

CHAPTER 10.

TERRESTRIAL BIOLOGICAL RESOURCES

10.1 AFFECTED ENVIRONMENT

This chapter describes the plant and animal species and habitats that occur in terrestrial and wetland environments potentially impacted by the proposed action. The region of influence (ROI) encompasses the lands that support terrestrial biological resources (i.e., individual species, their habitats, and areas of habitat connectivity) that may be affected directly or indirectly by the proposed action. The ROI varies depending on the type of disturbance and the resource being considered. Construction, operations, and/or training activities have the potential to impact biological resources. Potential activities that may cause impact include, but are not limited to, ground-disturbing activities, noise, lighting, introduction of non-native species, and operational movement (e.g. vehicle traffic). Consequently, the ROI is broadly defined for terrestrial biological resources as the entire Military Lease Area (MLA) of Tinian.

10.1.1 Definition of Resource

The analysis of terrestrial biological resources focuses on species and vegetation communities crucial to the functions of biological systems, of special public importance, or that are protected under federal or local law or statute. For the purposes of this document, terrestrial biological resources are divided into three categories: *vegetation communities*, *wildlife*, and *special-status species*. Special-status species include those species listed under the Endangered Species Act (ESA), candidates for ESA listing, and listed by the Commonwealth of the Northern Mariana Islands (CNMI). Species mentioned in this section are described using the common name when there is an accepted English common name (wildlife and some plants). Common names are cross-referenced to scientific names in Appendix G. If available, the Chamorro name is provided in parentheses when the species is first mentioned in the text.

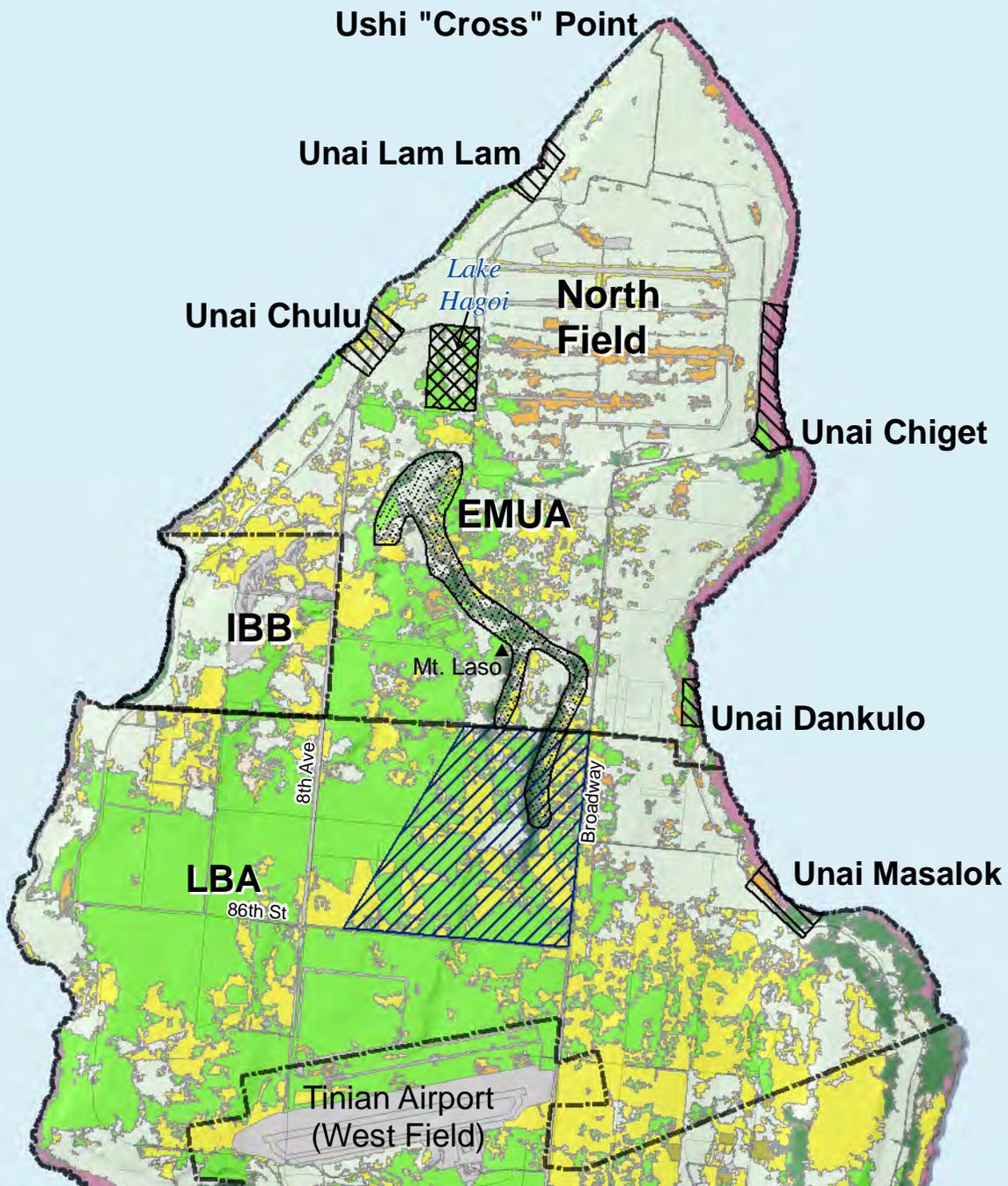
Key sources of information for this section include the Integrated Natural Resources Management Plan (INRMP) for Navy lands (Commander Navy Region [COMNAV] Marianas 2004); United States Fish and Wildlife Service (USFWS) (USFWS 2009b) Tinian survey report; Natural Resource Survey and Assessment Report (TEC Joint Venture [JV] 2007) and references therein; Environmental Impact Statements (EISs), Environmental Assessments, Biological Assessments (BAs), and resulting USFWS Biological Opinions (BOs) for previous actions on military lands on Tinian; and internal Navy field survey reports. Site-specific natural resources data within the ROI was obtained from the COMNAV Marianas Geographic Information System as of January 2008.

10.1.2 Tinian

10.1.2.1 Vegetation Communities

The general physiography of Tinian is a series of five limestone plateaus, separated by escarpments. Vegetation on Tinian was described and mapped by Hawaiian Agronomics International, Inc. (1985). In the 1920s, the island was cleared for sugarcane production under Japanese occupation. Aerial photographs reveal that World War II bombing, fires, and military reconstruction significantly reduced the amount of native limestone forest on Tinian, and once-forested areas not under cultivation were susceptible to encroachment of non-native tangantangan. Vegetation mapping was updated islandwide by the U.S. Forest Service (USFS) (2006; based on 2000-2001 aerial photography) and this base mapping was subsequently updated by USFWS (2009a; based on 2006 aerial photography) (Figure 10.1-1; Table 10.1-1). The USFWS (2009a) did not conduct species-specific plant surveys during their studies.

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Legend

- LBA-IBB-EMUA Boundary
- Restricted Military Training
- No Military Training
- No Wildlife Disturbance
- FAA Mitigation Area

Vegetation

- Agroforest
- Agroforest -- Coconut
- Barren/Sandy Beach/Bare Rocks
- Casuarina Thicket
- Cropland
- Tangantangan
- Mixed Introduced Forest

- Native Limestone Forest
- Savanna/Other Shrub and Grass
- Strand
- Urban and Built-up
- Wetland

Source: USFWS 2009a

**Figure 10.1-1
Vegetation Communities - Tinian MLA**

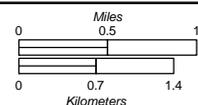


Table 10.1-1. Vegetation Types on Tinian within the MLA

<i>Vegetation Community</i>	<i>ac (ha)</i>
Native Limestone Forest	391 (158)
Mixed Introduced Forest	4,680 (1,894)
<i>Casuarina</i> Thicket	299 (121)
Tangantangan	5,998 (2,427)
Savanna/Other Shrub and Grass	2,934 (1,187)
Agroforest and Coconut Groves	32 (13)
Wetland	34 (14)
Strand and Barren/Beach/Bare Rocks	460 (186)
Cropland	2.5 (1.0)
Urban and Built-up	483 (195)
Total	15,314 ac (6,197 ha)

Legend: ac = acres, ha = hectares.

Source: USFWS 2009a.

The USFWS (2009b) assessment of vegetation changes since the 1980s noted that coverage of open fields decreased 11.6% while coverage of secondary forest increased 10.3%, likely a result of succession over the last two decades as open areas are abandoned. Smaller changes included a decrease in tangantangan and an increase in urban land cover. Vegetation community descriptions that follow are summarized from Falanruw et al. (1989).

Native Limestone Forest

Few native limestone forests remain on Tinian. Within the MLA they occur along cliff lines near Mount Lasso and around the north escarpment of Maga. This forest community harbors native tree species such as *Cynometra ramiflora* (gulos), *Neisosperma oppositifolia* (fagot), *Cerbera dilatata* (chiute), *Psychotria* spp., *Eugenia* spp., *Guamia mariannae* (pai pai), pandanus, coral tree, *Ficus* spp. (nunu), *Pisonia grandis* (umumu), and tropical almond. These species are important habitat and food sources for Mariana fruit bat, Micronesian megapode, and Tinian monarch.

Mixed Introduced Forest

Secondary growth forests contain a mixture of predominantly introduced trees, shrubs, and dense herbaceous plants. Introduced trees common in this vegetation community include *Albizia lebbbeck* (Trongkon-mames), Formosan koa, flame tree, and *Pithecellobium dulce* (kamachile).

Casuarina thicket

Casuarina equisetifolia, commonly called ironwood or Australian pine, tolerates dry and salty conditions. It often grows in shrub and grass habitat and in some locations forms a sparse woodland with little understory. Ironwood also occurs in exposed areas and along the coast at some locations in narrow bands.

Tangantangan

Tangantangan forests dominate much of the level and moderately sloping areas of lowland habitat areas, especially in the northern portions of the island. This habitat is nesting and foraging habitat for the Tinian monarch.

Savanna/Other Shrub and Grass

These areas, dominated by grassy and low herbaceous vegetation, occur on both limestone and volcanic soils. *Pennisetum* spp. are common, as well as patches of other weeds and areas of mixed ferns.

Agroforest and Coconut groves

The agroforest land class category is applied to areas of mixed growth including trees managed for fruit, food, wood, and other products.

Wetland

Wetland vegetation communities are areas of grasses, sedges, and herbs, or woody species growing in standing water or saturated soils most of the year. This type is most prevalent at Lake Hagoi.

Strand

Strand vegetation occurs on sandy beaches, and includes beach heliotrope, Portia tree, and beach naupaka. In rocky areas it includes *Pemphis acidula* (nigas).

Hawaiian Agronomics (1985) listed and mapped four terrestrial plant species of special concern on Tinian due to their status in the Southern Marianas. Those species within the MLA are: *Heritiera longipetiolata* (Ufa halomtano) from coastal forests where it was reported growing with *Barringtonia asiatica* (puteng) near Unai Masalok on the east coast, and along the Lamanibot Bay escarpment of the MLA; *Canthium odoratum* (listed as variety *tinianense* in Raulerson 2006) where it was reported near the shrine at Mount Lasso and near Unai Masalok; *Callicarpa lamii*, a shrub reported from the north-south trending cliff area of Mount Lasso; and *Euphorbia sparrmannii* var. *tinianensis*, a small, semi-succulent herb reported from a single rock at Unai Masalok (not reported in Raulerson 2006).

10.1.2.2 Wildlife - Native

Indigenous wildlife species on Tinian reported in the most recent INRMP (COMNAV Marianas 2004) include 46 birds, the majority are classified as migratory birds under the Migratory Bird Treaty Act (MBTA); one bat species (Mariana fruit bat); seven reptile species (two sea turtles, three geckos and two skinks); and two land crustaceans (coconut crab and land crab). Special-status species are addressed separately below. The 936-acre (ac) (379-hectare [ha]) Federal Aviation Administration (FAA) mitigation area is located in the Lease Back Area (LBA) just south of the Exclusive Military Use Area (EMUA) boundary. It was designated to compensate for the loss of Tinian monarch habitat during the expansion of the Tinian airport (COMNAV Marianas 2004).

A total of 18 land bird species were detected during one or more of the three surveys conducted between 1982 and 2008 on Tinian (USFWS 2009b). The most abundant native species were the bridled white-eye, rufous fantail, collared kingfisher, island-collared dove, white-throated ground-dove, Mariana fruit-dove, white tern, Tinian monarch (see additional discussion below), Micronesian honeyeater, Micronesian starling, and yellow bittern. Monthly DoN monitoring and periodic monitoring by CNMI Department of Fish and Wildlife [DFW] has also been conducted and support these observations. Of these species, the bridled white-eye and rufous fantail were the most abundant. The abundance of collared kingfisher, white-throated ground-dove, rufous fantail, Micronesian starling, and yellow bittern has increased since 1982 while the abundance of Tinian monarch, Mariana fruit dove, and Micronesian honeyeater has decreased since 1982 (USFWS 2009b).

The Tinian monarch is an endemic land bird species that nests in limestone, secondary, and tangantangan forest habitats. It was federally delisted in 2004 (USFWS 2004) and was delisted by the CNMI government in 2009. Although the Tinian monarch is no longer listed, the species is currently being monitored under the *Post-Delisting Monitoring Plan for the Tinian Monarch* (USFWS 2005). The DoN would continue to assist with that monitoring. Based on monitoring being conducted, the population of this species may be in decline (USFWS 2009b).

Based on several sources, the USFWS (2004) estimated the monarch currently inhabits approximately 62% of the land area on Tinian, of which approximately 93% is secondary and tangantangan vegetation and 7% is native limestone forest. The MLA encompasses roughly 75% of the current monarch habitat on the island and supports about 70% of the total monarch population (USFWS 2004). An island-wide Tinian monarch survey in 1982 estimating a population of 35,846 was repeated in 1996, resulting in an estimated population of 55,721 (Lusk et al. 2000). The same survey found a significant increase in forest density since 1982, indicating an improvement in monarch habitat quality.

The current population estimate for Tinian based on June 2008 surveys is approximately 40,000 individuals. Based on the 2008 survey, the greatest monarch densities were observed in limestone forest, secondary forest, and tangantangan thicket, decreasing in that order but not statistically different. Territory densities ranged from 4.2 territory pairs/ac (1.7 pairs/ha) in tangantangan thickets to 19.3 pairs/ac (7.8 pairs/ha) in limestone forest (USFWS 2009b). Native tree species are preferred monarch nesting sites, as evidenced by higher densities, nesting rates, and reproductive success in limestone forest (Naval Facilities Engineering Command [NAVFAC] Pacific 1997).

A total of 58 species of migratory seabirds and shorebirds were detected in various studies summarized in the Mariana Islands Range Complex (MIRC) EIS/Overseas EIS [OEIS]), of which 11 species are residents or species breeding on the island (DoD 2009). Most of the resident or breeding species have been observed at Lake Hagoi, a major bird area on Tinian. In surveys conducted in 1994 and 1995, a total of 9 different bird families including at least 12 species were recorded at Lake Hagoi wetlands, including 2 native forest birds and 10 migratory bird species (USFWS 1996). Specific birds identified at Lake Hagoi from the most recent studies include the Mariana common moorhen (discussed further below under Special-Status Species), black noddy, brown noddy, white tern, brown booby, masked booby, red-footed booby, Pacific reef heron, yellow bittern, great frigatebird, red-tailed tropicbird, and white-tailed tropic bird (DoN 2010).

Numerous gray-tailed (aka) Siberian tattlers and wandering tattlers, reef herons, black noddies, and white terns (including one large colony of 30 plus birds), all protected under the MBTA, were recorded during 2008 shoreline surveys of Navy lands on Tinian (USFWS 2009b). No black noddy nesting areas were observed on Tinian during the survey. Most birds observed were along the western coastline that consists of flat coralline shelves along the water with large boulders in the bays and protection from the prevailing winds. White-tailed tropicbirds, black noddies, and white terns were noted in point transect surveys on Tinian and the white tern total population was estimated at approximately 18,000 birds (USFWS 2009b). Puntan Masalok and Puntan Tahgong are identified as potential habitat for pelagic birds including noddies and terns in Environmental Sensitivity Index Maps (National Oceanic and Atmospheric Administration [NOAA] 2005).

In a recent reptile survey several native species were found including the snake-eyed skink that was found adjacent to Unai Chulu and in a monitoring plot just northeast of North Field (USFWS 2009b). The tide-pool skink was reported as common in the *Pemphis acidula* vegetation zone north of Unai Chulu and thought likely to be present in similar habitat at other locations (USFWS 2009a). In 2008, surveys the blind snake was found in both mixed and limestone forest (USFWS 2009b). USFWS states that it is unquestionably native given that Pregill (1998) found archeological evidence of its presence in the Mariana Islands since at least early pre-human times.

In addition to being a highly-valued game species in the CNMI, the coconut crab serves important ecological functions such as dispersing seeds and as scavengers. Recently, coconut crabs densities have

been estimated at 4.95 crabs/ha in native forest and 1.83 crabs/ha in tangantangan. Coconut crab size distribution was highly skewed to the lower sizes, possibly due to illegal poaching (USFWS 2009b).

10.1.2.3 Wildlife – Non-Native

Non-native species are common on Tinian. The most abundant non-native bird is the Eurasian tree sparrow (USFWS 2009b). Introduced mammals include rats, mice, shrews, cats and dogs. The musk shrew and roof rat are distributed throughout the island but other rats are uncommon (COMNAV Marianas 2004). Roof rat densities of up to 185/ac (75/ha) were found in native forest and musk shrew densities of up to 183/ac (74/ha) were found in tangantangan. Roof rat densities were higher than on many other tropical Pacific islands and it is likely these high densities are having a detrimental effect on flora and fauna including bird species (USFWS 2009b).

Oceanic geckos were reported during the 2008 surveys and constituted about half of the lizard biomass in limestone forest areas (USFWS 2009b). Monitor lizards have been observed at Lake Hagoi and they may be a primary threat to Mariana common moorhen chicks and eggs (USFWS 1996, Vogt 2008a). It should be noted that recent studies have indicated that monitor lizards may be native to some Mariana Islands (Pregill and Steadman 2009). The marine toad is the only introduced amphibian and the mangrove crab, introduced as a potential food source, is the only crustacean (COMNAV Marianas 2004).

The brown tree snake (BTS) has the potential to impact the economy, human health, and island ecology in the CNMI. This species was inadvertently introduced to Guam by way of military cargo after World War II (Rodda and Savidge 2007). The BTS native range is coastal Australia, Papua New Guinea, and a large number of islands in northwestern Melanesia (Fritts and Leesman-Tanner 2008).

Although BTS were known to occur on Guam in the 1950s through the 1980s, they were not seen as a threat as this was the first instance of a predatory snake arriving on an isolated island. However, as a result of this introduction, 17 of 18 native bird species were severely impacted, and 12 of the 18 species were likely extirpated due to the BTS (Wiles et al. 2003).

Efforts to control the BTS are mostly limited to preventing BTS from leaving Guam in cargo, by ship or air. The DoD has collaborated with other partners and participated in the development of BTS-specific trapping techniques, BTS detection using sniffer dogs, fence design, development of toxicants, and delivery methods. While these efforts have had success, BTS originating on Guam have been found in Kwajalein, Pohnpei, Hawaii (Oahu), Diego Garcia, Spain, Alaska, Texas, Oklahoma, and neighboring CNMI islands (Rota, Tinian, and Saipan).

The potential establishment of the BTS on Tinian is of great concern. As of 2008, there have been 75 confirmed BTS detections throughout the CNMI (N. Hawley, CNMI DFW, unpublished data). There have been eight unconfirmed BTS sightings on Tinian: one in February 1990, four reported in 1994 (Fritts and Leesman-Tanner 2001), and three reported in 2003 (BTS Technical Working Group 2009). If BTS were to become established (without immediate suppression) on Tinian as a result of the proposed action, the impacts would likely be similar to those experienced on Guam.

Goats have been recently transported from Aguiguan to Tinian. A survey around the coast in October 2008 confirmed at least 20 goats at Puntan Kastiyu and there was some evidence they were already creating trails, accelerating erosion, and impacting the native vegetation (USFWS 2009b).

10.1.2.4 ESA-listed Species

Six federally listed threatened and endangered or candidate species have been observed or potential habitat for those species is present on Tinian (Table 10.1-2, Figure 10.1-2). Another species, the Mariana swiftlet is presumed extirpated from Tinian and is not evaluated further in this EIS. Green sea turtles are known to nest on Tinian; there is no known nesting of hawksbill sea turtles.

Table 10.1-2. Occurrence of Special-Status Species within the Tinian ROI

Common Name/ Chamorro Name	Status		Habitat	Occurrence in ROI
	ESA	CNMI		
Mammals				
Mariana fruit bat/ Fanihi	T	E	Limestone forest, coastal forest, and coconut plantations	Occasional sightings.
Birds				
Mariana common moorhen/Pulattat	E	E	Freshwater wetlands	Population up to 75 birds.
Micronesian megapode/Sasangat	E	E	Limestone forest and coconut groves	Reports of a few individuals in recent years but none in 2008 surveys.
Mariana swiftlet/ Chuchaguak	E	E	Nests in caves	Observed historically; no records since 1970 - presumed extirpated.
Reptiles				
Green sea turtle/ Haggan bed'di	T	T	Suitable beaches for basking and nesting.	Nesting documented.
Hawksbill sea turtle	E	E	Suitable beaches and strand for basking or nesting	No nesting known.
Micronesian gecko/ Guali'ek	-	E	Forested areas	Reported from Mt Lasso and Carolinas Plateau in 2008.
Invertebrates				
Humped tree snail/ Akaleha', Denden	C	-	Intact limestone forest	Not seen since 1970; possibly extirpated.

Legend: C = candidate, E = endangered, T = threatened.

Sources: COMNAV Marianas 2004, CNMI Department of Land and Natural Resources (DLNR) 2005, TEC JV 2007, Vogt 2008a, b; DoN 2010, USFWS 2009b.

Mariana Fruit Bat

Although Tinian once held a large number of fruit bats, after World War II it was estimated to retain only 5% of native forest cover (USFWS 1998), a primary reason, along with poaching, for the current near-absence of Mariana fruit bats on Tinian. No permanent fruit bat colony is believed to exist on Tinian. However, bats may fly between islands in the southern Marianas. Within the MLA, fruit bats have been observed historically in the vicinity of Mount Lasso, Puntun Diaplo, and Lake Hagoi (COMNAV Marianas 2004). Surveys were conducted for Mariana fruit bat on Tinian in 1994 and 1995 at five observation stations and fruit bats were not observed. However, there were two incidental observations, one near San Jose village and one near the south end of the island. No bat colonies were observed on Tinian so no direct colony counts were conducted (Kreuger and O'Daniel 1999). In 2008, eight separate station counts were conducted at seven locations on Tinian and no bats were observed (Brooke 2008).

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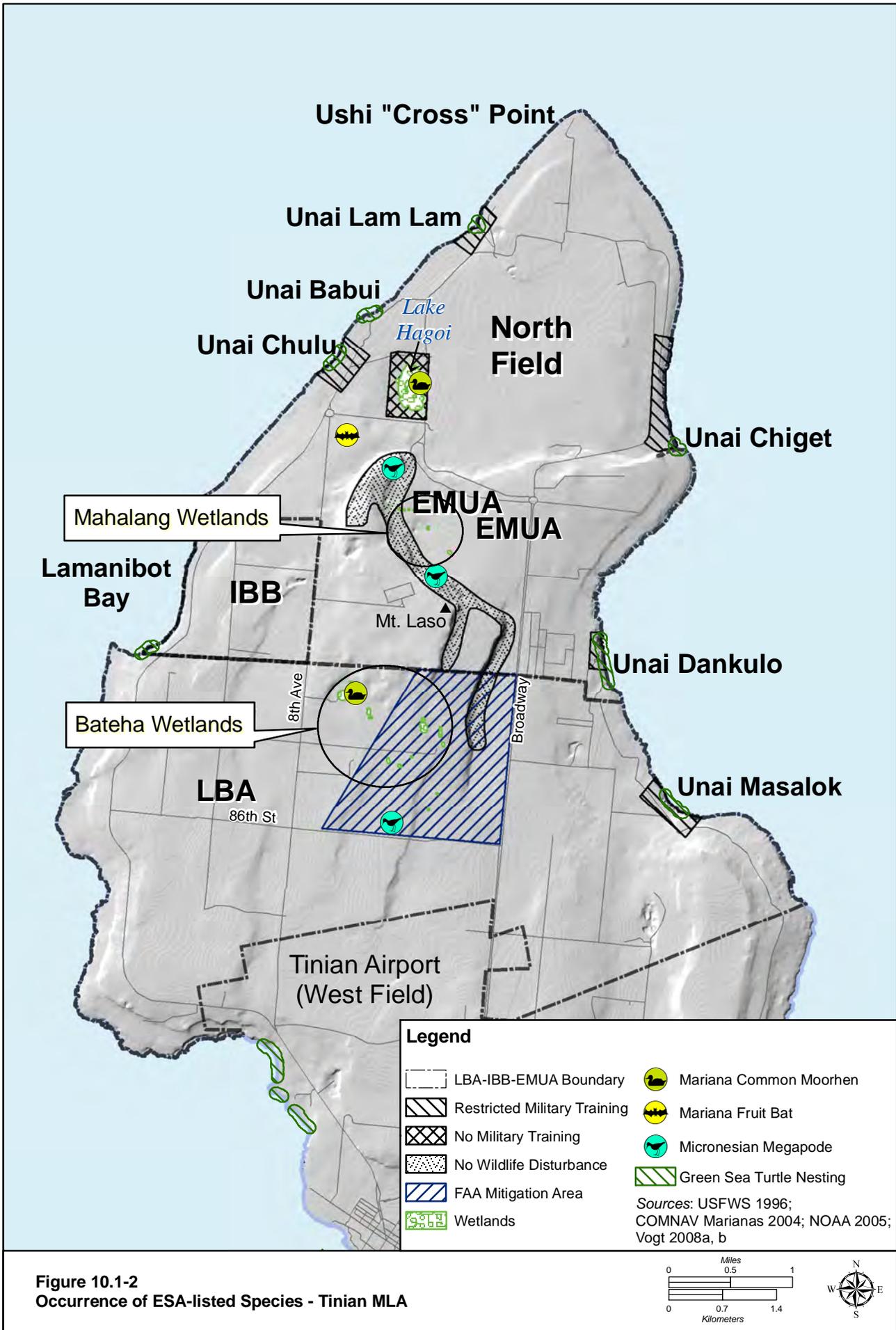


Figure 10.1-2
Occurrence of ESA-listed Species - Tinian MLA

Mariana Common Moorhen

The Mariana common moorhen is an inhabitant of emergent vegetation of freshwater marshes, ponds, and placid rivers. In the Mariana Islands, its preferred habitat includes freshwater lakes, marshes, and swamps. The recovery plan for the moorhen identifies Lake Hagoi (44 ac -18 ha) with 2.5 ac [1 ha] of open water) (Takano and Haig 2004) within Tinian's EMUA as primary habitat for the moorhen. Primary habitat is defined as the best current or potential remaining moorhen habitat and is considered essential to the recovery program (USFWS 1991).

The 1991 recovery plan estimated the moorhen population on Tinian to be between 20 and 125 birds (USFWS 1991). Based on previous reports and surveys from 1989, 1994-1995, and 2001, the moorhen population on Tinian was estimated to be between 41 and 75 birds (Takano and Haig 2004). Yearly averages of a monthly monitoring program show that 2003 and 2007 were peak years for moorhen numbers at Lake Hagoi (16.9 and 17.1, respectively), and lows during 1999 and 2005 (10.1 and 9.9, respectively). These numbers are the means for the year and are index surveys not an absolute population estimate. The number of birds observed appears to correlate to periodic dry conditions at the Lake Hagoi wetland; Lake Hagoi was completely dry in April 2005 (Vogt 2008a). Predation from rats and monitor lizards may be impacting the moorhen population at Lake Hagoi, especially during peak nesting periods (USFWS 1996, Vogt 2008a).

The 27 ac (11 ha) Magpo wetland area identified as secondary moorhen habitat (USFWS 1991) is located over 1 mi (1.6 km) south of the MLA boundary in southeastern Tinian. In 1995, the estimated maximum numbers of moorhens using the smaller 32 ac (13 ha) Mahalang and 15 ac (6 ha) Bateha wetlands is three and four birds, respectively; however, these wetlands are overgrown with vegetation (USFWS 1996, Takano and Haig 2004). The moorhen populations have declined due to habitat loss (vegetation encroachment), historical poaching, and possible predation by rats and monitor lizards (USFWS 2009b).

Micronesian Megapode

In 1902, the Micronesian megapode was noted as common on Tinian. However, by 1949 these birds were already becoming difficult to locate in surveys (NAVFAC Pacific 1997). Its continued existence on Tinian was confirmed during a USFWS survey in 1995 where incidental sightings of single birds were reported at three separate locations including Mount Lasso, the Maga area (to the northeast of the International Broadcast Bureau), and a small section of native forest adjacent to Cross Island Road in the Bateha area (Krueger and O'Daniel 1999). Extensive megapode surveys in 2001 resulted in a conservative estimate of at least two individual birds (Witteman 2001). During monthly surveys from 1999-2005 three megapodes were detected on the Maga transect (Vogt 2006). In surveys conducted on seven transects in July and August 2006 no megapodes were documented (Vogt 2008b). This was also the only area where megapodes were documented in the 2001 surveys (Witteman 2001). Since 1995 biologists have detected megapodes 13 times on Tinian during 234 individual survey efforts (Vogt 2008b). Because some of these detections may be repeat observations of the same bird, it is not possible to determine a current population size for Tinian. Occasional sightings of megapodes may be a result of movement from Aguiguan. No Micronesian megapodes were detected in 2008 during point-transect and playback surveys on Tinian (USFWS 2009b). However, as noted in a comment to the Draft EIS from the Office of the CNMI Governor, in the summer of 2009 a Tinian DLNR employee with bird survey experience sighted a Micronesian megapode along the road between the Seabees monument and Broadway near the FAA Mitigation Area.

Mariana Swiftlet

Mariana swiftlets were last documented on Tinian in the 1970s; however current evidence indicates that it is likely an infrequent visitor from Saipan or Aguiguan (Cruz et al. 2008). Detailed surveys and mapping of 88 caves on Tinian (Stafford 2003, as cited in Cruz et al. 2008) revealed no evidence of Mariana swiftlets and they are presumed extirpated from the island (USFWS 2009b).

Sea Turtles

The green sea turtle is known to nest on Tinian, and the hawksbill turtle has been sighted in the waters offshore, but is not known to nest on the island. Green sea turtle abundance and density are highest along the island's relatively uninhabited east coast. The most recent estimate of the number of green sea turtles occurring in the nearshore waters around Tinian was 832 turtles in 2001 (Kolinski et al. 2004). For successful nesting, green sea turtles require deep sand beaches with open ocean exposure and minimal disturbance. Beaches within the MLA where green sea turtles have nested include Unai Masalok, Unai Dankulo, Unai Lamlam, Unai Babui, Unai Chulu, Unai Dumpcoke, Unai Barcinas, and Leprosarium Beach (COMNAV Marianas 2004). Green sea turtle nesting activity occurs as early as late January and ends in mid-July on most of Tinian's sandy beaches (NAVFAC Pacific 1997). The beaches that occur within the MLA are surveyed monthly for sea turtle activity (i.e., crawls, nests, potential nests, body pits and hatchling tracks). Surveys between 1999 and 2005 were summarized by Vogt (2006). The highest number of beach crawls (13) and nests (6) were recorded in 2005 with activity occurring at Unai Dankulo (Long Beach), Chulu, and Masalok.

Tree Snails

The humped tree snail is a federal candidate species. It was historically present on Tinian but has not been observed since 1970 (CNMI DLNR 2005) and is thought to be extirpated (USFWS 2007). Recent surveys in likely habitat areas did not record this species (report in preparation).

Other Species

Recent surveys were conducted for ESA candidate butterfly species and none were found, although host plant species were present (USFWS 2009b). No federally listed plant species are known from Tinian.

10.1.2.5 CNMI-Listed Species

Seven CNMI-listed threatened and endangered species have been observed or potential habitat is present on Tinian (refer to Table 10.1-2 and Figure 10.1-2). As mentioned above, the Mariana swiftlet is also listed in Table 10.1-2 but it is presumed extirpated on Tinian and is not evaluated further in this EIS. Those species that are also federally listed were discussed above.

Micronesian Gecko

This species is endemic to Micronesia and native to Tinian (USFWS 2009b) and is the only CNMI-listed gecko in the CNMI. It was believed to be extirpated after 1946 but was again collected in 2003 on Tinian (CNMI DLNR 2005) and was sighted in 2007 and collected (a single specimen only) in limestone forest in 2008 studies (USFWS 2009b).

10.2 ENVIRONMENTAL CONSEQUENCES

10.2.1 Approach to Analysis

10.2.1.1 Methodology

Biological resource issues and concerns include the potential direct, indirect, and cumulative impacts of the proposed actions and alternatives during the construction and operation phases. Impacts may be either temporary (reversible) or permanent (irreversible). Direct and indirect impacts are distinguished as follows.

Direct impacts are associated with proposed construction activities (e.g., ground-disturbing activities) and operations (e.g., range use). Potential types of direct impacts include, but are not limited to:

- Loss of habitat due to vegetation removal during construction and potential wildfires from training activities.
- Temporary loss of habitat during construction from noise, lighting, and human activity.
- Potential loss of habitat due to increased noise from proposed aircraft activities and training range usage.
- Injury or mortality to wildlife or special-status species caused by the action that occur at the same time and place as the action.

Indirect impacts are caused by or result from project-related activities, are usually later in time, and are reasonably foreseeable (e.g., increased likelihood of non-native species moving into the area after disturbance). Potential indirect impacts include, but are not limited to:

- All disturbances from human activity, noise, and lighting that would potentially impact unoccupied suitable habitat for special-status species.
- Introduction of new non-native species or increased dispersal of existing non-native species on Tinian.
- Dispersal of existing non-native species from Tinian to other destinations.
- Increased threats from feral animals.
- Adverse effects from pollutants that are released from construction, military operations, or training.
- Adverse effects from wildfires.

Potential direct impacts of noise from small arms ranges were determined based on sound levels estimated from noise models. Potential direct and indirect impacts to species occupying habitat nearby to the ranges (e.g., from daily operations at facilities, and lighting disturbance) were assessed within 328 ft (100 m). This distance was selected because the impacts being considered for this analysis are for general noise and human activity, and there is no information available on the sensitivity of the species being evaluated.

General principles used to evaluate impacts are:

- The extent, if any, that the action would permanently lessen ecological habitat qualities that ESA-listed species depend upon, and which partly determines the species' prospects for conservation and recovery.
- The extent, if any, that the action would diminish population sizes, distribution, or habitat of regionally important native plant or animal species.

- The extent, if any, that the action would be likely to jeopardize the continued existence of any ESA-listed species.
- The extent, if any, that the action would be inconsistent with the goals of USFWS recovery plans, DoN INRMPs, or the CNMI Comprehensive Wildlife Conservation Strategy (CWCS).

10.2.1.2 Determination of Significance

Significance of impacts to vegetation, wildlife, and special-status species were determined using guidelines in the previous section. Special-status species are defined as ESA- and CNMI-listed species and species that are designated candidates for ESA listing. Specific significance criteria are discussed below.

Vegetation

Impacts would be determined significant if any primary limestone forest (mature forest dominated by native species) would be cleared, unless determined to be very minor in the context of the surrounding forest areas. Any loss of this forest vegetation community would be considered significant because of the large historical and continuing losses of this forest type on Tinian. Loss of wetland or mangrove vegetation would also be considered potentially significant.

Wildlife

Impacts would be determined significant if native wildlife species are present and the proposed project would result in more than minimal changes in population sizes or distributions of regionally important native animal species. These wildlife species include those designated in the CNMI CWCS. Non-native species impacts that exceed the criteria specified above are evaluated. A major concern for wildlife is if the BTS would be inadvertently introduced to Tinian. This concern is addressed comprehensively for all actions proposed in this EIS with proposed mitigation measures described in Volume 2, Section 10.2.2.6. If significant impacts are determined, then mitigation may be proposed to offset the impacts. For this EIS, a major consideration for minimizing impact is biosecurity. A Micronesia Biosecurity Plan (MBP) is being developed and is further discussed in Section 10.2.2.3 of this volume.

Migratory Birds

For migratory birds, the MBTA prohibits the taking, killing, or possession of migratory birds, with an exemption for military readiness activities (as defined in federal regulations) provided they do not result in a significant adverse effect on a population of a migratory bird species. Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Military readiness activities do not include: (A) routine operation of installation support functions such as administrative offices, military exchanges, water treatment facilities, schools, housing, storage facilities, and morale, welfare, and recreation activities; (B) the operation of industrial activities; and (C) the construction or demolition of facilities used for a purpose described in A or B (50 CFR Part 21).

The DoD must consult with the USFWS if it is determined that a military readiness activity would have a significant adverse effect on a population of a migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem.

Migratory bird conservation relative to non-military readiness activities is addressed separately in a Memorandum of Understanding developed in accordance with EO 13186, *Responsibilities of Federal*

Agencies to Protect Migratory Birds. The Memorandum of Understanding between the DoD and USFWS was signed in July 2006 and DoD responsibilities included, but are not limited to: (1) incorporating conservation measures addressed in regional or state bird conservation plans and INRMPs; (2) managing military lands and activities other than military readiness in a manner that supports migratory bird conservation; and (3) avoiding or minimizing impacts to migratory birds, including incidental take and the pollution or detrimental alteration of the environments used by migratory birds.

Special-Status Species

The presence of special-status species in the project areas was described in Section 10.1. Background information is presented in the species profiles in Appendix G. Impacts would be determined significant if special-status species are present in the project area and any project action is likely to result in harassment or harm of an individual, population or species. Impacts to ESA-listed species would include vegetation clearing of habitat, unless it is determined that the removal of habitat or other affect is minor when considering all the remaining habitat and quality of habitat available to that species and considering USFWS recovery plan goals. Significant indirect impacts would also include disturbing ESA- and CNMI-listed species due to noise, lighting, or human activity. If unoccupied but recognized habitat is affected by operational noise, lighting, or human activity, impacts would be considered indirect and would be determined significant unless the area affected is considered minor when considering all the remaining habitat and quality of habitat available to that species.

For ESA-listed species, federal agencies are required to ensure that their actions do not jeopardize the continued existence of an endangered or threatened species or its critical habitat. Analyses of potential impacts are based on review of plans for the proposed action and the available current and historical distributional data for each species. In accordance with Section 7 of the ESA, a Biological Agreement (BA) has been prepared by the DoN, which analyzed the potential impacts to ESA-listed species on Tinian under the jurisdiction of the USFWS. There is no critical habitat designated on Tinian.

The BA and subsequent Biological Opinion (BO) issued by the USFWS would be the final determination of impacts to ESA-listed species that are evaluated in this EIS. Candidate species are also evaluated in the BA, but were not evaluated in the BO because they were not formally listed at the time the BO was completed. The USFWS effects determinations from the BO are incorporated into the Final EIS and/or Record of Decision. The BO also specifies conservation recommendations that are discretionary proponent activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

10.2.1.3 Issues Identified during Public Scoping Process

As part of the analysis, concerns related to terrestrial biological resources that were mentioned by the public, including regulatory stakeholders, during the public during scoping meetings were addressed. A general account of these comments includes the following:

- Concern that activities associated with the military expansion (i.e., construction, expansion, renovation projects, and military training activities) may result in habitat loss and physical disturbance of federally listed endangered species and other federal trust species.
- Potential for harm to fragile ecosystems on Guam and in the Marianas from the introduction of non-native species due to increased traffic among the islands from the movement of personnel and materials. Such species include the BTS, flatworms, various insects, and some plants. This EIS should outline inspection and sanitary procedures to prevent this movement.

- Existing control and containment activities at air and sea ports for BTS are insufficient to deal with the risk associated with the increased cargo and personnel movement from Guam to other vulnerable destinations. The issue “of utmost concern” is BTS interdiction and an effective and enforceable procedure for inspecting all military cargo, personnel, and equipment entering the CNMI. A sustainable 100% inspection rate of all cargo, vehicles, munitions, and household goods would be anticipated, and Guam regulation protocols 505 and 506 should be incorporated into a BTS control plan to be included as part of the EIS.

10.2.2 Alternative 1 (Preferred Alternative)

10.2.2.1 Tinian

Construction

Vegetation

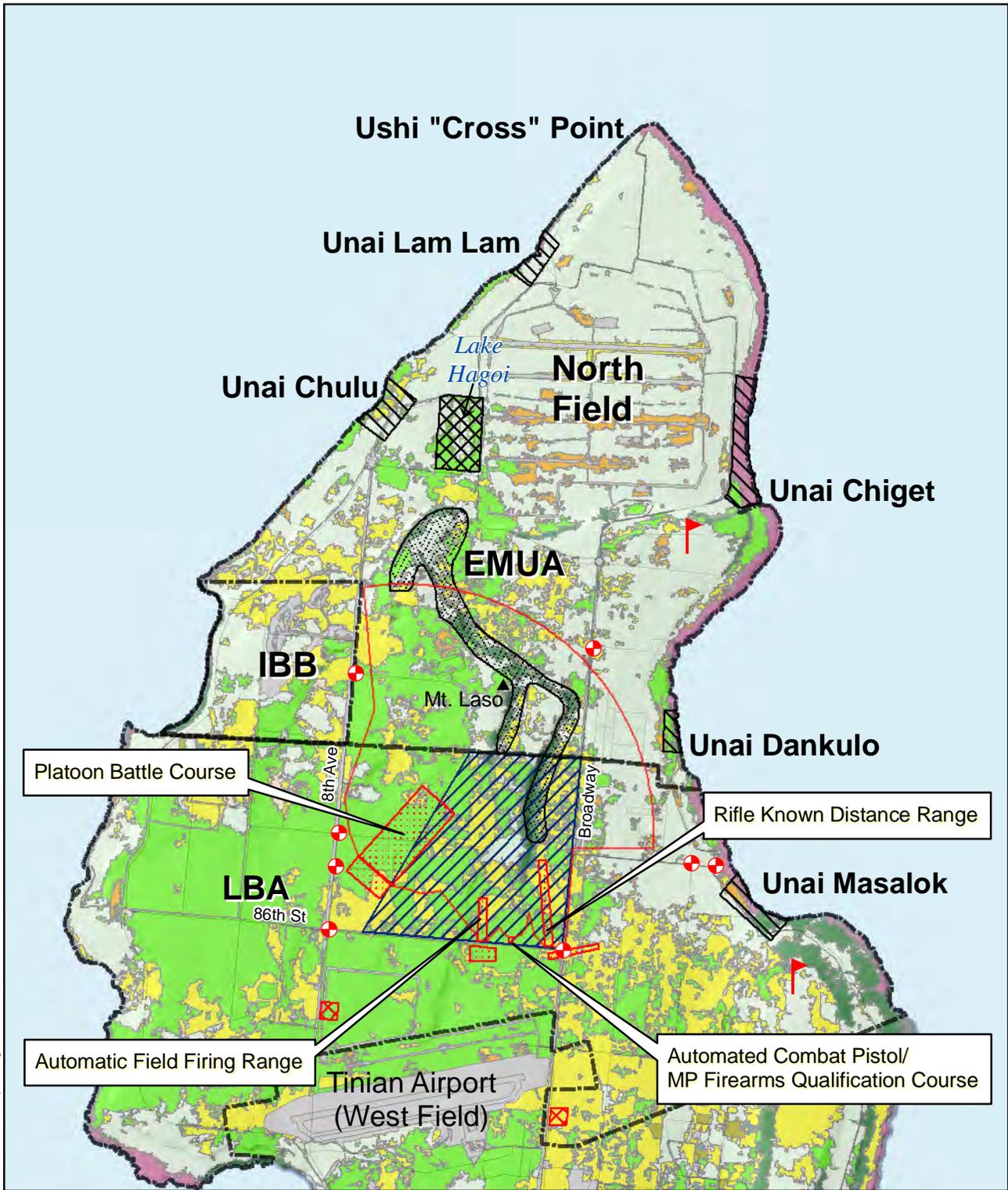
Vegetation that would be removed for construction of ranges and other facilities is shown in Table 10.2-1 and Figure 10.2-1. Vegetation removed includes 173 ac (70 ha) of mixed introduced forest and smaller amounts of tangantangan and shrub/grassland. No limestone forest would be removed. Impacts to vegetation would be less than significant. The vegetation to be removed serves as potential habitat for all special-status species. This impact to habitat is addressed separately below.

Table 10.2-1. Potential Impacts to Vegetation Communities within the Tinian MLA with Implementation of Alternative 1 (ac [ha])

<i>Parcel and Activity</i>	<i>Mixed Introduced Forest</i>	<i>Tangantangan</i>	<i>Shrub and Grass</i>	<i>Developed</i>
Construction Areas (vegetation removed)				
Platoon Battle Course	123 (50)	0	13 (5.3)	0
Ranges	13 (5.3)	0	25 (10)	0
Range Control	9.0 (3.6)	0	9.8 (4.0)	1.0 (0.4)
Range Support Areas	28 (11)	0.8 (0.3)	19 (7.7)	0.4 (0.2)
Total area removed	173 (70)	0.8 (0.3)	67 (27)	1.4 (0.6)

Wildlife

TINIAN MONARCH. The Tinian monarch is an endemic species that nests in limestone forest, secondary forest, and tangantangan forest habitats. It is likely to be present in all areas surrounding the proposed ranges and range support areas. Potential habitat for the species would be removed as summarized in Table 10.2-2. The MLA encompasses roughly 75% of the current monarch habitat on the island and supports about 70% of the total monarch population. Based on densities estimated by USFWS (2009b), the number of Tinian monarchs that would potentially be displaced through construction would be 408 birds (USFWS 2008). With a total population estimated at approximately 40,000 birds, project construction would impact 1.0% of the current population. Based on territory densities estimated by USFWS (2009b), the number of Tinian monarch territories that would be lost through construction would be 204. Based on the amount of habitat removed compared to the total amount available, impacts to the Tinian monarch would be less than significant.



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Legend

- LBA-IBB-EMUA Boundary
- Restricted Military Training
- No Military Training
- No Wildlife Disturbance
- FAA Mitigation Area

- USMC Proposed Actions**
- Traffic Control Point
 - Range Observation Sites
 - Firing Range Footprint/Range Access/Parking
 - Notional SDZ
 - Range Control Alternatives

- Vegetation**
- Agroforest
 - Agroforest -- Coconut
 - Barren/Sandy Beach/Bare Rocks
 - Casuarina Thicket
 - Cropland
 - Tangantangan
 - Mixed Introduced Forest

- Native Limestone Forest
 - Savanna/Other Shrub and Grass
 - Strand
 - Urban and Built-up
 - Wetland
- Source: USFWS 2009a

Figure 10.2-1
Vegetation Impacts - Range Training Area Alternative 1



Table 10.2-2. Direct Impacts to the Tinian Monarch with Implementation of Alternative 1

<i>Habitat Type</i>	<i>Habitat Removed (ac [ha])</i>	<i>Monarch Density (# per ha)*</i>	<i>Total Potential Birds in Removed Habitat</i>	<i>Max. Territories (# per ha)*</i>	<i>Total Potential Territories in Removed Habitat</i>
Mixed Introduced Forest	173 (70)	5.82	407	2.9	203
Tangantangan	0.8 (0.3)	4.36	1	2.5	1
Totals	174 (70)	NA	408	NA	204

Legend: NA = Not Applicable.

Source: *USFWS 2009b.

The placement of ranges under Alternative 1 does not meet the requirements set out in the “Dedication of Tinian Military Retention Area Land for Wildlife Conservation” (Government of CNMI and Navy 1999) whereby a 936-ac (379-ha) FAA Mitigation Area was established for the protection of “endangered and threatened wildlife, particularly the Tinian Monarch” with the provision that it is the right of the U.S. military to “use the premises for low-impact military training and for other purposes that do not disrupt the habitat and living conditions of the Tinian Monarch.” Approximately 70 ac (28 ha) of the 936-ac (379-ha) FAA Mitigation Area that was intended as habitat for the monarch would be removed (Figure 10.2-2), resulting in a significant impact. In addition, a zone 328-ft (100-m) wide surrounding the perimeter of the range footprint areas is assumed to be indirectly impacted by noise and activity from construction (Table 10.2-3).

Table 10.2-3. Potential Indirect Impacts to Habitat surrounding the Proposed Ranges with Implementation of Alternative 1

<i>Project</i>	<i>Forested Habitat Affected - 100 m Buffer (ac [ha])</i>
Platoon Battle Course	71 (29)
KD Range	44 (18)
Field Firing Range	42 (17)
Combat Pistol/Qualification Course	12 (4.9)
Range Control/Bivouac Areas	24 (10)
Totals	193 (78)

As compensation for the removal of a portion of the FAA Mitigation Area, including the construction footprint and the surrounding area impacted by noise and activity, additional mitigation area would be established and other conservation measures would be implemented as described in Section 10.2.2.3. With this mitigation, impacts from loss of a portion of the FAA Mitigation Area would be less than significant.

OTHER WILDLIFE SPECIES. All the terrestrial bird species listed in Section 10.1.2 have the potential to be present in the proposed range area. Proposed construction activities would remove suitable habitat used by these species (refer to Table 10.2-1) and displace them to other areas. Construction actions could inadvertently kill small species such as skinks and geckos.

Other CWCS-designated species include the Micronesian honeyeater, a species known to be declining since 1982 and with a current estimated population of 4,156 on Tinian (USFWS 2009b) and the Mariana fruit dove, a Marianas endemic species with a current estimated population of 3,201 birds (USFWS 2009b). The honeyeater population density estimate is 0.41 birds per ha (USFWS 2009b) so the loss of 70 ha (refer to Table 10.2-2) would result in the loss of habitat for up to 29 birds.

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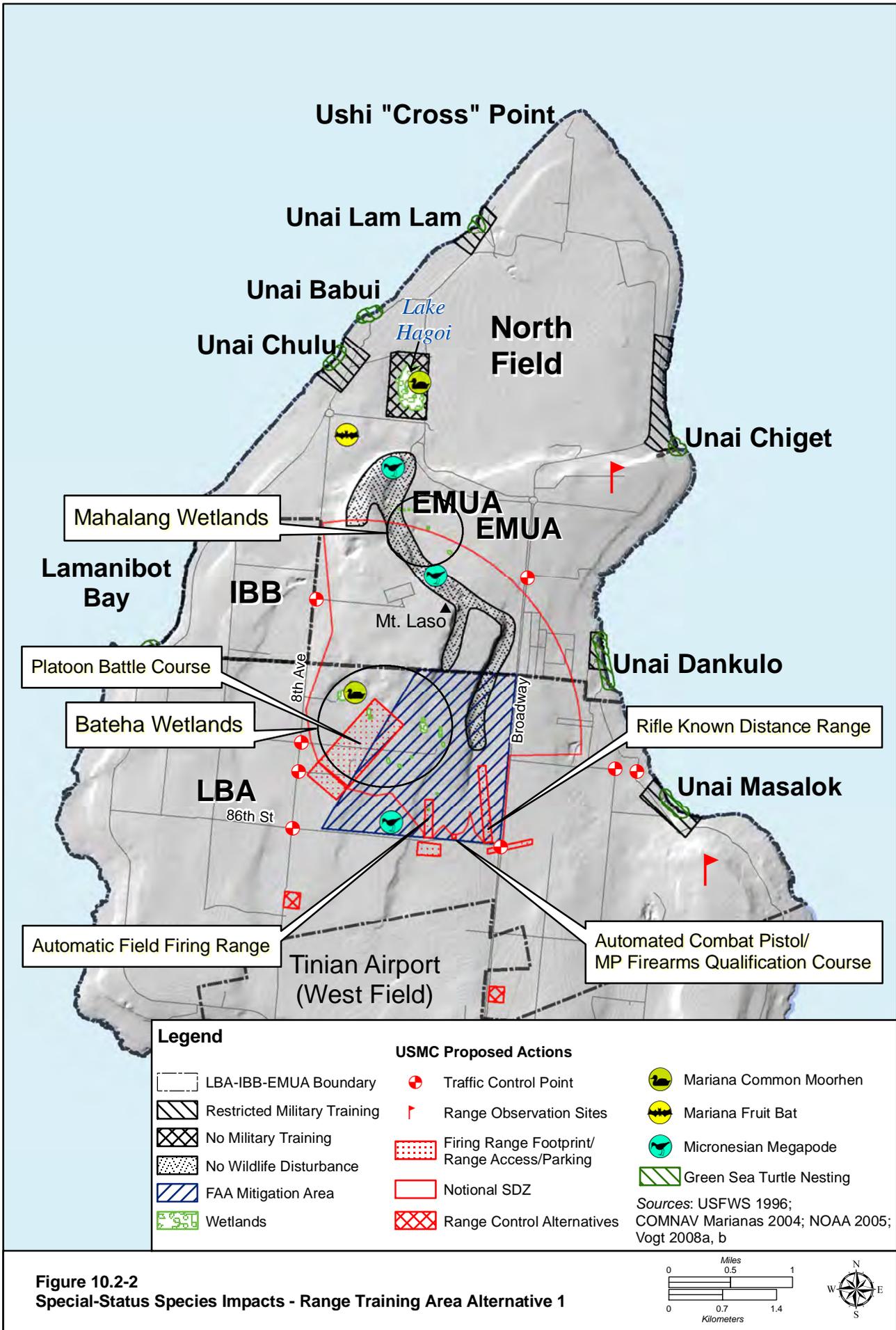


Figure 10.2-2
Special-Status Species Impacts - Range Training Area Alternative 1

The fruit dove population density estimate is 0.33 birds per ha (USFWS 2009b) so the loss of 70 ha (refer to Table 10.2-2) would result in the loss of habitat for up to 23 birds. It is assumed that some birds would relocate to suitable adjacent habitat; however, it is probable that a portion of these birds may be unable to successfully relocate. During construction activities, some of the birds may not immediately establish territories and/or breeding pairs that may result in reduced breeding activity. However, this loss in habitat and temporary loss in reproduction would result in minimal changes in population size or distribution of these species.

NON-NATIVE WILDLIFE. Movement of construction personnel, equipment, and supplies could result in the movement and spread of invasive plant and animal species to Tinian. Of particular concern is the BTS. Non-native, invasive species would affect wildlife and special-status species or degrade habitat, thus are potential indirect impacts resulting from actions proposed in Alternative 1. Non-native, invasive species impacts for construction would be similar to those for operations but shorter-term. The impacts are discussed in detail under operations below. Impacts from non-native species such as the BTS would be significant but are biosecurity measures are included (see Section 10.2.2.3) to reduce this threat to less than significant.

Other areas surrounding the cleared ranges would be indirectly impacted by disturbance from range construction. Areas adjacent to the ranges, including portions of the FAA Mitigation Area, would be subject to disturbance from the range construction from noise and general human activity. However, construction would be for a relatively short period. Species sensitive to noise and activity would disperse to other areas that provide abundant habitat and could return to the area following construction. None of the species are rare based on survey results by USFWS (2009b). Long-term, permanent impacts to populations of wildlife would not likely result. Impacts to wildlife from construction noise would be less than significant.

Special-Status Species

Direct impacts to special-status species includes the removal of habitat and subsequent fragmentation of remaining habitat. Figure 10.2-4 shows general locations of special-status species in relation to the proposed ranges.

MARIANA FRUIT BAT. The fruit bat was not documented in 2008 surveys on Tinian (USFWS 2009b). Based on this finding, no proposed removal of limestone forest vegetation, and because of the relatively small amount of vegetation community types that would be removed compared to what is available, construction would have a less than significant impact on the fruit bat.

MARIANA COMMON MOORHEN. A wetland approximately 1,000 ft (305 m) to the northwest of the Platoon Battle Course is used by up to 4 moorhens (USFWS 1996). There is no documented use of other areas identified as potential wetlands (see Chapter 4 for an additional discussion of wetlands). To ensure no moorhens are disturbed, monitoring prior to construction would be conducted. If nesting moorhens are present in the limits of construction, construction would be halted until the species left the area. With this mitigation, impacts would be less than significant.

MICRONESIAN MEGAPODE. Although not observed in 2008 surveys, several birds were documented on Tinian in 1999 in the Maga area, northwest of Mount Lasso where there is native limestone habitat that is generally preferred by the species. A single bird was detected just west of the proposed Automatic Field Firing Range in 1995. However, surveys in 2001 (Witteman 2001) and in 2008 (USFWS 2009b) in this same area did not detect any megapodes. Proposed construction under Alternative 1 would be at least 7,500 ft (2,300 m) from the most recent sightings at the Maga location. If a megapode were within the

direct action area it should be able to successfully disperse to adjacent unoccupied habitats. To ensure no megapodes are disturbed, monitoring prior to construction would be conducted. If the species is nesting within 984 ft (300 m), construction would be halted until the species left the area. With this mitigation, impacts would be less than significant.

SEA TURTLES. There are no proposed activities in Alternative 1 that occur in beach areas. Impacts would be less than significant.

MICRONESIAN GECKO. This species is uncommon but has been collected in 2008 in a limestone forest area and it is likely to be present only in limestone forest areas (USFWS 2009b). Clearing would not occur in known limestone forest areas and the species is unlikely to be found in other vegetation types, and because of the relatively small amount of vegetation community types that would be removed compared to what is present on Tinian, construction would have a less than significant impact on this species.

TREE SNAILS. The humped tree snail, a candidate species under ESA, historically occurred on Tinian, but is now thought to be extirpated (USFWS 2007). Recent surveys in likely areas recorded no occurrence of this species (report in preparation). There would be no impact on this species.

Operation

Vegetation

Stray ammunition would have limited impact to surrounding vegetation. Impacts to vegetation would be less than significant.

Wildlife

TINIAN MONARCH. There would be indirect impacts from general noise and activity at the ranges in the surrounding forested areas. As discussed below, because there is no information available on the sensitivity of the species being evaluated for general noise and human activity, significant impacts were assumed possible in forested habitat within a surrounding zone of 328 ft (100 m) surrounding the ranges. Using this buffer area, the areas affected are as specified in Table 10.2-3. Noise studies have been conducted for the proposed small arms firing ranges and a summary of the study and noise contours are provided in Chapter 6. Contours are based on two noise metrics: (1) A-weighted day-night level (ADNL) and (2) unweighted peak, 15% Metric (PK-15) (met) which is the peak noise exceeded by 15% of firing events and is a linear peak sound pressure level of individual shots rather than a cumulative or average level; using this measure means the size of the contours would not change if the number of rounds fired increases. For the Tinian monarch, the surrounding forested areas are important. The area within the PK-15 (met) 104 dB noise contour contains 577 ac (234 ha) of forest consisting of the following subtypes: limestone forest – 25 ac (10 ha); mixed introduced forest – 506 ac (205 ha); and tangantangan - 46 ac (19 ha). The area within the 65 dB ADNL noise contour contains 1,229 ac (497 ha) of forest consisting of the following subtypes: limestone forest – 41 ac (16 ha); mixed introduced forest – 999 ac (404 ha); and tangantangan - 189 ac (76 ha).

No noise studies have been conducted specifically on the Tinian monarch; however, noise studies have been conducted on the effects of military noise on a similar species in the Pacific. Vanderwerf et al. (2000) studied the effects of military noise on the elepaio, another endangered Pacific flycatcher in the same family as the Tinian monarch. That study provides some indirect evidence that the Tinian monarch may not be highly sensitive to noise, particularly small arms fire.

The study evaluated the responses of Oahu elepaio at the Schofield Barracks Range in Hawaii to 282 high explosive artillery (60-mm, 105-mm, and 155-mm) and demolition blasts located 328 to 3,281 ft (100 to 1,000 m) from elepaio nests, ranging in intensity from 81.4 to 116 dBA. The effects of artillery blast noise were only detected in two instances. In both instances, an incubating male elepaio was preening his breast feathers with its head down when a blast occurred and it suddenly looked up and scanned immediately after the blast, as if attempting to visually locate the source of the sound. The response was minor and short-lived in both cases; the male lowered its head and resumed preening 1 to 2 seconds after each blast noise had subsided. In no case did an elepaio flush from the nest or pause when returning to the nest in response to artillery noise. This study suggests that Oahu elepaio reproductive success is not negatively impacted by noise associated with live-fire training, particularly artillery (VanderWerf et al. 2000). In addition to the elepaio study, coastal California gnatcatchers regularly occur and nest successfully within 400 ft (122 m) of the Sheriff's Training Range and a Trap and Skeet Range at Marine Corps Air Station Miramar (Navy 2001).

It should be noted the elepaio studied at Schofield Barracks Range may be habituated to the noise associated with live-fire training and since live-fire training has not been conducted on Tinian before, it may take some time for the birds on Tinian to habituate to the noise. Birds habituate to noises and may not respond to stimuli when they do not perceive a direct threat. In general, wildlife, particularly birds, react more to a visual stimulus associated with a noise rather than just a noise without an association to a visual source (Lamp 1989, Bowles 1995). The noise associated with the proposed small arms ranges may be heard at some distance from the range. However, due to the intervening vegetation, there would be no direct visual cue to the proposed weapons firing by a Tinian monarch or other bird, unless the bird was directly adjacent to the firing line of the range. Based on the information available on bird response to noise, impacts from the proposed action would be less than significant.

ALL WILDLIFE SPECIES. Potential direct and indirect impacts to all wildlife species may result from munitions, pollutants, non-native species, fire, recreation, and potential termination of agricultural leases that are currently held within the LBA. Stray ammunition may fall within the Surface Danger Zones (SDZs); however, the likelihood of any single animal being struck is negligible. Assuming that 0.01% of ammunition falls outside the range and in the SDZ, the estimated number of bullets is approximately 328 over the course of a year. Use of ammunitions may result in increases of contaminants in the soil and an increase in the runoff from the ranges, most likely in localized areas. Incidental spills of petroleum used for vehicles or other power equipment could also occur. However, Best Management Practices (BMPs) would control and reduce generation and migration of contaminants from the range area and periodical monitoring for metals contamination in areas surrounding ranges would be conducted (see also Section 4.2.2.1). With these BMPs impacts would be less than significant.

Species in areas surrounding the cleared ranges such as the Micronesian honeyeater and the Mariana fruit dove could be indirectly impacted by disturbance from range operations (impacts to Tinian monarchs were addressed above). These periods of disturbance would not be continuous due to periodic training. Information on the noise sensitivity of the bird species of concern is not available. However, there are other large areas of suitable habitat that could be utilized in adjacent areas. Based on this availability of habitat and total population and distribution for the species, impacts to these migratory birds from operations are considered to be less than significant.

Training activities would result in additional aircraft trips between Guam and Tinian with their associated personnel and equipment. The BTS is the most serious of potential non-native species that might be brought to Tinian. In addition, several non-native plant species in Micronesia (e.g., refer to Space and

Falenruw 1999) present on Guam that are previously unrecorded for Tinian could be introduced due to proposed training activities on Tinian. These and other species have the potential to degrade limestone forest habitat and other forested and shrub habitats that support Tinian monarch and other species. Impacts would be significant. To prevent non-native species, particularly BTS, from being imported to Tinian from Guam, a MBP is being developed to address potential invasive species impacts associated with this EIS as well as to provide a plan for a comprehensive regional approach. The MBP is specified in Section 10.2.2.3. DoD will implement specific biosecurity measures to ensure that risk from transporting invasive species to or from Guam and Tinian is controlled. With implementation of these measures, invasive species impacts would be less than significant.

Fire potential would be increased from firing range operations. Fire can result in direct effects to all wildlife through mortality from smoke inhalation or direct mortality. Native plants, animals, and their habitats on Tinian are adapted to a humid, tropical climate and are not adapted to a fire driven ecosystem (USFWS 2008). Grass fires are regular occurrences on Tinian, and there is greater danger during the dry season. Data cited in the 1997 Tinian INRMP (NAVFAC Pacific 1997) shows that the worst fire hazard exists during the driest months (May through July) of the dry season and during this short time 200 or more acres may burn each year. Information was presented for 1991 that 33 fires burned, the largest occurring in the month of March and two-thirds of the fires burned between 1 and 8 ac (0.4 and 3.2 ha), and approximately one-third burned 9 to 20 ac (3.6 to 8.1 ha). The alteration or removal of habitats by fire could reduce food sources or prevent or inhibit breeding and create competition for feeding and sheltering, particularly for species that establish discrete territories. Impacts would be significant.

Standard practice at Marine Corps firing ranges are specific training range regulations that address fire prevention and response for day-to-day operations. Units undergoing training at the ranges would be briefed by range control on requirements suitable to the conditions of the day and protocols should a fire occur (e.g., specifying how the range would shut down and how fire suppression action would be taken). In addition to these standard procedures, mitigation fire management plan would be prepared to address the potential for fires on Tinian as the result of live-fire training activities on the proposed ranges. The plan would provide background information and strategic planning for fire prevention. Information on this plan is provided under Conservation Measures (Section 10.2.2.3). With implementation of these practices, impacts would be less than significant.

There is currently 2,550 ac (1,032 ha) of land within the LBA being leased to residents on Tinian for agricultural use, primarily grazing. DoD would only terminate subleases in the LBA that are within the footprint and SDZ of the proposed ranges. The relocation of any leases are under the control of the CNMI government as they are responsible for non-federal land use decisions on Tinian. However, DoN would work with CNMI land use and natural resource officials to ensure that native forest habitat concerns for wildlife and all protected species are taken into account. With this measure, impacts would be less than significant.

Special-Status Species

Stray ammunition may fall within the SDZs; however, the likelihood of any single animal being struck is negligible. As described above, the estimated number of bullets that would fall on land within the SDZ is approximately 328 bullets over the course of a year. Impacts would be less than significant. The Mariana fruit bat and Micronesian megapode are not present in the proposed training area based on the most recent studies (USFWS 2009b) so they would not be affected by noise and activity, therefore impacts would be less than significant. Potential impacts to special-status species from pollutants, non-native species, fire,

and recreation would be similar to that discussed above for wildlife and would be less than significant or mitigated to less than significant. Noise and activity impacts are discussed below.

MARIANA COMMON MOORHEN. Up to four Mariana common moorhens use the larger of the two Bateha wetlands located approximately 1,000 ft (305 m) to the northwest of the Platoon Battle Course (USFWS 1996). There is no documented use of the other areas identified as potential wetlands, although one small wetland that would be removed may hold water for at least short periods (refer to Chapter 4 for an additional discussion of wetlands). No noise studies have been conducted to measure responses of Mariana common moorhens to noise. However, given the distance and the likely infrequent use of the wetland by moorhens, noise and activity from operation of the ranges and support areas are unlikely to disturb the species. Impacts would be less than significant.

SEA TURTLES. Marines on liberty could have a significant impact on threatened green sea turtles in coastal areas if no educational or enforcement program was in place. The existing COMNAV Marianas Training Handbook (COMNAV Marianas Instruction 3500.4, June 2000) has specific prohibition on harassing or taking all sensitive species and military commanders would enforce these prohibitions. All Marines would also be made aware of the sensitive species present. Impacts would be less than significant.

ALL SPECIAL-STATUS SPECIES. Impacts that would potentially affect all special-status species are the same as those described above under wildlife.

10.2.2.2 Summary of Alternative 1 Impacts

Table 10.2-4 summarizes Alternative 1 impacts.

Table 10.2-4. Summary of Alternative 1 Impacts

<i>Project Activities</i>	<i>Project Specific Impacts</i>
Construction	Mixed introduced forest, shrub habitat, and tangantangan would be removed that is habitat for numerous native birds, including the Tinian monarch; approximately 1% of the Tinian monarch population on Tinian would be affected resulting in a less than significant impact; due to the removal of a small amount of the previously designated FAA Mitigation Area. The FAA Mitigation Area would be reconfigured and increased in size.
Operation	The Mariana common moorhen and Tinian monarch would not be significantly impacted by noise from small arms range firing; the potential for fire and non-native species are significant but would be reduced to less than significant with the implementation of mitigation measures and BMPs; indirect potential significant impacts from termination of grazing leases and movement of grazing animals to other areas would be minimized by working with natural resource officials to ensure that native forest habitat concerns for all wildlife and protected species are taken into account.

10.2.2.3 Alternative 1 Proposed Mitigation Measures

Specific protection measures and general conservation measures that would be implemented are described as well as existing conservation measures that are relevant to the terrestrial natural resources that may be affected. Although BMPs are mentioned, they are not generally considered mitigation because they are actions, plans or Standard Operating Procedures that would be implemented as part of the proposed action regardless of impacts or project. A detailed description of BMPs and resource protection measures required by regulatory mandates can be found in Chapter 2 of Volume 7. A more detailed explanation of regulatory permitting requirements is in Volume 8.

Existing Conservation Measures

Environmental restrictions and requirements for training operations are included in the COMNAV Marianas Training Handbook (COMNAV Marianas Instruction 3500.4, June 2000). The instruction contains the following components: guidance for developing an Environmental Protection Annex in support of a major military exercise plan; training requirements; BTS control and interdiction; monitoring and monitoring reports; emergency procedures; environmental monitor checklists; and an environmental awareness pocket card. This instruction is currently being updated as part of the recent MIRC EIS/OEIS and BO to incorporate new requirements and information.

Project-Specific Protection Measures

The following are specific measures that would be taken to minimize potential impacts to wildlife and special-status species:

- The DoN would hire two full-time Biological Monitors during the construction phase for monitoring construction projects on both Guam and Tinian. The Biological Monitors would be responsible for oversight of avoidance, minimization, mitigation, and conservation measure implementation by the construction contractors for projects associated with the proposed action. The Biological Monitors would ensure that the construction contractor has clearly staked the project limits and the boundary remains in place throughout construction. In addition, the Biological Monitor would monitor construction activities to ensure all avoidance and minimization measures are being implemented by the construction contractor. The Biological Monitors would accurately map and prepare monitoring reports documenting actual impacts of proposed project construction.
- The Biological Monitors would assist with the review and compliance of these procedures and practices, conduct site visits, and provide expert knowledge to contractors and workers. Such advice and technical expertise provided by the Biological Monitor shall not relieve contractors of their liabilities for compliance with relevant resource protection laws and regulations, including the ESA.
- Construction personnel would receive natural resource awareness briefings which address special-status species, avoidance measures and reporting requirements. This program would focus on the purpose for resource protection; construction contractor identification of sensitive resource areas in the field (e.g., areas delineated on maps and by flags or fencing); environmentally responsible construction practices and protection measures; protocol to resolve conflicts that may arise at any time during the construction process; and ramifications of noncompliance.
- Approximately 1 week prior to clearing vegetation a qualified biologist would survey to determine if the Mariana fruit bat is present. If present in the area, construction would be delayed until they left the area.
- If nesting Mariana common moorhens are present within the limits of construction, clearing and construction would be postponed until the chicks have fledged. If work stopped for more than 1 week, another survey would be conducted to ensure that no birds have begun to nest.
- If Micronesian megapodes are present within 492 ft (150 m) of the project site, the work would be postponed until the megapode has left the area. If megapodes are nesting within 984 ft (300 m) of the project site, the work would be postponed and the USFWS contacted immediately as no nesting is known to occur there.

- Upon termination of any agricultural leases in the leaseback area, DoN would work with CNMI land use and natural resource officials to ensure that native forest habitat concerns for ESA-listed species are taken into account.

Establish a Forest Mitigation Area

Due to the placement of the proposed firing ranges within portions of the current FAA Mitigation Area (refer to Figure 10.2-1), the DoN in coordination with the FAA and USFWS would revise the existing FAA Mitigation Area to encompass the central escarpment associated with Mt. Lasso to protect some of the largest remaining areas of intact native limestone forest on Tinian (Figure 10.2-3). The amount lost from proposed ranges, including a 100-m buffer around each range, would be replaced at a minimum replacement to lost ratio of 2:1. This revised and larger mitigation area would serve as important habitat for ESA-listed species (e.g., Micronesian megapode, Mariana fruit bat) and the delisted Tinian monarch, in particular increasing the acreage of native limestone forest, mixed introduced forest, and tangantangan within the proposed expanded FAA Mitigation Area.

Native Forest Enhancement Plan

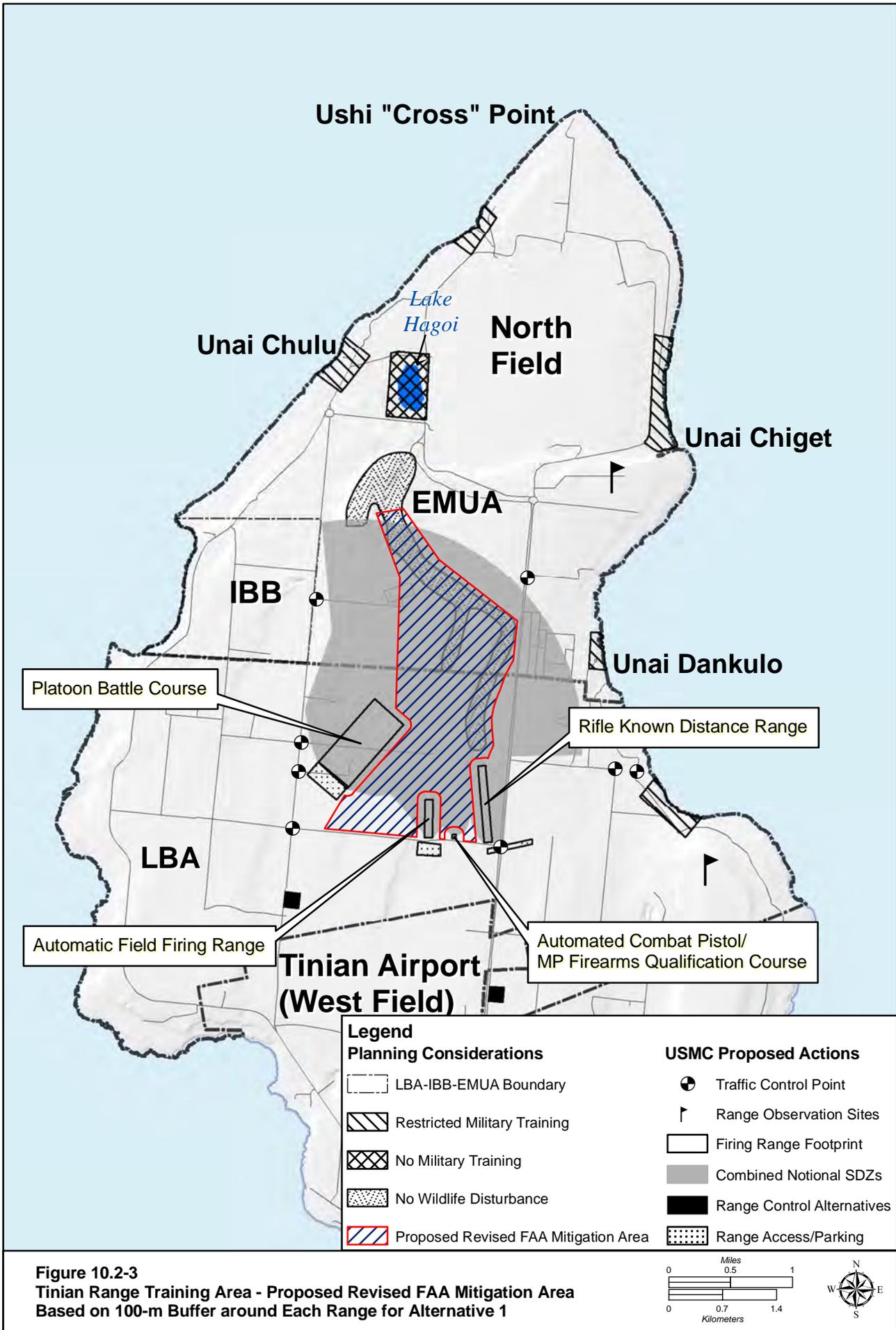
The DoN would further minimize impacts to listed and other native species on Tinian by developing and implementing a Native Forest Enhancement Plan within the FAA Mitigation Area. The Native Forest Enhancement Plan would focus on improving the quality of native forest habitat and result in the conversion of non-native habitats into native forest types for the benefit of listed species. Implementation of the plan would begin prior to any construction for new ranges on Tinian; therefore, the plan would be completed at least 1 year prior to the proposed onset of construction on Tinian.

Wildland Fire Management Plan and Resources

A Wildland Fire Management Plan would be developed and implemented. Although this plan is considered a conservation measure overall, some elements in the plan would be project-specific protection measures. This plan would include protocols for monitoring fire conditions and adjusting training as needed, location and management of fuels reductions, fire breaks, fire fighting roads, fire fighting water systems, burn hazard assessment response, on-call helicopter fire suppression, protocols for using units to be briefed by range control on range restrictions, and protocols that will be implemented should a fire occur.

The Tinian Fire Department maintains a 300-gallon (1,136-liter) pump truck and fire crew to respond to wildland fires that would augment military fire response efforts. The Tinian Fire Department also maintains a 750-gallon (2,839-liter) pumper truck and crew in San Jose to respond to and provide fire service for the southern, more developed portion of the island, and backup support to West Field. A military request for the use of these assets would be made through the West Field command post during major exercises.

Printing Date: Apr 28, 2010, M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_3\10.2-3.mxd



Invasive Species Issues and the Micronesia Biosecurity Plan

The MBP is being developed to address potential invasive species impacts associated with this EIS as well as to provide a plan for a comprehensive regional approach. The MBP would include risk assessments for invasive species throughout Micronesia and procedures to avoid, minimize, and mitigate these risks. It is being developed in conjunction with experts within other federal agencies including the National Invasive Species Council, U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS), the U.S. Geological Survey, and the Smithsonian Environmental Research Center. The plan is intended to be a comprehensive evaluation of risks in the region, including all Marine Corps and Navy actions on Guam and Tinian. It would include control measures to prevent BTS movement off Guam and management within Guam. For additional information on the MBP and existing and interim measures for invasive species control, please refer to Volume 2, Chapter 10, Section 10.2.2.6. DoD will implement interim biosecurity measures to ensure that risk from transporting invasive species to or from Guam and Tinian is controlled.

Specific procedures are already in place or will be in place in conjunction with requirements under the MIRC BO for BTS interdiction and would be continued. The DoD would use the existing dog and handler team for Tinian to conduct all BTS interdiction activities on Tinian for proposed new actions. The current BTS interdiction quarantine facility on Tinian is surrounded by a typhoon proof snake barrier. This facility is adequate for the current import rate of cargo onto Tinian. All military related cargoes (construction and training equipment, vehicles, materials, and supplies) from the proposed project would be inspected by USDA-APHIS and Wildlife Services and determined to be clean prior to leaving the quarantine and inspection areas for work or training on Tinian and for shipment off Tinian.

Habitat Monitoring

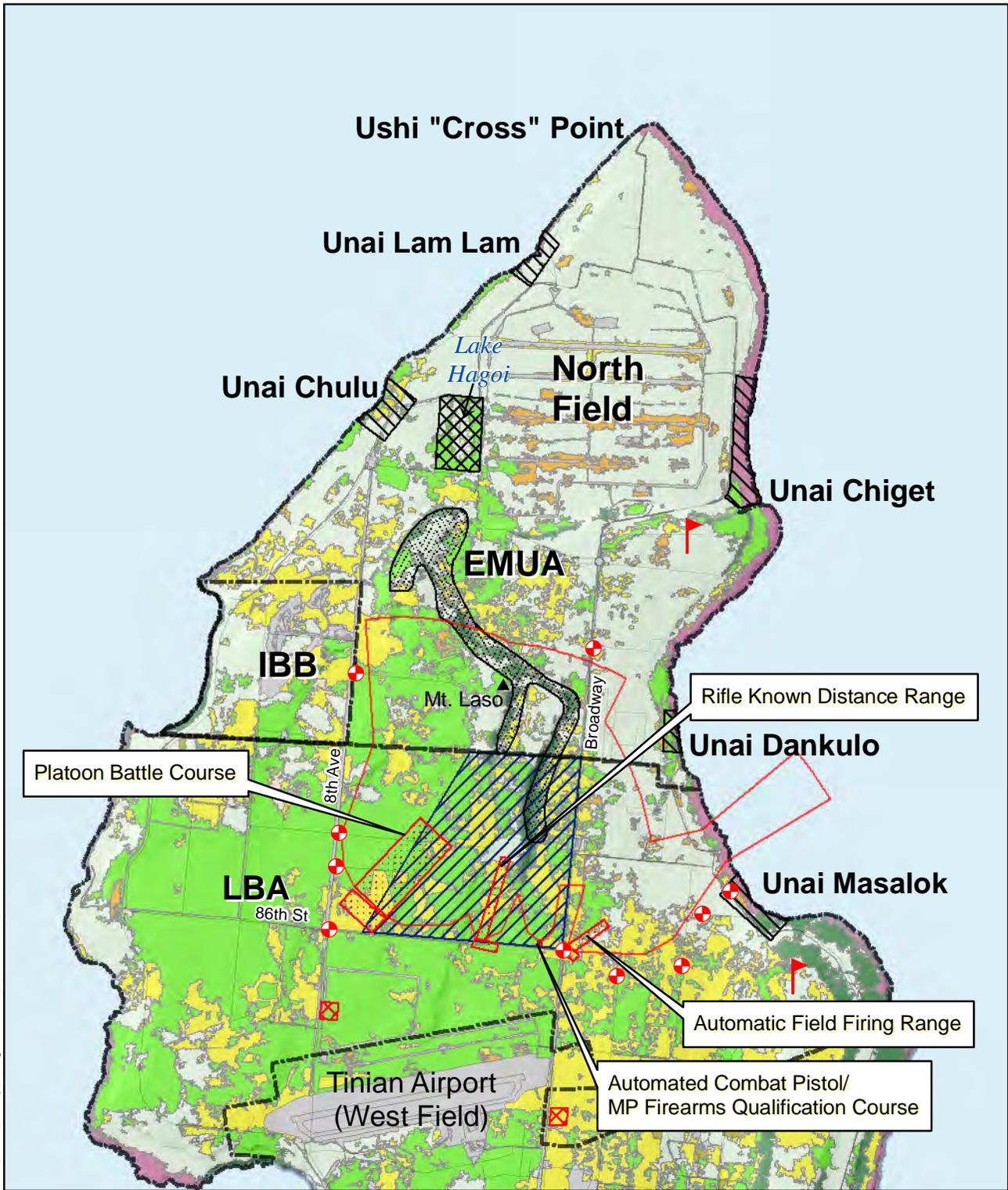
Ongoing long-term habitat monitoring on DoD lands on Tinian would continue.

10.2.3 Alternative 2

10.2.3.1 Tinian

Construction*Vegetation*

Vegetation that would be removed for construction of ranges and other facilities is shown in Table 10.2-5 and Figure 10.2-4. Vegetation removed includes mixed introduced forest, tangantangan, and shrub/grassland. No limestone forest would be removed. Impacts to vegetation would be less than significant. The vegetation to be removed serves as potential habitat for all the sensitive animal species that are addressed under the special-status species section below.



Printing Date: Jun 15, 2010, M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_3\10.2-4.mxd

Legend

LBA-IBB-EMUA Boundary	Traffic Control Point	Vegetation	Native Limestone Forest
Restricted Military Training	Range Observation Sites	Agroforest	Savanna/Other Shrub and Grass
No Military Training	Firing Range Footprint/ Range Access/Parking	Agroforest -- Coconut	Strand
No Wildlife Disturbance	Notional SDZ	Barren/Sandy Beach/Bare Rocks	Urban and Built-up
FAA Mitigation Area	Range Control Alternatives	Casuarina Thicket	Wetland
		Cropland	<i>Source: USFWS 2009a</i>
		Tangantangan	
		Mixed Introduced Forest	

Figure 10.2-4
Vegetation Impacts - Range Training Area Alternative 2

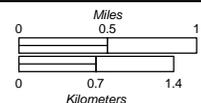


Table 10.2-5. Potential Impacts to Vegetation Communities within the Tinian MLA with Implementation of Alternative 2 (ac [ha])

<i>Parcel and Activity</i>	<i>Mixed Introduced Forest</i>	<i>Tangantangan</i>	<i>Other Shrub and Grass</i>	<i>Developed</i>
Construction Areas (vegetation removed)				
Platoon Battle Course	93 (38)	0	44 (18)	0
Ranges	9.6 (3.9)	6.9 (2.8)	22 (8.9)	0
Range Control	9.0 (3.6)	0	9.8 (4.0)	1.0 (0.4)
Range Support Areas	9.1 (3.7)	0	30 (12)	1.4 (0.6)
Total area removed	121 (49)	6.9 (2.8)	106 (43)	1.4 (0.6)

Wildlife

TINIAN MONARCH. The Tinian monarch is likely to be present in all areas surrounding the proposed ranges and range support areas. Potential habitat for the species would be cleared including 121 ac (49 ha) of mixed introduced forest and lesser amounts of shrub and tangantangan (Table 10.2-6). The MLA encompasses roughly 75% of the current monarch habitat on the island and supports about 70% of the total monarch population. Based on densities estimated by USFWS (2009b), the number of Tinian monarchs that would potentially be displaced through construction would be 297 birds. With a total population estimated at 40,000 birds, project construction would impact 0.7% of the current population. Based on territory densities estimated by USFWS (2009b), the number of Tinian monarch territories that would be lost through construction would be 149 (refer to Table 10.2-4).

Table 10.2-6. Potential Direct Impacts to the Tinian Monarch with Implementation of Alternative 2

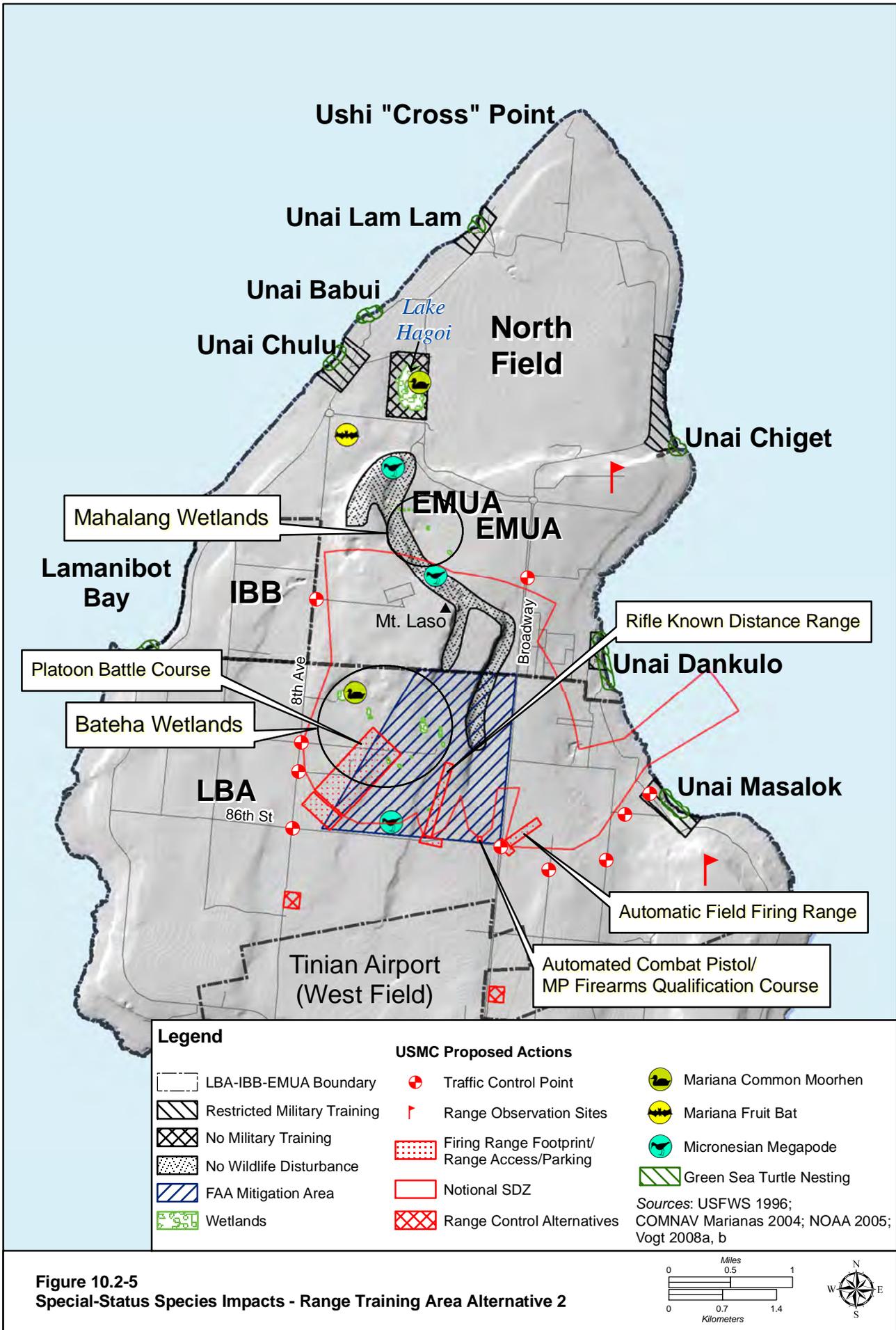
<i>Habitat Type</i>	<i>Habitat Removed (ac [ha])</i>	<i>Monarch Density (# per ha)*</i>	<i>Total Potential Birds in Removed Habitat</i>	<i>Max. Territories (# per ha)*</i>	<i>Total Potential Territories in Removed Habitat</i>
Mixed Introduced Forest	121 (49)	5.82	285	2.9	142
Tangantangan	6.9 (2.8)	4.36	12	2.5	7
Totals	128(52)	NA	297	NA	149

Legend: NA = Not Applicable.

Source: *USFWS 2009b.

The placement of ranges under Alternative 2 does not meet the requirements set out in the “Dedication of Tinian Military Retention Area Land for Wildlife Conservation” (Government of CNMI and U.S. Navy 1999) whereby a 936-ac (379-ha) FAA Mitigation Area is established for the protection of “endangered and threatened wildlife, particularly the Tinian Monarch” with the provision that it is the right of the U.S. military to “use the premises for low-impact military training and for other purposes that do not disrupt the habitat and living conditions of the Tinian Monarch.” As discussed above for wildlife, approximately 108 ac (44 ha) of the 936-ac (379-ha) FAA Mitigation Area would be removed (Figure 10.2-5). In addition, a zone 328-ft (100-m) wide surrounding the perimeter of the range footprint areas is assumed to be directly impacted by noise and activity from construction (Table 10.2-7).

Printing Date: Apr 28, 2010, M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_3\10.2-5.mxd



**Figure 10.2-5
Special-Status Species Impacts - Range Training Area Alternative 2**

Table 10.2-7. Potential Indirect Impacts to Habitat surrounding the Proposed Ranges with Implementation of Alternative 2

<i>Project</i>	<i>Forested Habitat Affected - 100 m Buffer (ac [ha])</i>
Platoon Battle Course	71 (29)
KD Range	49 (20)
Field Firing Range	25 (10)
Combat Pistol/Qual Course	8.5 (3.4)
Range Control/Bivouac Areas	24 (10)
Totals	178 (72)

As compensation for the removal of a portion of the FAA Mitigation Area, including the construction footprint and the surrounding zone impacted by noise and activity, additional mitigation area would be established and other conservation measures would be implemented, as described in Section 10.2.2.3. With this mitigation, impacts from removal of a portion of the FAA Mitigation Area would be less than significant.

ALL OTHER WILDLIFE SPECIES. Approximately 108 ac (44 ha) of the 936-ac (379-ha) FAA Mitigation Area that was previously designated in the Lease Back Area (LBA) just south of the EMUA boundary would be removed (Figure 10.2-5).

Based on the honeyeater population density estimate of 1.0 birds per ac (0.41 per ha; USFWS 2009b) and the loss of 128 ac (52 ha; refer to Table 10.2-2) there would be a loss of habitat for up to 21 birds. Based on the fruit dove population density estimate of 0.8 birds per ac (0.33 birds per ha; USFWS 2009b) and the loss of 128 ac (52 ha) there would be a loss of habitat for up to 17 birds.

Other impacts from construction would be the same as for Alternative 1. Long-term, permanent impacts to populations or distributions of wildlife from construction would not likely result. Impacts to wildlife would be less than significant.

NON-NATIVE WILDLIFE. Movement of construction personnel, equipment, and supplies could result in the movement and spread of invasive plant and animal species to Tinian. Impacts would be the same as for Alternative 1. Impacts from non-native species such as the BTS would be significant but are biosecurity measures are included (see Section 10.2.3.3) to reduce this threat to less than significant.

Special-Status Species

Direct impacts to special-status species includes the removal of habitat and subsequent fragmentation of remaining habitat. Figure 10.2-5 shows general locations of special-status species in relation to the proposed ranges.

MARIANA FRUIT BAT. The fruit bat was not documented in 2008 surveys on Tinian (USFWS 2009b). Based on this finding, no proposed removal of limestone forest vegetation, and because of the relatively small amount of vegetation community types that would be removed compared to what is available, construction would have a less than significant impact on the fruit bat.

MARIANA COMMON MOORHEN. One area of 0.3 ac (0.12 ha) identified as a wetland (Figure 10.2-5; also see Chapter 4) is located approximately 375 ft (114 m) north of the proposed Platoon Battle Course. There is no evidence that this potential wetland is being used by the moorhen. A wetland approximately 1,800 ft (549 m) to the northwest has been used by up to four moorhens (USFWS 1996). The estimated maximum numbers of moorhens using the Bateha wetlands is four birds (USFWS 1996). Although

construction would result in noise and activity, the distance to this wetland and the temporary nature of the work would result in less than significant impacts to moorhens.

MICRONESIAN MEGAPODE. Although not observed in 2008 surveys, several individual birds were documented on Tinian in 1999 in the Maga area, northwest of Mount Lasso where there is native limestone habitat that is generally preferred by the species. A single bird has been detected just west of the proposed rifle known distance range in 1995. However, surveys in 2001 (Witteman 2001) and in 2008 (USFWS 2009b) in this same area did not detect any megapodes. Proposed construction under Alternative 1 would be at least 8,500 ft (2,591 m) from the most recent sightings at the Maga location. If a megapode were within the direct action area it should be able to successfully disperse to adjacent unoccupied habitats. Impacts would be less than significant.

SEA TURTLES. There are no proposed activities in Alternative 2 that occur in beach areas. Impacts would be less than significant.

MICRONESIAN GECKO. This species is uncommon but has been collected in 2008 in a limestone forest area and it is likely to be present only in limestone forest areas (USFWS 2009b). Since no clearing would occur in limestone forest (except possibly unmapped small, isolated areas) and the species is unlikely to be found in other vegetation types, and because of the relatively small amount of vegetation community types that would be removed compared to what is present on Tinian, construction would have a less than significant impact on this species.

TREE SNAILS. The federal ESA candidate humped tree snail has occurred historically on Tinian but is now thought extirpated (USFWS 2007); recent surveys in likely habitat areas did not find this species (report in preparation). There would be no impact on this species.

Operation

Vegetation

Impacts would be the same as for Alternative 1.

Wildlife

Overall, impacts would be the same as for Alternative 1. However, due to the different configuration of the ranges under Alternative 2, the potential area of noise increases would be more than double than that under Alternative 1. The area within the PK-15 (met) 104 dB noise contour contains 624 ac (252 ha) of forest consisting of the following subtypes: limestone forest – 3.4 ac (1.4 ha); mixed introduced forest – 574 ac (232 ha); and tangantangan - 47 ac (19 ha). The area within the 65 dB ADNL noise contour contains 2,878 ac (1,165 ha) of forest consisting of the following subtypes: limestone forest – 29 ac (12 ha); mixed introduced forest – 2,397 ac (970 ha); and tangantangan - 452 ac (183 ha).

Special-Status Species

Impacts would be the same as described for Alternative 1.

MARIANA COMMON MOORHEN. As noted above under construction, the nearest wetland with evidence of use by moorhens is approximately 1,800 ft (549 m) to the northwest. The estimated maximum numbers of moorhens using the Bateha wetlands is four birds (USFWS 1996). Although operations would result in noise and activity, the distance to this wetland would result in impacts that are less than significant.

SEA TURTLES. Impacts would be the same as for Alternative 1.

ALL SPECIAL-STATUS SPECIES. Other indirect impacts would be the same as for Alternative 1.

10.2.3.2 Summary of Alternative 2 Impacts

Table 10.2-8 summarizes Alternative 2 impacts.

Table 10.2-8. Summary of Alternative 2 Impacts

<i>Activity</i>	<i>Project Specific Impacts</i>
Construction	Mixed introduced forest, shrub, and tangantangan would be removed that is habitat for numerous native birds, including the Tinian monarch. Approximately 0.7% of the Tinian monarch population on Tinian would be impacted. A small amount of the previously designated FAA Mitigation Area would be removed.
Operation	The CNMI-listed Tinian monarch would not be significantly impacted by noise from range small arms firing; the potential for fire and non-native species are significant but would be reduced to less than significant with the implementation of mitigation measures and BMPs: indirect significant impacts from termination of grazing leases and movement of grazing animals to other areas would be minimized by working with natural resource officials to ensure that native forest habitat concerns for all wildlife and protected species are taken into account.

10.2.3.3 Alternative 2 Proposed Mitigation Measures

The proposed mitigation measures would be the same as described for Alternative 1. The configuration of the revised FAA Mitigation Area (refer to Figure 10.2-3) would be adjusted based on the layout of the Alternative 2 ranges but would include a minimum 2:1 replacement ratio.

10.2.4 Alternative 3

10.2.4.1 Tinian

Construction

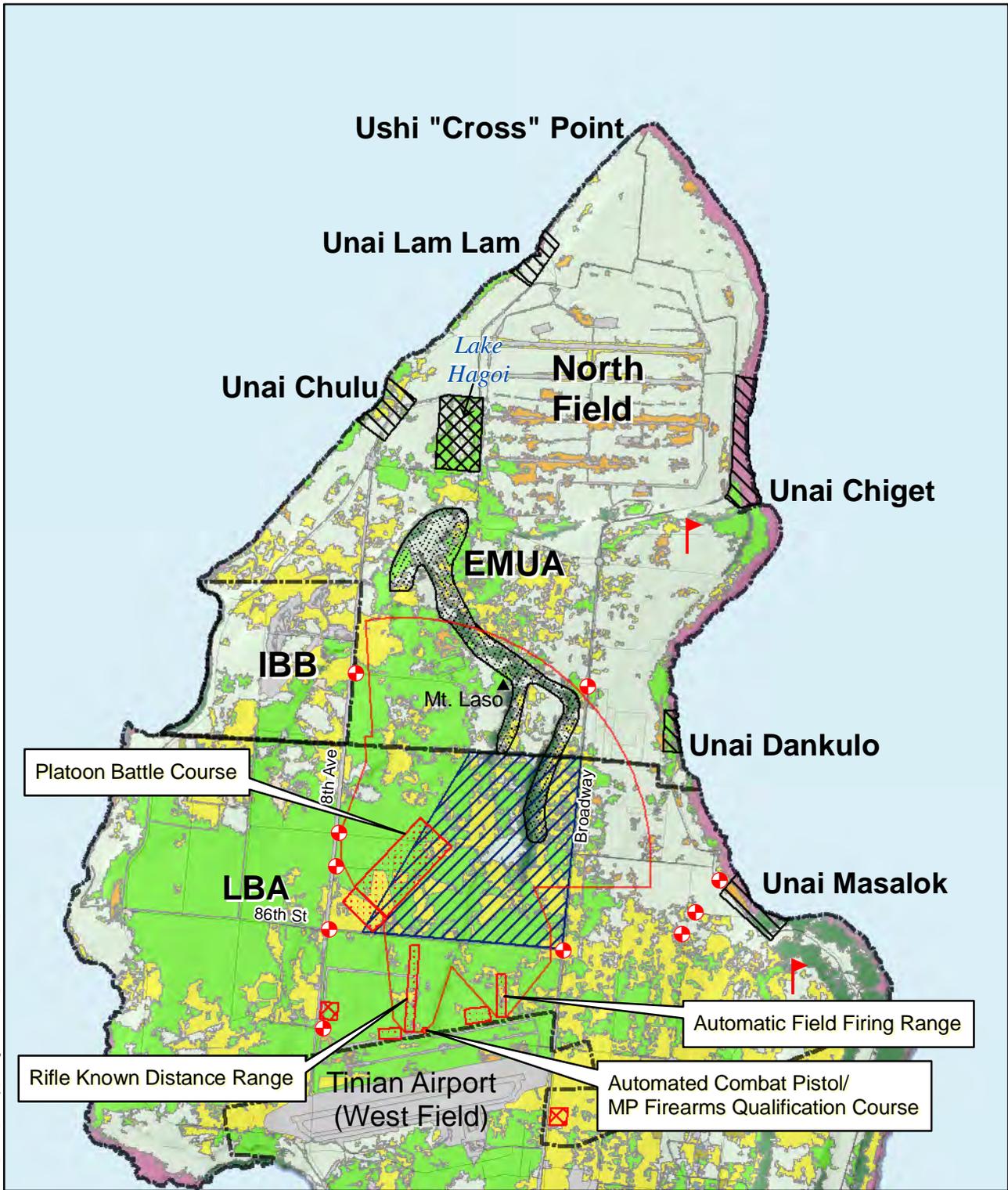
Impacts from Alternative 3 would be identical to Alternative 2 with the following exceptions.

Vegetation

Vegetation that would be removed for construction of ranges and other facilities is listed in Table 10.2-9 and shown in Figure 10.2-6. Vegetation removed includes mixed introduced forest and tangantangan, as well as some shrub/grassland and Casuarina thicket. No limestone forest would be removed. The vegetation to be removed serves as potential habitat for wildlife species that are addressed under the special-status species section below.

Table 10.2-9. Potential Impacts to Vegetation Communities within the Tinian MLA with Implementation of Alternative 3 (ac [ha])

<i>Parcel and Activity</i>	<i>Mixed Introduced Forest</i>	<i>Tangantangan</i>	<i>Shrub and Grass</i>	<i>Developed</i>
Construction Areas (vegetation removed)				
Platoon Battle Course	93 (38)	0	44 (18)	0
Ranges	34 (14)	6.9 (2.8)	8.7 (6.9)	1.4 (0.6)
Range Control	9.0 (3.6)	0	9.8 (4.0)	1.0 (0.4)
Range Support Areas	19 (7.7)	0	26 (11)	2.3 (0.9)
Total area removed	155 (63)	6.9 (2.8)	89 (36)	4.7 (1.9)



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Legend

- LBA-IBB-EMUA Boundary
- Restricted Military Training
- No Military Training
- No Wildlife Disturbance
- FAA Mitigation Area

USMC Proposed Actions

- Traffic Control Point
- Range Observation Sites
- Firing Range Footprint/Range Access/Parking
- Notional SDZ
- Range Control Alternatives

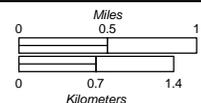
Vegetation

- Agroforest
- Agroforest -- Coconut
- Barren/Sandy Beach/Bare Rocks
- Casuarina Thicket
- Cropland
- Tangantangan
- Mixed Introduced Forest

- Native Limestone Forest
- Savanna/Other Shrub and Grass
- Strand
- Urban and Built-up
- Wetland

Source: USFWS 2009a

Figure 10.2-6
Vegetation Impacts - Range Training Area Alternative 3



Wildlife

TINIAN MONARCH. The Tinian monarch is likely to be present in all areas surrounding the proposed ranges and range support areas. Potential habitat for the species would be removed including 155 ac (63 ha) of mixed introduced forest and lesser amounts of shrubs and tangantangan (Figure 10.2-7 and Table 10.2-10). The MLA encompasses roughly 75% of the current monarch habitat on the island and supports about 70% of the total monarch population. Based on densities estimated by USFWS (2009b), the number of Tinian monarchs that would potentially be displaced through construction would be 379 birds (Figure 10.2-6 and Table 10.2-10). With a total population estimated at 40,000 birds, project construction would impact 0.9% of the current population. Based on territory densities estimated by USFWS (2009b), the number of Tinian monarch territories that would be lost through construction would be 190 (Figure 10.2-7 and Table 10.2-10).

Table 10.2-10. Potential Direct Impacts to the Tinian Monarch with Implementation of Alternative 3

<i>Habitat Type</i>	<i>Habitat Removed (ac [ha])</i>	<i>Monarch Density (# per ha)*</i>	<i>Total Potential Birds in Removed Habitat</i>	<i>Max. Territories (# per ha)*</i>	<i>Total Potential Territories in Removed Habitat</i>
Mixed Introduced Forest	155 (63)	5.82	367	2.9	183
Tangantangan	6.9 (2.8)	4.36	12	2.5	7
Totals	162 (66)	NA	379	NA	190

Note: NA- Not Applicable.

Source: USFWS 2009b.

The placement of ranges under Alternative 2 does not meet the requirements set out in the “Dedication of Tinian Military Retention Area Land for Wildlife Conservation” (Government of CNMI and U.S. Navy 1999) whereby a 936-ac (379-ha) FAA Mitigation Area is established for the protection of “endangered and threatened wildlife, particularly the Tinian Monarch” with the provision that it is the right of the U.S. military to “use the premises for low-impact military training and for other purposes that do not disrupt the habitat and living conditions of the Tinian Monarch.” As discussed above for wildlife, approximately 82 ac (33 ha) of the 936-ac (379-ha) FAA Mitigation Area would be removed. In addition, a zone 32-ft (100- m) wide surrounding the perimeter of the range footprint areas is assumed to be directly impacted by noise and activity from construction (Table 10.2-11).

Table 10.2-11. Potential Indirect Impacts to Habitat Surrounding the Proposed Ranges with Implementation of Alternative 3

<i>Project</i>	<i>Forested Habitat Affected - 100 m Buffer (ac [ha])</i>
Platoon Battle Course	69 (28)
KD Range	65 (26)
Field Firing Range	44 (18)
Combat Pistol/Qual Course	11 (4.5)
Range Control/Bivouac Areas	24 (10)
Totals	213 (86)

As compensation for the removal of a portion of the FAA Mitigation Area, including the construction footprint and the surrounding zone impacted by operational noise and activity, the mitigation area would be reconfigured and expanded and other conservation measures would be implemented, as described in Section 10.2.2.3. With this mitigation, impacts from the removal of a portion of the FAA Mitigation Area would be less than significant.

OTHER WILDLIFE SPECIES. Approximately 82 ac (33 ha) of the 936-ac (379-ha) FAA Mitigation Area that was previously designated in the Lease Back Area (LBA) just south of the EMUA boundary would be removed (refer to Figure 10.2-7).

Based on the honeyeater population density estimate of 0.41 birds per ha (USFWS 2009b) and the loss of 66 ha (refer to Table 10.2-10), there would be a loss of habitat for up to 27 birds. Based on the fruit dove population density estimate of 0.33 birds per ha (USFWS 2009b) and the loss of 66 ha (refer to Table 10.2-10), there would be a loss of habitat for up to 22 birds.

Other impacts from construction would be the same as for Alternative 1. Long-term, permanent impacts to populations or distributions of wildlife would not likely result. Impacts to wildlife would be less than significant.

NON-NATIVE WILDLIFE. Movement of construction personnel, equipment, and supplies could result in the movement and spread of invasive plant and animal species to Tinian. Impacts would be the same as for Alternative 1. Impacts from non-native species such as the BTS would be significant but are biosecurity measures are included (see Section 10.2.4.3) to reduce this threat to less than significant.

Special-Status Species

Direct impacts to special-status species includes the removal of habitat and subsequent fragmentation of remaining habitat. Figure 10.2-7 shows general locations of special-status species in relation to the proposed ranges.

MARIANA FRUIT BAT. The fruit bat was not documented in 2008 surveys on Tinian (USFWS 2009b). Based on this finding, no proposed removal of limestone forest vegetation, and because of the relatively small amount of vegetation community types that would be removed compared to what is available, construction would have a less than significant impact on the fruit bat.

MARIANA COMMON MOORHEN. One area 0.3 ac (0.12 ha) identified as a potential wetland (see Figure 10.2-7; also see Chapter 4) is located approximately 375 ft (114 m) north of the proposed Platoon Battle Course. There is no evidence that this potential wetland is being used by the moorhen. A wetland approximately 1,800 ft (549 m) to the northwest is used by up to four moorhens (USFWS 1996). The estimated maximum numbers of moorhens using the Bateha wetlands is four birds (USFWS 1996). Although construction would result in noise and activity, the distance to the wetland and the temporary nature of the work would result in impacts that are less than significant.

MICRONESIAN MEGAPODE. Although not observed in 2008 surveys, several individual birds were documented on Tinian in 1999 in the Maga area, northwest of Mount Lasso where there is native limestone habitat that is generally preferred by the species. One bird was detected in 1995 approximately 1,300 ft (396 m) northeast of the proposed rifle known distance range. Surveys in 2001 (Witteman 2001) and in 2008 (USFWS 2009b) in this same area did not detect any megapodes. Proposed construction under Alternative 1 would be at least 8,500 ft (2,591 m) from the most recent sightings at the Maga location. If a megapode were within the direct action area it should be able to successfully disperse to adjacent unoccupied habitats. Impacts would be less than significant.

SEA TURTLES. There are no proposed activities in Alternative 3 that occur in beach areas. Impacts would be less than significant.

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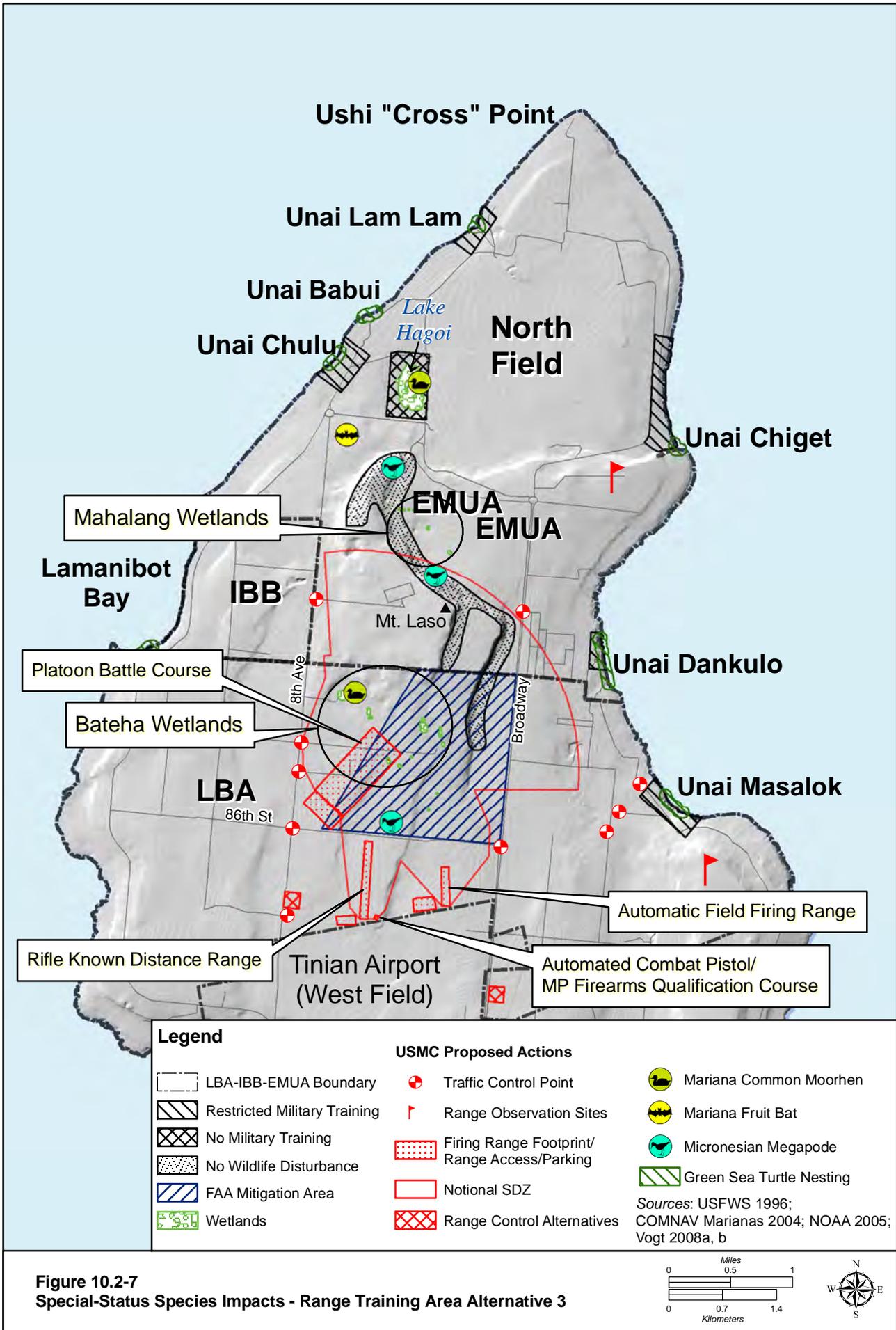


Figure 10.2-7
Special-Status Species Impacts - Range Training Area Alternative 3

MICRONESIAN GECKO. This species is uncommon but has been collected in 2008 in a limestone forest area and it is likely to be present only in limestone forest areas (USFWS 2009b). Since no clearing would occur in limestone forest (except possibly unmapped small, isolated areas) and the species is unlikely to be found in other vegetation types, and because of the relatively small amount of vegetation community types that would be removed compared to what is present on Tinian, construction would have a less than significant impact on this species.

TREE SNAILS. The federal ESA candidate humped tree snail has occurred historically on Tinian but is now thought extirpated (USFWS 2007); recent surveys in likely habitat areas did not find this species (report in preparation). Impacts would be less than significant.

Operation

Vegetation

Impacts would be the same as for Alternative 1.

Wildlife

Overall, impacts would be the same as for Alternative 1. However, due to the different configuration of the ranges under Alternative 3, the potential area of noise increases would be slightly more than that under Alternative 1. The area within the PK-15 (met) 104 dB noise contour contains 836 ac (338 ha) of forest consisting of the following subtypes: mixed introduced forest – 835 ac (338 ha); and tangantangan – 0.8 ac (0.3 ha). The area within the 65 dB ADNL noise contour contains 1,431 ac (579 ha) of forest consisting of the following subtypes: limestone forest – 2 ac (0.8 ha); mixed introduced forest – 1,364 ac (552 ha); and tangantangan - 65 ac (26 ha).

Special-Status Species

Impacts would be the same as described for Alternative 1.

MARIANA COMMON MOORHEN. The Mariana common moorhen may use the Bateha wetland approximately 1,800 ft (549 m) to the northwest of the Platoon Battle Course. This location is outside the PK-15 (met) 104 db noise contour determined for small arms firing. Based on the distance from the firing ranges, impacts would be less than significant.

SEA TURTLES. Impacts would be the same as for Alternative 1.

ALL SPECIAL-STATUS SPECIES. Other indirect impacts would be the same as for Alternative 1.

10.2.4.2 Summary of Alternative 3 Impacts

Table 10.2-12 summarizes Alternative 3 impacts.

Table 10.2-12. Summary of Alternative 3 Impacts

<i>Activities</i>	<i>Project Specific Impacts</i>
Construction	Mixed introduced forest, shrub, and tangantangan would be removed that is habitat for numerous native birds, including the Tinian monarch. Approximately 0.9 % of the Tinian monarch population on Tinian would be impacted. A small amount of the previously designated FAA Mitigation Area would be removed.
Operation	The Tinian monarch would not be significantly impacted by noise from the small arms range; the potential for fire and non-native species are significant but would be reduced to less than significant with the implementation of mitigation measures and BMPs; indirect impacts from termination of grazing leases and movement of grazing animals to other areas would be minimized by working with natural resource officials to ensure that native forest habitat concerns for wildlife and protected species are taken into account.

10.2.4.3 Alternative 3 Proposed Mitigation Measures

Proposed mitigation measures would be the same as described for Alternative 1. The configuration of the revised FAA Mitigation Area (refer to Figure 10.2-3) would be adjusted based on the layout of the Alternative 3 ranges but would include a minimum 2:1 replacement ratio.

10.2.5 No-Action Alternative

Under the no-action alternative, no new construction or new training activities associated with the Marine Corps relocation to Guam would occur in Tinian, and the Marine Corps would not meet training needs and requirements in support of the proposed action. The purpose and need for training in Tinian as described in Chapter 1 would not be met. Existing operations on Tinian would continue. Therefore, the no-action alternative would not have significant impacts to terrestrial biological resources.

10.2.6 Summary of Impacts

Table 10.2-13 summarizes the potential impacts with implementation of each action alternative and the no-action alternative.

Table 10.2-13. Summary of Impacts – Construction and Operation

<i>Alternative 1</i>	<i>Alternative 2</i>	<i>Alternative 3</i>	<i>No-Action Alternative</i>
Vegetation			
LSI <ul style="list-style-type: none"> No primary limestone forest would be removed 	LSI <ul style="list-style-type: none"> No primary limestone forest would be removed 	LSI <ul style="list-style-type: none"> No primary limestone forest would be removed 	NI
Wildlife			
SI-M <p>Less than significant direct impact to the Tinian monarch and other native birds</p>	SI-M <p>Less than significant direct impact to the Tinian monarch and other native birds</p>	SI-M <p>Less than significant direct impact to the Tinian monarch and other native birds</p>	NI
Wildlife and Special-Status Species			
SI-M <ul style="list-style-type: none"> Potential significant indirect impacts from wildfire, mitigated to less than significant Potential significant impacts from introduction of non-native species such as BTS, mitigated to less than significant Indirect significant impacts from termination of grazing leases and movement of grazing animals to other areas, mitigated to less than significant Significant impacts from removal of a part of the previously designated FAA mitigation area, mitigated to less than significant 	SI-M <ul style="list-style-type: none"> Potential significant indirect impacts from wildfire, mitigated to less than significant Potential significant impacts from introduction of non-native species such as BTS, mitigated to less than significant Indirect significant impacts from termination of grazing leases and movement of grazing animals to other areas, mitigated to less than significant Significant impacts from removal of a part of the previously designated FAA mitigation area, mitigated to less than significant 	SI-M <ul style="list-style-type: none"> Potential significant indirect impacts from wildfire, mitigated to less than significant Potential significant impacts from introduction of non-native species such as BTS, mitigated to less than significant Indirect significant impacts from termination of grazing leases and movement of grazing animals to other areas; mitigated to less than significant Significant impacts from removal of a part of the previously designated FAA mitigation area, mitigated to less than significant 	NI

Legend: LSI = Less than significant impact, SI-M = Significant impact mitigable to less than significant, NI = No impact.

10.2.7 Summary of Proposed Mitigation Measures

Table 10.2-14 summarizes the proposed mitigation measures.

Table 10.2-14. Summary of Proposed Mitigation Measures

<i>Alternatives 1, 2, and 3</i>	<i>No-Action Alternative</i>
Vegetation	
<ul style="list-style-type: none"> • None specifically for vegetation 	None
Wildlife and Special-Status Species	
<ul style="list-style-type: none"> • The DoN would hire two full-time Biological Monitors during the construction phase on Guam and Tinian. The biological monitors would be responsible for oversight of avoidance, minimization, mitigation, and conservation measure implementation by the construction contractors for projects associated with the proposed action. 	None
<ul style="list-style-type: none"> • Approximately 1 week prior to clearing vegetation a qualified biologist would survey the project site for the occurrence of ESA-listed species and if present, the work would be postponed. 	
<ul style="list-style-type: none"> • If nesting Mariana common moorhens are present within the limits of construction, clearing and construction would be postponed until the chicks have fledged. If work stopped for more than 1 week, another survey would be conducted to ensure that no birds have begun to nest. 	
<ul style="list-style-type: none"> • Construction personnel would receive natural resource awareness briefings which address special-status species, avoidance measures and reporting requirements. 	
<ul style="list-style-type: none"> • Upon termination of any agricultural leases in the leaseback area, DoD would work with CNMI land use and natural resource officials to ensure that native forest habitat concerns for ESA-listed species are taken into account. 	
<ul style="list-style-type: none"> • A Tinian Native Forest Enhancement Plan would be prepared by the DoN. 	
<ul style="list-style-type: none"> • To compensate for the removal of a portion of the existing FAA Mitigation Area, the mitigation area would be expanded and reconfigured and the replacement would be at a minimum 2:1 ratio. 	
<ul style="list-style-type: none"> • The U.S. Forest Service (USFS) has developed a fire management plan that the DoD will use to develop a military Instruction to implement fire management actions on DoD land. The Instruction would also include BMPs such as for cleaning gear and equipment to prevent the spread of non-native invasive species resulting from wildfire suppression. 	
<ul style="list-style-type: none"> • The DoN is developing a MBP and would implement a biosecurity program and specific biosecurity measures to ensure that risk from transporting invasive species to or from Guam and Tinian is controlled (refer to Volume 2, Chapter 10, Section 10.2.2.6 for a further description of these measures). 	
<ul style="list-style-type: none"> • If Micronesian megapodes are present within 492 ft (150 m) of the project site, the work would be postponed until the megapode has left the area. If megapodes are nesting within 984 ft (300 m) of the project site, the work would be postponed and the USFWS contacted immediately as no nesting is known to occur there. 	

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