosystems. The proposed actions on KTA could affect the introduction and spread of alien species in the following ways:

- Troops and equipment moving into Hawai'i from other countries, states, or islands and between subinstallations within Hawai'i increase the likelihood of alien plant/animal introductions.
- Construction could introduce alien species and other weeds through the use of sand and gravel that potentially contains alien plant seeds.

The use of Drum Road would introduce more invasive species to the area, which would have both a short-term and long-term impact on sensitive plants and wildlife.

A long-term increase in the use of Drum Road is associated with the Proposed Action. This includes increasing Stryker and conventional truck traffic (trucks and HMMWVs) on the proposed road. There would be 275 vehicles, 114 of which would be Strykers, that would travel on either trails or roads, from SBMR to KTA 12 times per year. Most of the travel would be on trails, but Drum Road would carry ten percent of all Stryker travel and 40 percent of all trucks between these two bases. There would be a net increase of 195 vehicles traveling on roads and trails between SBMR and KTA, four times per year, and 235 vehicles eight times per year. Transformation-related increases in the number of vehicles that would traverse Drum Road increase the likelihood that alien plants would be introduced or spread. The Proposed Action would increase the likelihood of a fire in the ROI, as discussed in Impact 1. Alien species often benefit from fires, due to their ability to colonize areas following a burn. Also the presence of alien species often provides fuel for wildfires, makes fires larger, and facilitates its spread. Alien plants pose a tremendous threat to sensitive plants and native vegetation communities.

Although most of the plant species in and around the proposed Drum Road are nonnative, the area could be further disturbed than it already is and would adversely affect the recovery of sensitive species. Sensitive plant species and sensitive wildlife species are likely to occur within the KTA ROI (See Section 8.10.1, Figures 8-27 and 8-28).

Satinleaf (*Chrysophyllum oliviforme*), manuka, and melochia (*Melochia umbellata*) are nonnative plants that have not yet established within the KTA ROI. The habitat degradation associated with the construction projects could lead to these very aggressive species becoming established throughout the project area. They can spread rapidly in a disturbed habitat, which could alter the original habitat and its associated ecosystem, adversely affecting native wildlife. Altering vegetative type and cover can devastate species that have evolved alongside another specialized species or cover type. Changes in vegetation can also adversely affect wildlife at sensitive times of their lifecycles by altering elements that they depend on, such as shelter.

It is unlikely that use of Drum Road and the vehicle tactical wash would introduce nonnative vertebrate animal species into the area. This is because there is a low risk of nonnative species being brought in from outside the state, which means a low risk of vector species and material being introduced.

Discrete quantities of sensitive native plant species that are especially threatened by nonnative species' invasion include the following:

- Ninety-five percent of the remaining nāioi (*Eugenia koolauensis*) plants exist within the KTA ROI. There is a high threat to these plants from alien species invasions associated with the proposed activities.
- Twelve individuals of the native gardenia nanu (*Gardenia manni*) exist in the KTA ROI. There is a moderate threat to these plants from alien species invasions associated with the proposed activities.
- Two to five percent of the remaining 'ohē'ohē plants (*Tetrapalasdandra gymnocarpa*) exist in the KTA ROI. There is a low to moderate threat to these plants from alien species invasions associated with the proposed activities.
- There are several sensitive wildlife species occurring within that ROI that could be affected by the spread of nonnative species: *Achatinella curta*, *A. livida*, *A. pulcherrima*, *A. soverbyana*, *Aurculella pulchra*, O'ahu 'elepaio, and the 'i'iwi (Figure 7-21). These species would be adversely affected by the introduction or increase in the spread of nonnative species within the KTA ROI.

Regulatory and Administrative Mitigation 3. USARHAW would follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines federal agency duties in regard to preventing and compensating for invasive species impacts. USARHAW would agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk. Implementing an environmental management system would further identify and reduce environmental risks inherent in mission activities. Section 7 Consultation and other regulatory and administrative measures identified in mitigations 1, 2, and 4 would apply to this impact and would help reduce the impact to a less than significant level.

Additional Mitigation 3. Potential mitigation measures for this impact include:

- Educating soldiers and other potential users of the facilities and roads in the importance of cleaning vehicles and field gear. Contractors and their employees would be educated about the need to wear clean clothes and to maintain clean vehicles when coming onto the construction site and would comply with measures to avoid introducing alien species to the project site.
- Using native plants in any new landscaping or planting, where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.
- Requiring all construction vehicles and equipment, excluding privately owned vehicles, to undergo a mandatory wash prior to entering construction sites. The construction vehicles and equipment would be left at the construction site or would be rewashed before returning to the construction site.

- Inspecting and washing all military vehicles at wash rack facilities prior to leaving SBMR, KTA, or PTA to minimize spreading weeds, such as fountain grass, and relocating invertebrates.

Additional mitigations 1, 2, and 4 would apply to this impact and would help reduce the impact to a less than significant level.

*Impact 4: Loss and degradation of sensitive species and habitat.* Loss and degradation of sensitive species and habitat would result from construction and training activities in the KTA ROI. The use of Drum Road as part of SBCT actions would adversely affect the environment by increasing the amount and intensity of traffic in the KTA ROI. Though much of the area surrounding Drum Road is already dominated by alien plants, the roads bring humans closer to biologically sensitive areas that exist in the ROI (Section 7.10.1, Figure 7-22). Sections of Drum Road cross biologically sensitive areas, with stands of intact, relatively common native vegetation. Part of the reason that these communities still exist is due to their remoteness. Opening this area up to the more direct effects of humans threatens these communities and their diversity. Hawaiian plant communities evolved without the environmental pressures that are prevalent on major landmasses and thus have no defense mechanisms to cope with these stresses. By fragmenting these sensitive communities, corridors for natural species dispersal are interrupted, alien plants are encouraged to spread, and the potential for native species to be reintroduced to areas dominated by alien species is limited. Troop and other foot traffic in or adjacent to native forest areas could harm rare natural communities, plants, and snails (R. M. Towill Corp. 1997b). *Tetraplasandra gymnocarpa*, a federally listed plant species was identified approximately 492 feet (150 meters) down a slope from Drum Road. This individual is unlikely to be affected directly by use of Drum Road but would be threatened by trampling if people were allowed to move off the proposed road or if a fire started as a result of vehicle use or a discarded cigarette. The likelihood of dismounted maneuver occurring along this portion of Drum Road is extremely small because the steepness of the slope is prohibitive.

Increased use of Drum Road would result in long-term direct and indirect impacts that would lead to habitat degradation. The present trail is a rutted dirt road that sees little activity. The use of Drum Road would fragment habitat for general and sensitive wildlife, ultimately reducing the quantity and quality of habitable lands. The presence of large loud vehicles would limit wildlife migration and would interrupt corridors for natural dispersal of species among these areas. Dust, erosion, and runoff would continue to adversely affect the areas that surround the road. The loss in habitat value occurs primarily in those areas surrounding the trail, which are exposed to increased noise, car fumes, general activity, and invasive species.

Dismounted and mounted training would occur on approximately 621 acres, (251 hectares) in multiple areas in the KTA ROI. Mounted training would occur and would almost double the present vehicular usage (7,211 MIMS currently; 13,772 MIMS predicted). Mounted maneuver proposed in portions of northern KTA (Figure 2-5) would destroy vegetation, possibly federally listed plants, would disturb wildlife, including federally and state listed species, and would cause severe soil erosion. The increased dismounted training proposed

for KTA and along Drum Road would result in trampling and habitat degradation in sensitive areas. Dismounted training would involve a greater area at KLOA, expanding the present 0 acres to 5,064 (2,049 hectares) as part of the Proposed Action.

Regulatory and Administrative Mitigation 4. To further avoid and minimize impacts on sensitive species and habitats, the following mitigation measures would be followed:

- In accordance with Section 404 of the Clean Water Act, the US Army Corps of Engineers Regulatory Branch must review any activities involving the discharge of dredged or fill material into waters of the US before construction to determine whether a Department of Army permit is required. If so, the Corps would determine whether a previously issued general permit authorizes the proposed action, or it would process a permit application for the proposed fill. If a Corps permit were required, a Section 401 Water Quality Certification issued by the State of Hawai'i Department of Health, Clean Water Branch, would also be required, as well as compliance with other applicable federal laws.
- Section 7 consultation and other Regulatory and Administrative Mitigation 1, 2, and 3 would apply to this impact and would help reduce the impact to a less than significant level; and
- Regulatory and Administrative Mitigation measures identified as part of Chapter 7, Section 7.8, Water Resources, and Section 7.9, Geology, would lessen this impact on sensitive species and habitat.

Additional Mitigation 4. Potential mitigation measures for this impact include:

- Using native plants in any new landscaping or planting, where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.
- Fencing or flagging, where practicable, any sensitive plant communities from activities that may take place within the ROI.
- Preserving or restoring sensitive habitat when feasible on its owned or leased lands.
- Investigating a new regulatory authority to work with nonprofit organizations to purchase buffer lands.

Additional mitigation measures identified as part of Chapter 7, Section 7.8, Water Resources, and Section 7.9, Geology, would lessen this impact on sensitive species and habitat.

#### Less than Significant Impacts

Threat to migratory birds. The presence of the FTI antennas could significantly affect migratory bird species known to occur in the KTA/KLOA ROI, especially those that migrate at night (USFWS 2000). Although the exact number of bird fatalities from tower collisions in Hawai'i is not known, birds are killed in large numbers worldwide by antenna support structures each year (USFWS 2000). This is a violation of the MBTA (16 USC 703-712), which prohibits

taking or killing migratory birds. Antenna height is also considered a factor, and those taller than 200 feet (61 meters) are responsible for the greatest number of bird fatalities (Manville 2000).

Migratory bird species known to occur at SBMR that could be adversely affected by the Proposed Action include the white-tailed tropicbird, black-crowned night heron, barn owl, golden plover, and northern cardinal (USARHAW and 25th ID[L] 2001a). USFWS tower guidelines (USFWS 2000) in Appendix I-2 would be integrated into the Proposed Action to ensure that MBTA species would not be significantly affected by the construction and placement of antennas in the SBCT ROI. Key avoidance measures include using no lighting or guy wires on the towers and keeping all towers below 199 feet.

UAVs would be allowed in restricted airspace over the entire training area, but activity is not anticipated to threaten night-migrating birds. If night collisions with birds did occur, then UAV operations would be halted at night until the USFWS and the Army could agree on a solution.

The following Army SOPs and BMPs identified for federal agencies in EO 13186 would help minimize the overall impact of SBCT actions on migratory birds:

- In accordance with the MBTA, USARHAW would avoid polluting or altering the migratory bird environment and would monitor migratory birds in the proposed ROI, focusing on species of concern, where practicable, to ensure that their numbers do not decline because of the Proposed Action; and
- USARHAW would continue yearly inventorying, monitoring, and collecting and assessing information on natural resources in training areas using ITAM LCTA and Army ecosystem management that might be considered relevant to migratory bird conservation. Information gathered would be shared with the USFWS, the Biological Resources Division of the USGS, and other appropriate repositories, such as the Cornell Laboratory of Ornithology.

Noise and visual impacts. No threatened or endangered species are known to occur within the immediate areas of the proposed CACTF. Sensitive species are primarily located at higher elevations, in areas where training generally does not occur. Maneuvers would not take place in areas known to contain sensitive species or sensitive habitats.

Dismounted (on foot) training includes walking in formations on roads or trails or in a dispersed fashion overland. Dismounted training on existing roads and trails would have no impact on biological resources, while those maneuvers that do not follow roads or trails could affect biological resources, particularly in the southern portion of the ROI where native species and natural communities are located, including the protected USACE jurisdictional wetland. Training is not expected in this area immediately surrounding the wetland because of the thick vegetation and steep edge of the Wai'anae Mountain. The most to all training would occur in the disturbed flatlands of KTA, which are dominated by

nonnative and invasive species. The impact on general vegetation and wildlife is therefore considered less than significant.

Impacts on general vegetation and wildlife. Construction would have a short-term adverse effect on plant species because of the dust and other airborne soil particles that would settle on plants, limiting their ability to photosynthesize. This impact is temporary due to the motile nature of dust; it is not expected to dramatically reduce the ability of vegetation to survive or propagate and is not expected to affect federally listed plant species that are not known to occur in the vicinity of the Proposed Action. Dust would also result from the use of Drum Road and would be a long-term effect of the Proposed Action. Although this impact alone would not cause a significant impact on a biological resource, it is a contributing factor that is considered further in cumulative impacts.

The proposed CACTF would be constructed in previously disturbed areas containing nonnative vegetation. Approximately 187 acres (76 hectares) of vegetation would be removed. Following construction of the CACTF, the Army would seed disturbed areas with native or noninvasive vegetation species. No native communities or sensitive species are known to occur or would be expected to occur within the proposed project area.

Following construction of the proposed range, vegetation in the proposed range area would consist primarily of grasses and shrubs. Impacts in these areas would include trampling and disturbance from vehicles or military personnel. No native vegetation communities occur within the proposed project site and therefore would not be disturbed by trampling or general operation of the ranges.

Approximately 621 acres (251 hectares) on KTA would be used for off-road maneuvers under the Proposed Action. Off-road vehicle maneuvers would be allowed in areas of less than 30 percent slope and would be expected to result in adverse impacts on biological resources.

Due to the weight of the Stryker vehicle (approximately 38,000 pounds [17,237 kilograms]), vegetation in areas where the Stryker performs off-road maneuvers likely would be crushed or flattened along tire paths. Stryker maneuvers would generally occur in unforested areas dominated by nonnative vegetation only. Strykers would also operate over existing roads and trails. Stryker operations on existing roads and trails within the installation are not expected to affect biological resources. Recovery of land affected by Stryker maneuvers would be addressed through the Army's ITAM program.

All lands used for general SBCT training would be included in the Army's ITAM program. In addition, natural resources personnel and USARHAW range control staff would routinely inspect all maneuver lands to ensure that the land is not being degraded.

The UAV would be flown over portions of KTA/KLOA already allowing aircraft and would follow AR 95-1, Aviation Flight Regulations, which restrict elevation of UAVs about Noise Sensitive Areas to minimum of 2,000 feet, unless mission essential. This would limit the effect of UAVs on sensitive biological resources during normal operation. Due to the nature

of the UAV, accidents would be possible and could cause wildfires. The impact of potential wildfires within the ROI is discussed above as Impact 1.

Due to the disturbed nature of the proposed construction sites, impacts on wildlife in the KTA/KLOA ROI would be minor or insignificant. Animal species in the project areas would be expected to vacate during construction. Smaller less mobile animals, such as mice, could be killed as a result of earth-moving equipment. Impacts on animal species resulting from construction under the Proposed Action are considered less than significant because no sensitive animal species are known to occur or would be expected to be affected by construction of the proposed project.

Wildlife are expected to vacate areas immediately adjacent to the ranges while the ranges were in use. Operation of the ranges would likely displace various wildlife species, such as birds and mammals by increased human presence in the area and by elevated noise levels. However, increased noise levels are not expected to adversely affect wildlife species.

Wildlife in maneuver areas are expected to sustain adverse impacts as a result of off-road maneuvers, which would occur in unforested areas that are generally dominated by nonnative plant species. Wildlife generally are expected to vacate areas that are being used for off-road maneuvers, those that do not vacate could sustain injuries. The most likely species to be affected by off-road maneuvers are ground-nesting birds or small mammals.

### ***Reduced Land Acquisition Alternative***

The impacts associated with RLA are identical to those described for the Proposed Action.

### ***No Action Alternative***

The existing baseline for biological resources would continue under the No Action Alternative. Under the status quo of No Action, present levels of Legacy Force training would continue. An in-depth analysis of Legacy Force training impacts on KTA biological resources can be found in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a).

### ***Significant but Mitigable to Less than Significant Impacts***

*Impact 1: Impacts from fire on sensitive species and habitat.* Under the status quo of No Action, current training threatens native habitat and sensitive species in the KTA/KLOA ROI. New measures of mitigation for wildland fires should be the same as those for this impact under the Proposed Action. In addition, the following Legacy Force fire avoidance and mitigation would be continued:

- Reevaluating and revising KTA and KLOA's current fire control plan and program for inclusion in the O'ahu general fire management plan;
- Regularly updating Incident Command System (ICS) contact personnel and reviewing fire control protocols;
- Posting signs about the Army's regulations concerning ignition sources;
- Addressing fire control in an island-wide fire management plan;

- Improving fire education and awareness by preparing educational materials on fire hazards and preventative measures; and
- Maintaining fire access roads and fire breaks.

*Impact 2: Impacts on federally listed species and their federally designated or proposed critical habitat.* There have been and would continue to be impacts on the listed plants and wildlife. Vehicle and dismounted maneuvers along with live-fire and nonlive fire training at KTA and KLOA occurs primarily on disturbed portions of the ROI that are of low value to Hawai'i's listed species. However, the effects of fire, spread of nonnative species, noise pollution, and visual presence of humans in or nearby designated and sensitive habitats negatively affects listed species that use or would potentially use this area.

The Army is consulting with the USFWS under Section 7 about the impacts on federally listed species and their designated critical habitat from routine training at KTA and KLOA. The designation of proposed plant habitat is part of the consultation. All reasonable and prudent measures determined during this consultation would be incorporated into the Proposed Action. Ongoing programs that would lessen the impact on listed species and their designated or proposed critical habitat include the ecosystem management plan, endangered species management plan, and INRMP (USARHAW and 25<sup>th</sup> ID[L] 2001a; R. M. Towill Corp. 1997b). These measures would help avoid effects and would compensate for impacts on listed species that would result directly and indirectly from implementing the No Action Alternative.

*Impact 3: Impact on sensitive species resulting from the spread of nonnative species.* Under the status quo of No Action, Legacy Force training would continue use of an upgraded Drum Road. Alien plants and animals, some of which could be invasive, have likely been and would continue to be introduced and spread into natural areas on KTA and KLOA. There would be no increase in the number of vehicles or soldiers, but the impact of vehicle traffic on the road would continue to be considered significant. Troop transport and vehicle entry into the KTA/KLOA ROI could spread invasive species via clothing and vehicles. Invasive species can spread rapidly in a habitat disturbed by human activities, such as troop maneuvers or construction. In compliance with EO 13112 on invasive species, the Army would continue to undertake all feasible and prudent measures to minimize risk of harm caused by invasive species. Army environmental management (described in Chapter 2, Section 2.2.4 of this document), including research, monitoring, and stabilization projects, would reduce these impacts to the less than significant level.

*Impact 4: Loss and degradation of sensitive species and habitat.* Under the status quo of No Action, vehicle use and troop transport and maneuvering in the KTA/KLOA ROI and along Drum Road would continue to have the same impacts as this impact under the Proposed Action. Army environmental management (Chapter 2, Section 2.2.4 of this document), including research, monitoring, and stabilization projects, would reduce these impacts to a less than significant level.

Less than Significant Impacts

Threat to migratory birds. Legacy Force activities would continue to have a less than significant impact on migratory birds. Status quo activities in the ROI may incidentally affect migratory birds but are unlikely to severely disturb birds, considering the highly disturbed nature of the present training area.

Noise and visual impacts. Noise would continue to be produced as a result of Legacy Force activities. Noise would adversely affect animals in the area but would not significantly affect their behavior and would not lead to a population level decline.

Impacts on general vegetation and wildlife. Under the status quo of No Action, use of Drum Road would result in the same impacts as those described for the Proposed Action. Non-Stryker vehicle use would continue, though MIMS would not increase. Continued use of Drum Road would cause dust to accumulate on vegetation in the proximity of the project and would have similar impacts as that described in the Proposed Action. Army environmental management (Chapter 2, Section 2.2.4 of this document), including research, monitoring, and stabilization projects, would reduce the intensity and extent of these impacts.