4.4 Biological Resources

4.4.1 Approach to Analysis

The focus of this biological resource analysis is on the impacts that proposed training events and construction may have on terrestrial and marine resources. Terrestrial resources includes terrestrial vegetation, wildlife, and special status species, and marine resources includes marine communities and marine special status species. Factors used to assess potential impacts to biological resources include: (1) the type of resource (i.e., legal, commercial, recreational, ecological, or scientific); (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource to proposed activities; and (4) the duration or ecological ramifications of the impact(s).

Impacts to biological resources would be significant if there would be: fragmentation or permanent loss of a terrestrial or marine community to a level that would alter the overall biological function of the community in the region; if there would be physical loss of or exclusion of a species from required habitat, a significant decrease in productivity of native wildlife populations, or a significant decrease in population size or distribution of regionally important native wildlife species; or if the Proposed Action were to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of habitat critical to the survival of the species.

The native species and habitats of Tinian are susceptible to the impacts of non-native, invasive species due to the island ecosystem and relatively small area of the island. Although certain highly invasive species such as the brown tree snake, coconut rhinoceros beetle, and little fire ant (*Wasmannia auropunctata*) have not been recorded on Tinian, these species have affected other islands in the region, such as Guam, and preventing the introduction of such species on Tinian is a high priority. As a result, the Proposed Action includes the construction of biosecurity facilities and implementing protocols to minimize the potential introduction of such invasive species, as described in Section 2.1.9.2 and further detailed in Appendix D.

4.4.2 No Action Alternative

Under the No Action Alternative, there would be no change to ground and aviation training. All existing best management practices and natural resources mitigations agreed to in previous consultations, including identified off-limits and limited training areas, forest enhancements, and Integrated Natural Resources Management Plan projects would continue. Because no change would occur under the No Action Alternative there would be no change to biological resources.

4.4.3 Alternative 1

4.4.3.1 Terrestrial Plant Communities

Under Alternative 1, plant communities could be impacted directly by proposed construction, vegetation maintenance and training events, and indirectly through the potential increase in the spread of invasive plant species over time or increased risk of potential fire, both of which can lead to changes in habitat composition. The Proposed Action incorporates best management practices to reduce the spread of invasive species and wildland fire risk. The plant communities directly impacted are presented in Table 4.4-1, and locations of impacts are shown on Figure 4.4-1, Figure 4.4-2, and Figure 4.4-3.

Under Alternative 1, up to 343 acres of vegetation would be removed, and those surfaces would then be maintained (mowed/trimmed). Landing Zones 2 and 6 and a new access road to Landing Zone 6, would be within the Natural Resources Conservation Area (part of the wildlife conservation area set aside in 1999 for Tinian Monarch conservation). Approximately 19 acres (2 percent of the Natural Resources Conservation Area) would be cleared for construction of the Landing Zones and access road. Of the impacted vegetation, over 81 percent is attributed to two types of plant communities. The two types of plant communities that would be most impacted are Leucaena forest and secondary limestone forest. Direct loss of up to 229.7 acres of Leucaena forest would represent an approximate 2.8 percent decrease in the total 8,283 acres of Leucaena forest on Tinian. Direct loss of up to 50.9 acres of secondary limestone forest would represent an approximate 0.8 percent decrease in the 6,207 acres of secondary limestone forest currently on Tinian. Alternative 1 would not impact the three most sensitive terrestrial plant communities on Tinian: limestone coastal scrub, limestone native forest, and wetland. The USMC is consulting with the U.S. Fish and Wildlife Service related to the 50.9 acres of secondary limestone forest that would be directly impacted during construction, because it is considered habitat for the Mariana fruit bat. The consultation will be complete and incorporated, as appropriate, into the EIS Record of Decision.

As discussed in Section 2.1.9.2 Biosecurity Facilities and outlined in Appendix D, the USMC would continue to comply with all existing Joint Region Marianas biosecurity protocols applicable to the Proposed Action to reduce the spread of non-native vegetation species. Construction and training related activities by DoD Commands are ongoing on Tinian. Biosecurity protocols and facilities are currently being implemented and constructed to support DoD activities. The USMC is committed to complying with existing biosecurity protocols and expanding biosecurity facilities on Tinian to prevent the introduction and reduce the spread of invasive species, with emphasis on the brown tree snake. The USMC would coordinate with CNMI and federal agencies on pre-planning actions associated with biosecurity and would ensure adequate interdiction and early detection/rapid response resources and capabilities are available to support construction and training actions. In addition, the USMC proposes to construct a wash rack and brown tree snake barrier at Tinian Port to support interdiction of invasive species. As noted above, the USMC is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act regarding impacts to listed species and their habitats, including potential impacts from invasive species. The consultation will be complete and incorporated, as appropriate, into the Record of Decision. Biosecurity protocols would be updated if required by the consultation.

The risk of wildfire would increase with the occurrence of training events related to the use of live-fire ranges, aircraft, and ground vehicles. Wildland fire has the potential to affect biological resources on Tinian through temporary habitat disturbance, vegetation loss, and short-term displacement of terrestrial wildlife. As described in Chapter 3, plant communities within the Military Lease Area consist primarily of grassland and disturbed grassland communities, secondary limestone forest, limestone native forest, freshwater wetlands, and limestone coastal scrub. Fire behavior modeling and historical fire patterns on Tinian indicate that wildfire occurrence is largely confined to grassland and disturbed grassland communities, particularly during the dry season. Notably, there are no records of wildfires on Tinian resulting from training events (NAVFAC Pacific 2014).

Grassland and disturbed grassland communities are the most fire-prone plant communities on Tinian and are typically dominated by nonnative or early-successional species adapted to periodic disturbance. Wildfire in these areas may result in short-term loss of aboveground vegetation; however, these communities typically recover rapidly through resprouting and recolonization. In contrast, limestone native forest, secondary limestone forest, and freshwater wetland plant communities are less susceptible to fire spread due to limited fine fuels, higher fuel moisture, and closed canopy conditions. Where fires reach forest edges, effects would be localized and temporary, with natural resprouting and canopy recovery expected following low-intensity burns. Repeated or large-scale fires that could result in long-term conversion of forested plant communities to grassland are considered unlikely.

Limestone native forest and freshwater wetlands represent particularly important biological resources on Tinian. Fire spread into freshwater wetlands is unlikely due to soil moisture and vegetation characteristics, and impacts to these habitats would be limited. Similarly, limestone forest interiors are not expected to carry fire, and any edge effects would be spatially limited. Implementation of firebreaks, vegetation management, and rapid suppression procedures would further reduce the likelihood of wildfire encroachment into habitats supporting federally listed and sensitive species.

The potential for wildfires would be reduced through vegetation removal during construction and continued vegetation management within the Military Lease Area at live-fire ranges, Landing Zones, and roadways. Under Alternative 1, and as part of the USMC's Conservation Program, a Range Wildland Fire Management Plan would be developed and implemented. The Range Wildland Fire Management Plan would identify a comprehensive approach to reduce the frequency of wildland fires and lay out specific guidance, procedures, and protocols for the prevention and suppression of wildland fires and minimize wildland fire frequency, severity, and size. Consistent with the fire stressor analysis presented in the Biological Assessment, wildfire-related biological resource impacts under Alternative 1 would be minimized through implementation of fire danger rating systems, training restrictions during high-risk conditions, vegetation management, and fuel breaks. These measures would substantially reduce ignition probability and limit fire size, preventing landscape-scale fires that could adversely affect biological resources.

If a wildfire were to occur, susceptible resources would primarily include grassland and disturbed grassland plant communities and associated terrestrial wildlife. Limestone native forest, freshwater wetlands, and habitats supporting federally listed and sensitive species are unlikely to sustain wildfire and would be expected to experience limited and temporary effects. With implementation of wildfire prevention, fuel management, and suppression measures under Alternative 1, landscape-scale fires would be unlikely. Therefore, Alternative 1 would result in less than significant impacts to biological resources from wildfire, consistent with the fire effects analysis and determinations presented in the Biological Assessment.

Figure 4.4-1 Plant Communities and Proposed Action Features (North)

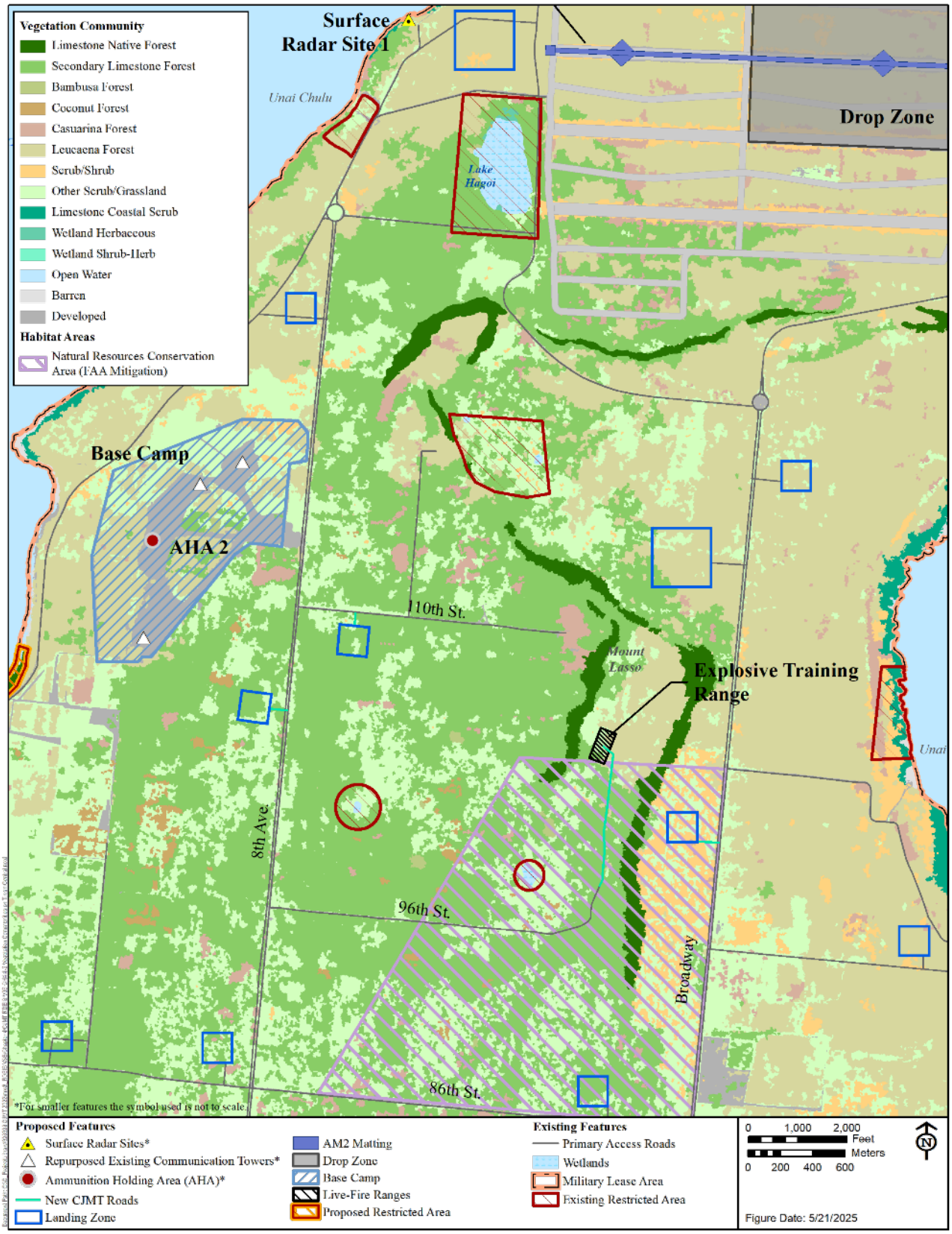

Figure 4.4-2 Plant Communities and Proposed Action Features (Central)

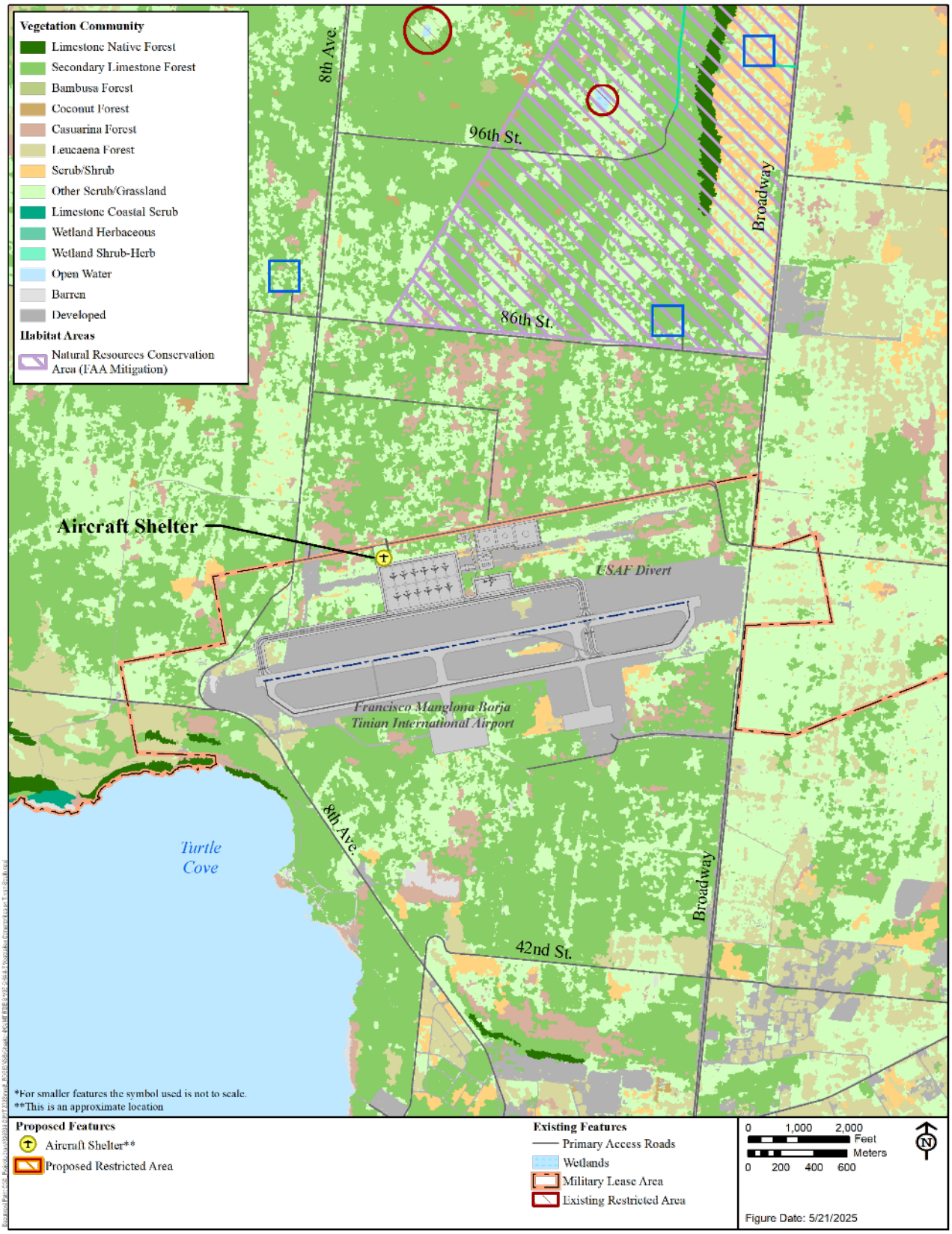

Figure 4.4-3 Plant Communities and Proposed Action Features (South)

Table 4.4-1 Plant Community Impacts under the Proposed Action

Plant Community	*Direct Impact Area (acres)*[1]										
	Landing Zones	*Multi-Purpose Maneuver Range (all components)*	*Utility Alignments*	*Base Camp Security Fencing*	*Explosives Training Range*	*Drop Zone*	*Surface Radar Towers*	*Potable Water Well Field*[2]		*New Roads*	*Total*
								Option A	*Option B*		
Casuarina Forest	0.7	0.02	1.0	0.1	-	2.2	0.1	0.5	0.2	-	**4.8**
Coconut Forest	-	-	0.02	-	-	-	-	-	-	-	**0.02**
Leucaena Forest	94.0	37.8	8.8	2.1	1.5	81.7	0.4	3.1	-	0.3	**229.7**
Secondary Limestone Forest	32.3	2.5	8.1	0.3	0.8	-	0.2	0.4	4.8	1.5	**50.9**
Other Scrub/ Grassland	23.8	1.2	10.5	1.5	2.5	0.02	-	3.2	2.7	0.4	**45.8**
Scrub/Shrub	6.3	-	0.1	0.1	-	4.4	-	0.8	0.02	0.1	**11.8**
Total	**157.1**	**41.5**	**28.5**	**4.1**	**4.8**	**88.3**	**0.7**	**8.0**	**7.7**	**2.3**	**343.0**

Notes: [1] Impacts to "Developed" habitat and areas that have been previously cleared of vegetation are not included in this table, as no vegetation impacts would occur in those areas.

Construction and training activities may impact individual plants with cultural importance (refer to Section 3.4.1), as is described above for plant communities across Tinian. However, these species are common to Tinian and occur throughout the Military Lease Area. They would not be widely removed or destroyed, nor be subjected to long-term access restrictions. Impacts to any natural resources with cultural importance due to access restrictions during training would be intermittent, temporary, and mitigated by Range Control scheduling accommodation.

Considering the small percentage of impacted vegetation compared to existing vegetation, the absence of any impact to the three most sensitive terrestrial plant communities, the proposed forest enhancement to mitigate for secondary limestone forest impacts, and the invasive species and wildfire protocols, impacts to vegetation under Alternative 1 would be less than significant.

4.4.3.2 Terrestrial Wildlife

Under Alternative 1, wildlife could potentially be impacted by habitat removal or modification, direct strike, noise (from construction, aircraft, live-fire, and vehicular activity), human presence and/or habituation, introduction of invasive species, fire, night lighting, and radio frequency radiation. Under Alternative 1, training events would continue and would increase over the No Action Alternative by approximately 15 percent.

Under Alternative 1, plant communities that are largely dominated by native plant species (limestone coastal scrub, limestone native forest, wetland vegetation) would actively be avoided and would not be removed. The majority of vegetation removal during construction activities would occur in areas that are dominated by invasive species (Leucaena forest and secondary limestone forest). Certain species, such as the non-protected native bird species on Tinian are known to occupy Leucaena forest and secondary limestone forest, and often occur in higher densities than they do in limestone native forest (Spaulding et al. 2022). Native reptile species on Tinian are most likely to inhabit native forest habitats but may also occur in non-native habitats that would be impacted during construction. Although commonly occurring native wildlife species may occupy the non-native dominated habitats that would be impacted under Alternative 1, the loss of approximately 343 acres of predominantly non-native dominated vegetation would represent a total loss of 1.5 percent of the approximately 22,964 acres of vegetated habitat on Tinian. Because vegetation clearance would only occur in small amounts dispersed throughout the Military Lease Area, and because pre-construction surveys would be conducted prior to vegetation removal, the loss of habitat would not result in habitat fragmentation that would hinder the connectivity of any population of species or the ability for species to continue using those areas for dispersal across the island.

The majority of training events would occur in areas that are dominated by non-native and invasive species (Leucaena forest and secondary limestone forest). Non-protected native birds and native reptiles may occur in non-native habitats and may be impacted from disturbance to these habitats during training events. However, wildlife habitats that are dominated by native plant species, such as limestone native forests and wetland habitats, would not be impacted by training. Therefore, impacts to native wildlife species due to habitat modification from training events would be minimal.

Terrestrial wildlife may be impacted by direct strike related to construction equipment, military vehicles, aircraft, and stationary objects, but is determined to be less than significant based on the implementation of best management practices listed in Appendix D. While the two proposed live-

fire ranges would pose a minimal risk of direct strike to wildlife (primarily bird species) from gunfire and explosives, the ranges would operate in a controlled and cleared area virtually eliminating the likelihood of directly impacting wildlife, as habitat for wildlife species would be removed on the ranges.

Noise impacts from training events would primarily occur during active live-fire training, flight operations (including Landing Zone and drop zone use), and maneuver training (including increased human presence and foot traffic). The severity of these disturbances would be dependent not only on noise level but on frequency, regularity, and species sensitivity. Wildlife generally respond to noise from low-flying aircraft, although the ways in which they respond vary depending on life history, habitat, aircraft, and flight activities, and previous exposure to aircraft (Burger 1981). Physiological and/or behavioral responses can reduce an animal's fitness and ability to survive or increase its propensity to relocate. Low-altitude overflights can cause excessive stimulation, alertness, or stress. Tests on various terrestrial animals have shown that many species will undergo a "startle reaction" to noise in the range of 80 to 100 decibels or higher (Bowles 1995; UCSF 2024).

Under Alternative 1, aircraft overflights would continue to be restricted to altitudes of no less than 1,000 feet over habitats such as wetlands and limestone native forest, thereby reducing the likelihood of noise impacts on native species that inhabit these habitats. Almost all fixed wing overflights within the Military Lease Area would occur above 10,000 feet above ground level, producing peak sound levels between 56 and 82 decibels (refer to Section 4.8.1 Approach to Analysis for a description of the noise modeling and metrics used for the impact analysis). Some overflights as low as 2,000 feet above ground level may occur (particularly around North Field), but these would be unlikely to occur as part of regular activity. These events would produce peak sound levels up to 111 decibels directly below the flight path. Helicopters and tilt-rotor aircraft would fly between 300 and 2,000 feet above ground level and would be expected to produce peak sound levels between 73 and 91 decibels. Therefore, aircraft activity would likely induce startle responses and other behavioral changes in wildlife; but such impacts would be brief and intermittent.

Training events involving the use of explosives would generate single event peak sound levels of between 115 and 130 decibels that extend over an area of the ocean surface (refer to Section 4.8 Noise, Figure 4.8-2 through Figure 4.8-4, and Appendix J, Noise Study, Section J.3.3). Use of explosives would typically occur during large or medium training events and include approximately 20 charges of 1.25 pounds net explosive weight (Figure 4.8-2 and Figure 4.8-4). When using the largest charge (Figure 4.8-3) training would involve only one detonation per event (during daytime), and this would occur 2 to 4 times per year. Exposure to this impulsive noise would be brief, lasting only for a fraction of a second per charge. Wildlife in the vicinity, such as birds, may startle and move away from the noise into nearby adjacent habitat. In summary, impacts from aircraft overflights, training with explosives and live-fire in the Explosives Training Range and Multi-Purpose Maneuver Range would be brief and intermittent, and would not induce behavioral shifts in wildlife populations; therefore, the increase in impacts on wildlife due to noise and human presence during training under Alternative 1 would be less than significant.

Noise and human presence during construction may cause wildlife to temporarily avoid areas in the immediate vicinity of construction activities. Nesting or breeding adults of various wildlife

species can also be disturbed by noise and construction activities, including foot traffic, which may result in abandonment of young, increased susceptibility to depredation, and temporary displacement of wildlife from breeding habitat, resulting in reduced breeding success. Nesting bird surveys would be conducted prior to construction, and appropriate U.S. Fish and Wildlife Service-developed avoidance and minimization measures would be incorporated if nests were discovered. Due to the temporary and dispersed nature of these activities in combination with best management practices in place, noise and human presence from construction would not result in significant impacts to the population of any species on Tinian.

Non-native species may be inadvertently transported through the movement of cargo via aircraft and vessels to Tinian. The risk of introducing invasive species would increase with logistical transport associated with training events and construction on Tinian. Non-native species have potential to upset the fragile island ecosystem on Tinian because these species directly compete with native species for resources such as space, water, and food sources. Invasive species may also prey on, parasitize, or cause disease to native species. Training events and construction may increase the spread of invasive species. Biosecurity protocols (as discussed in Section 2.1.9.2 Biosecurity Facilities) and best management practices (Appendix D) would be implemented to avoid the potential spread or introduction of non-native species. The USMC would continue to comply with all existing biosecurity protocols applicable to the Proposed Action. Protocols for all administrative and other tactical and non-tactical movements are expected to include: (1) pre-departure biosecurity cleanliness inspections for plants/seeds, invertebrates (insects [including coconut rhinoceros beetles & little fire ants], spiders, snails, slugs, etc.), small vertebrates (frogs, lizards, rodents, shrews, etc.), and accumulated soil for all cargo transported to Tinian from Guam; (2) pre-departure and arrival brown tree snake canine inspections for all cargo, aircraft, and small vessels (≤100ft) departing Guam and arriving in Tinian; and (3) bio-sanitation standard operating procedures per the Armed Forces Pest Management Board Technical Guide No. 31.

Terrestrial wildlife and avian species present on Tinian may experience short-term behavioral disturbance or displacement during wildfire events. Mobile species are expected to move away from active fire areas and return once conditions stabilize. Temporary reductions in habitat suitability may occur within burned grassland and disturbed grassland communities; however, these areas typically regenerate quickly and may continue to provide foraging habitat. As previously described for vegetation, prior to any live-fire training on the Multi-Purpose Maneuver Range and Explosives Training Range, a Range Wildland Fire Management Plan would be developed and implemented to reduce the frequency, intensity, and size of wildland fires and lay out specific guidance, procedures, and protocols in the prevention and suppression of wildland fires.

Artificial lights associated with construction and training activities can pose a threat to wildlife species that may either be attracted to or dissuaded from areas where the artificial light originates. For instance, bat and bird species may alter flight/foraging patterns based on artificial lighting at night. In addition, artificial lighting can affect sea turtle species by disrupting their natural navigation system, causing nesting females to be drawn away from nesting sites and hatchlings to become disoriented, leading them away from the ocean upon hatching (Witherington et al. 2000). Whenever feasible, exterior night lighting would include wildlife-friendly design features such as shielded lights (to reduce ambient light), use of motion detectors and/or other automatic controls, long wavelength bulbs, lowest possible lumens, and lighting design that uses shields to prevent

light from shining upward into the sky. In addition, night lighting best management practices listed in Appendix D would be implemented that would greatly reduce the potential for night lighting to affect wildlife species on Tinian, both during construction and training activities.

The proposed use of the mobile radar systems and surface radar towers would introduce the possibility of exposing bats and birds to radio frequency radiation, which is capable of heating organic tissues if exposed to radiation beams for long periods of time (the Occupational Safety and Health Administration metric of the upper limit of safe exposure [IEEE Std. C95.1] is 10 watts per square meter over 30 minutes). Potential effects to dangerous levels of radiation include disturbance, stress from overheating, or bodily injury. However, these surveillance systems produce radiation at extremely high frequencies (well above 116 megahertz). Although frequent exposure to frequencies below 100 megahertz is known to negatively affect biological systems, there is no scientific evidence that infrequent exposure to radio frequencies above 100 megahertz has any adverse impacts on wildlife (Pophof et al. 2022). Also, the radar beam emissions are extremely narrow and thus very unlikely to intercept wildlife in flight. Should wildlife cross an active radar beam, exposure time would likely only be for fractions of a second due to the narrowness of the beam and because both the animal and the beam would be moving.

Alternative 1 incorporates best management practices, standard operating procedures, and other measures to avoid or minimize impacts to wildlife. These measures are discussed in detail in Appendix D, and include, but are not limited to, erosion control measures that would minimize ground disturbance and reduce erosion from training events and construction, a Stormwater Management Plan and Pollution Prevention Plan that would minimize impacts to water sources, pest control and biosecurity measures that aim to limit introduction of non-native species, and noise abatement measures that would reduce noise from construction. Therefore, impacts to wildlife under Alternative 1 would be less than significant.

4.4.3.3 Terrestrial Special Status Species

Known occurrences of federally listed and CNMI-listed species in the Proposed Action footprint are shown on Figure 4.4-4. Potential stressors to wildlife associated with the Proposed Action under Alternative 1 as described above also apply to the special status species analyzed in this section and are discussed as appropriate below. Preliminary effects determinations for federally listed species are presented in Table 4.4-2. Consultation with the U.S. Fish and Wildlife Service is ongoing under section 7 of the Endangered Species Act. The consultation will be complete and incorporated, as appropriate, into the Record of Decision. As introduction of invasive species would pose a threat to all species on Tinian, including special status species, biosecurity protocols (as discussed in Section 2.1.9.2 Biosecurity Facilities) and best management practices (Appendix D) would be implemented to avoid the potential spread or introduction of non-native species. As discussed in the preceding *Terrestrial Wildlife* section, these protocols and practices would reduce the likelihood of introduction and spread of non-native, invasive species.

Federally Listed and CNMI-listed Species

Mariana Common Moorhen. Mariana common moorhens are present throughout the year at Lake Hagoi and at the seasonal Bateha and Mahalang ephemeral wetlands when water is present. No training events or construction would occur at these wetland locations and no moorhens have previously been observed in the areas proposed for training events. As a result, construction activities would have no effect on the Mariana common moorhen. Potential effects from training noise affecting moorhens on the aforementioned wetlands are analyzed here, as increases in average noise and/or intermittent loud noise events may cause moorhens to alter behavior that may then affect their distribution, reproduction, and overall fitness. Noise levels from munitions training and aircraft operations were modeled for Lake Hagoi, the Mahalang wetlands complex, and the Bateha wetlands to assess potential effects to Mariana common moorhens. The results of the noise modeling are presented in Table 4.4-3. Refer to Section 4.8 for descriptions of noise measurements.

Figure 4.4-4 Occurrences of Federally Listed Species and Proposed Restricted Areas on Tinian

Table 4.4-2 Summary of Effects Determinations for Federally Listed Species on Tinian

Species	*Potential Stressors*	*Effects Determination*[1]
Mariana Common Moorhen	Noise	Not Likely to Adversely Affect
Micronesian Megapode	None	No Effect
Mariana Fruit Bat	Habitat Loss, Noise, Human Presence	Not Likely to Adversely Affect
Green Turtle	Noise and Human Presence	Not Likely to Adversely Affect
Hawksbill Turtle	None	No Effect
Humped Tree Snail	None	No Effect
Heritiera longipetiolata	Human Presence (low likelihood of foot traffic)	Not Likely to Adversely Affect
Dendrobium guamense	Human Presence (low likelihood of foot traffic)	Not Likely to Adversely Affect

Note: [1]Endangered Species Act section 7 determinations are pending. The consultation will be complete and incorporated, as appropriate, into the Record of Decision.

Table 4.4-3 Sound Exposure Levels at Mariana Common Moorhen Wetlands Under Alternative 1

Location	*Small Arms*		*Explosive Detonations*		*Aircraft Activity*[1]		
	CDNL (dB)	*PK15(met) (dBP)*	*CDNL (dB)*	*PK15(met) (2 to 4 events per year) (dBP)*	*DNL (dB)*	*Change from No Action Baseline DNL (dB)*	*L_{max} (dB)*
Lake Hagoi	48	108	<35	106	69	+25	102
Mahalang Complex	45	104	52	115	59	+18	95
Bateha 1	46	98	65	148	49	+2	99
Bateha 2	41	99	43	138	49	+3	99

Legend: CDNL = C-weighted Day-Night Average Noise Level; dB = decibels; dBP = peak unweighted decibels; DNL = Day-Night Average Noise Level; L_{max} = maximum sound level; PK15(met) = peak noise level expected to be exceeded by 15 percent of all events when adjusting for statistical variation due to weather.

Notes: Refer to Appendix J, *Noise Study*, for additional information about noise metrics and modeling.

[1] Includes cumulative noise level for an average year of training on Tinian, including landings and takeoffs at North Field, Landing Zones, low-level flights, and transport of materials, personnel, and equipment to support training through TNI.

Sound levels from live-fire training on Tinian may cause periodic startle responses or flushing of moorhens at Lake Hagoi, the Mahalang Complex wetlands, and the Bateha wetlands. At these locations, moorhens could exhibit short-term behavioral and/or physiological responses from exposure to noise during training activities under the Proposed Action, especially from explosives detonation which could reach up to 148 decibels (only 2 to 4 times per year) (Table 4.4-3). However, the wetlands where moorhens are known to occur on Tinian are surrounded by thick, forested habitat that would generally provide a buffer to any live-fire or explosives noise in those habitats. Aircraft overflights would be restricted to altitudes of no less than 1,000 feet over wetland habitats, so these activities are less likely to impact individuals. However, the Day-Night Average Noise Levels at Lake Hagoi and the Mahalang Complex wetlands from aircraft activity would be

approximately 25 decibels and 18 decibels higher than baseline, respectively, under Alternative 1. Although average noise at wetland habitats from aircraft activity would not reach levels that would mask moorhen calls, it would represent a noticeable change from the baseline conditions. Small arms and explosives may present blast noises that could temporarily alter moorhen behaviors and average noise levels at wetland habitats would increase from aircraft activity. However, these events would be sporadic and short-term, and No Training Areas would be implemented on wetland habitats where the species occurs. Based on the USMC Biological Assessment, the Proposed Action under Alternative 1 is not likely to adversely affect Mariana common moorhens and therefore, impacts to Mariana common moorhens would not be considered significant. The USMC is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act regarding impacts to listed species and their habitats. The consultation will be complete and incorporated, as appropriate, into the Record of Decision.

Micronesian Megapode. Historical observations of Micronesian megapodes in low numbers in the Mount Lasso area, south of Lake Hagoi, and a small area of forested habitat adjacent to Cross Island Road in the southern portion of the Tinian Military Retention Land for Wildlife Conservation (Figure 3.4-3) all occurred prior to 2014. Since then, megapodes have not been detected on Tinian (Joint Region Marianas 2023). No construction would occur in the vicinity of, or in any area where megapodes have historically been observed. Training events could occur adjacent to historical megapode locations. Given that the species has not been detected on the island since before 2014 and no resident breeding population of megapodes has ever been identified on Tinian (historical occurrences are all believed to be visiting individuals from neighboring islands), the Proposed Action under Alternative 1 would have no effect on the Micronesian megapode.

Mariana Fruit Bat. Ground training would not occur in the limestone native forest along the cliff line of Mount Lasso where the known fruit bat colony occurs, and training activities would generally occur in areas far removed from this location. Fruit bats typically roost during the day in colonies at sites to which they show a high level of fidelity (unless disturbed). In addition, a small proportion of fruit bats, usually males, roost alone or in small groups. While fruit bat colonies can be very easily disturbed by the sight, smell, or sound of humans (Mildenstein and Boland 2010), resting or foraging bats (not at a colony) have exhibited some tolerance for human disturbance and are approachable at relatively close distances. A 2012 study on Guam documented three encounters with Mariana fruit bats where the observers were able to get within 5 to 21 meters of roosting bats (two males, one male, and one female). During all three encounters, the Mariana fruit bats eventually departed their roost site but only after considerable time had passed (30 to 69 minutes) despite the presence of one or two observers (SWCA 2012b). During training events, individual bats could be exposed to noise and human disturbance. Although mostly active at night, fruit bats can be active during daylight hours and would potentially be exposed to noise and visual impacts from live-fire, use of blank ammunition, aircraft activity, and other training exercises. Mariana fruit bats do not echolocate, meaning they do not depend on a quiet soundscape to forage (Jones and Teeling 2006). However, fruit bats do rely on sound for vocalized communication with each other and excessive noise or any sort of stress from disturbance can lead to a variety of negative stress responses (Klose et al. 2006; Department of the Navy 2010). Hearing in *Pteropus* fruit bats is primarily used for communication or social activity and in detecting the approach of potential threats (e.g., predators) (Grinnell 1995). For those species of fruit bats that have been

tested for hearing sensitivity, their audiograms are very similar to those of humans, with similar upper and lower frequency limits and hearing threshold levels (Calford et al. 1985; Koay et al. 1998; Heffner et al. 2006; Tarnovsky et al. 2023). A sound level of 0 decibels is approximately the lower threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 decibels; sound levels above 120 decibels begin to be felt inside the human ear as discomfort, and sound levels ranging from 130 to 140 decibels are toward the upper threshold and are felt as pain (Berglund and Lindvall 1995). Therefore, it can be assumed that fruit bat species have similar thresholds.

Responses to military aircraft noise by Mariana fruit bats have been studied on Guam and Rota (SWCA 2012a). Results of this research indicated that fruit bats flushed at aircraft noise levels exceeding 90 A-weighted decibels (mid-range frequencies) and 106 C-weighted decibels (low and high frequencies). Fruit bats at a maternity colony on Rota flushed when a helicopter flew within 200 meters of the colony and when a military jet flew within 300 meters. This study also found that following aircraft overflights, Mariana fruit bat active thermoregulation increased by 32 percent, maintenance behaviors increased by 14 percent, locomotion increased by 74 percent, and alertness increased by 62 percent (SWCA 2012a).

Under Alternative 1, all construction would occur during daylight hours. No construction activities would occur in any limestone native forest or on Mount Lasso, and any bat colony location occurring in the limestone native forest of that region would be far enough removed from construction activities, and sheltered by the forested habitat, so as not to be impacted by noise from construction in other areas of the island. For example, at 50 feet away, construction equipment can produce maximum sound levels between 70 and 95 decibels, but that dissipates to around 65 decibels at a distance of 300 feet and less than 65 decibels at 1,000 feet. Under Alternative 1, the nearest construction to the known fruit bat colony would be over 3,000 feet away. Mariana fruit bats are largely nocturnal (resting/roosting during the day and most active at night). Loss of up to 50.9 acres of secondary limestone forest under Alternative 1 would initially represent a loss of potential roosting and foraging locations for Mariana fruit bats on Tinian. However, as described in Section 4.4.3.1, the USMC would mitigate impacts to secondary limestone forest through forest restoration/enhancement.

Based on known habitat use for this species, most noise generated as part of training events and construction to support training would be produced from much farther distances away from known observation points. Consistent with current measures to protect the Mariana fruit bat on Tinian, under the Proposed Action, any aircraft that must fly over limestone native forest during training exercises would fly at a minimum of 1,000 feet above ground level to minimize visual and noise disturbance to potentially occurring fruit bats. Although these disturbances would most likely be intermittent, infrequent, and temporary, fruit bats, especially those foraging or roosting away from the known colony or traversing in areas adjacent to training activities may still be subjected to peak sound levels at or above 90 decibels, which may induce startle responses or other temporary behavioral shifts. Results of noise modeling that show sound exposure levels at the Mariana fruit bat colony location on Tinian are presented in Table 4.4-4. Refer to Section 4.8 for descriptions of noise measurements.

Table 4.4-4 Sound Exposure Levels at Mariana Fruit Bat Colony Location

Location	*Small Arms*		*Explosive Detonations*		*Aircraft Activity*[1]	
	CDNL (dB)	*PK15(met) (dBP)*	*CDNL (dB)*	*PK15(met) (2-4 events/year) (dBP)*	*DNL (Change from No Action Baseline) (dB)*	*L_{max} (dB)*
Bat Colony Location	45	104	<35	107	55 (+12)	104

Legend: CDNL = C-weighted Day-Night Average Noise Level; dB = decibels; dBP = peak unweighted decibels; DNL = Day-Night Average Noise Level; L_{max} = maximum sound level; PK15(met) = peak noise level expected to be exceeded by 15 percent of all events when adjusting for statistical variation due to weather.

Notes: Refer to Appendix J, *Noise Study*, for additional information about noise metrics and modeling.

[1] Includes cumulative noise level for an average year of training on Tinian, including landings and takeoffs at North Field, Landing Zones, low-level flights, and transport of materials, personnel, and equipment to support training through TNI.

As shown in Table 4.4-4 and detailed in the Noise Study (Appendix J), the loudest single event noise impacts from the Explosives Training Range would occur from large detonations (cratering charges of up to 40 pounds net explosive weight). Such detonations would occur infrequently, up to 4 times per year. In addition, during the planning process for the Proposed Action, the USMC re-sited the location of the Explosives Training Range from an area further north on Tinian and closer to the bat colony, to the current location presented in this Final EIS, which would decrease the noise impacts on the species. However, the 107 decibel noise contour generated by the detonations would overlap the northern portions of the Mount Lasso region, likely reaching the known Mariana fruit bat colony. Therefore, these events may induce behavioral and/or physiological shifts in Mariana fruit bats on Tinian, but the effects would be infrequent and dispersed throughout the year, very brief in duration (fractions of a second), and would not rise to the level of inducing pain.

As fruit bats are largely active at night and use vision for foraging, night lighting has the potential to impact fruit bats. Measures discussed in Appendix D would be implemented to reduce the impact of any night lighting on wildlife, including fruit bats.

Noise from explosives training and intermittent disturbance from human presence (especially due to visual and noise disturbance from training activities) may induce startle responses or other temporary behavioral shifts. However, these events would be sporadic and short-term. Additionally, the implementation of a 1,000-foot altitude restriction for aircraft over limestone native forest would further serve to minimize impacts from noise. Based on the USMC Biological Opinion, the Proposed Action under Alternative 1 is not likely to adversely affect the Mariana fruit bat on Tinian and therefore, impacts to the Mariana fruit bat would not be considered significant. The USMC is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act regarding impacts to listed species and their habitats. The consultation will be complete and incorporated, as appropriate, into the Record of Decision.

Green Turtle. As discussed in Section 3.4.3.1, over 50 percent of recent green turtle nesting activity has occurred at Unai Dankulo, with other nesting activity occurring on scattered beaches across Tinian (Figure 3.4-3). Ground training events under Alternative 1 would occur on Unai Chulu, Unai Babui, Unai Lam Lam, Unai Masalok and Unai Dankulo, all of which are known nesting beaches for green turtles. Personnel accessing these beaches have the potential to disturb turtles

that may be on the beach and pose a risk of directly harming eggs if turtles are actively nesting on these beaches. Per the Joint Region Marianas Integrated Natural Resources Management Plan, regular monitoring of sea turtle nesting would continue at all potential beach nesting sites where training may occur under Alternative 1. If an active nest has been discovered, night training will not occur after 50 days of incubation until the nest has hatched or a buffer (9 meters [30 feet] wide) from the active nest to the water will be in place to avoid any potential impacts to sea turtle hatchlings trying to reach the ocean. Pre-event surveys for turtles would be conducted no more than six hours prior to training on any beaches that are suitable for turtle nesting. In addition, if a turtle is observed hauling out on a beach where training activities are occurring, the training activity would halt until the turtle has left the beach. These ongoing measures would largely eliminate potential disturbances to sea turtles.

Results of noise modeling for sound exposure levels at green turtle nesting beaches in the Military Lease Area are presented in Table 4.4-5. Refer to Section 4.8 for descriptions of noise measurements.

Table 4.4-5 Sound Exposure Levels at Green Turtle Nesting Beaches in the Military Lease Area

Location	*Small Arms*		*Explosive Detonations*		*Aircraft Activity*[1]	
	CDNL (dB)	*PK15(met) (dBP)*	*CDNL (dB)*	*PK15(met) (2-4 events/year) (dBP)*	*DNL (Change from No Action Baseline) (dB)*	*L_{max} (dB)*
Unai Chulu	47	106	<35	104	75 (+32)	108
Unai Lam Lam	60	122	40	104	31 (+22)	99
Unai Chiget	49	109	36	123	64 (+24)	95
Unai Dankulo	43	102	40	137	50 (+3)	104
Unai Masalok	40	98	46	126	53 (+1)	99
Unai Babui	49	110	<35	104	76 (+36)	108

Legend: CDNL = C-weighted Day-Night Average Noise Level; dB = decibels; dBP = peak unweighted decibels; DNL = Day-Night Average Noise Level; L_{max} = maximum sound level; PK15(met) = peak noise level expected to be exceeded by 15 percent of all events when adjusting for statistical variation due to weather.

Notes: Refer to Appendix J, *Noise Study*, of the Revised EIS.

[1] Includes cumulative noise level for an average year of training on Tinian, including landings and take-offs at North Field, Landing Zones, low-level flights, and transport of materials, personnel, and equipment to support training through TNI.

Results of noise modeling completed for the Revised EIS indicate that small-caliber weapons training on Tinian would expose nesting green turtles to less than 50 decibels C-weighted day-night average sound level at Unai Chiget, Unai Chulu, Unai Dankulo, and Unai Masalok, and 60 decibels C-weighted day-night average sound level at Unai Lam Lam. Small-caliber weapons fire would generate between 98 and 122 decibels Peak (PK_{15}) at these same beaches. Noise generated by explosive detonations would potentially expose nesting green turtles to up to 46 decibels C-weighted day-night average sound level and a peak sound level 104 to 137 decibels (unweighted). All aircraft operations on Tinian could expose nesting green turtles to 95 to 108 decibels or 31 to 76 decibels day-night average sound level. See Appendix J for detailed noise metrics and modeling results.

Information regarding exact noise disturbance thresholds of turtles on land is limited (National Oceanic and Atmospheric Administration 2023). Morphological investigations have demonstrated that sea turtles have poor auditory receptors to airborne sound, with limited on land hearing for low frequencies (Bartol and Ketten 2006; Popper et al. 2014; Piniak et al. 2016). The National Oceanic and Atmospheric Administration (2023) currently uses Root Mean Square 175 decibels as the underwater "Onset of Behavioral Disturbance Acoustic Threshold for Sea Turtles." No such threshold is known for land-based noise. As shown in Table 4.4-5, no sound levels would approach 175 decibels under the Proposed Action. Peak sound levels from explosive detonations and small arms may cause individual adult turtles to avoid beaches during periods of training. In addition, the Day-Night Average Sound Level from aircraft activity would increase on beaches such as Unai Chulu, Unai Lam Lam, Unai Chiget, and Unai Babui. Although the behavioral shifts that green turtles may exhibit based on such increases in land-based noise are not well understood, it is expected that nesting and hauled out individuals would be exposed to increases in noise exposure that may alter behavior.

No construction would occur on any of the beaches on Tinian. The nearest construction to any sea turtle nesting beach would be over 1,000 feet away. Morphological investigations demonstrated that sea turtles have poor auditory receptors to airborne sound, with limited on-land hearing for low frequencies typically produced by ground construction (Bartol and Ketten 2006; Popper et al. 2014; Piniak et al. 2016). Therefore, airborne noise is not anticipated to disturb green turtles as potentially loud noise levels would attenuate by the time sound would reach a green turtle on the beach and hearing sensitivity is limited on land. Although night lighting in the vicinity of beaches has the potential to impact sea turtles, floodlights that may be temporarily used for training events would not be used on beaches and would utilize light shielding best management practices, as described in Appendix D, which would eliminate the potential to impact nesting or hauled out turtles.

Land-based noise from explosive training, small arms, and aircraft activity may induce startle responses or other temporary behavioral shifts. However, these events would be sporadic and short-term, and with the implementation of ongoing measures to protect nesting/beached turtles on beaches in the Military Lease Area. Based on the USMC Biological Opinion, the Proposed Action under Alternative 1 is not likely to adversely affect the green turtle on Tinian and therefore, impacts to the green turtle would not be considered significant. The USMC is consulting with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act regarding impacts to listed species and their habitats. The consultation will be complete and incorporated, as appropriate, into the Record of Decision.

Humped Tree Snail. Humped tree snails on Tinian are currently only known to occur at Lamanibot Bay. Under Alternative 1, no training events or construction would occur at Lamanibot Bay, and a restricted area would be established (Figure 4.4-4). Likewise, there would be no removal of potential limestone native forest tree snail habitat. Therefore, the Proposed Action under Alternative 1 would not impact the humped tree snail.

Heritiera longipetiolata. H. longipetiolata groves are well-documented on Tinian in limestone habitats near the coast (Figure 3.4-3). No construction would occur in areas where the species occurs. In addition, a restricted area would be established where the majority of *H. longipetiolata* occur (Figure 4.4-4). Although there is one known *H. longipetiolata* grove that occurs outside of

the proposed restricted area, which would make it susceptible to foot traffic during foot patrols and foot maneuver exercises, the grove occurs in such a difficult to access area of ragged, karst limestone coastal scrub, it is unlikely that troop foot traffic would ever occur there. In addition, there are no planned training activities in the vicinity of the *H. longipetiolata* grove that occurs outside of the proposed restricted area. Therefore, the Proposed Action may affect but is not likely to adversely affect *H. longipetiolata* and impacts to the species would be less than significant.

Dendrobium guamense. D. guamense individuals occur in limestone native forest habitat in the Mount Lasso region (Figure 3.4-3). No vegetation removal would occur on or around Mount Lasso and there would be no training activities involving live-fire or explosives on Mount Lasso. However, foot patrols and foot maneuvers may occur in limestone forest habitat on Mount Lasso in and around where *D. guamense* individuals are known to occur. Although an epiphytic species, there is still potential for *D. guamense* to be trampled, crushed, or otherwise disturbed during foot patrols and foot maneuver exercises. However, the likelihood of individuals being trampled or crushed is very low given the dispersed occurrence of individuals, typically in difficult to access karst terrain, and their general occurrence above ground level on branches or downed logs. In addition, any troop training on Mount Lasso would occur in areas that are open to the public and already experience intermittent foot traffic disturbance. Therefore, the Proposed Action is not likely to adversely affect *D. guamense* and impacts to the species would be less than significant.

Migratory Birds

Impacts to migratory birds would be similar to those described for bird species in Section 4.4.3.2. Most migratory bird species that may occur on Tinian are shorebirds or pelagic species (e.g., black noddy, brown booby, brown noddy, gray-tailed tattler, Pacific reef heron, wandering tattler and white tern), that do not utilize the majority of inland habitats on Tinian. These birds would not be exposed to construction impacts and would generally be less exposed to training activity as Alternative 1 training occurs mainly inland and away from the shoreline. Training activities occurring on the beach may disturb foraging birds, but because these species are highly mobile, any effects would be temporary and minor.

The eight native species of Migratory Bird Treaty Act-protected land birds that occur on Tinian would experience nearly identical impacts as those described for native bird species in Section 4.4.3.2. In particular, the removal of up to 343 acres of vegetated habitat would result in the loss of nesting, foraging, and resting areas for these migratory bird species. This would represent a loss of 1.5 percent of the approximately 22,964 acres of vegetated habitat on Tinian. Training activity impacts to these three species would be as described in Section 4.4.3.2. All eight of these species are relatively common on Tinian, their populations have been increasing on Tinian since the 1980s, and they are able to utilize a variety of habitats on the island. Although Alternative 1 may disturb individuals of these species, such impacts would be minor and temporary, and as such would not affect the overall fitness of any population of these migratory species.

Although impacts to migratory birds are expected to be minimal, best management practices incorporated into the Proposed Action would further minimize impacts to migratory birds. Nesting bird surveys would be conducted prior to construction, and appropriate U.S. Fish and Wildlife Service-developed avoidance and minimization measures would be incorporated if Migratory Bird Treaty Act-protected bird nests were discovered. Other best management practices that would minimize impacts to migratory birds include pest control and biosecurity measures that aim to

limit introduction of non-native species, and noise abatement measures that would reduce noise from construction.

In summary, the Proposed Action under Alternative 1 is anticipated to result in less than significant impacts for all federally listed species, CNMI-listed species, and migratory birds. This NEPA conclusion is supported by the location of training and construction areas, minimal habitat loss, the abundance of other species, and the implementation of best management practices and standard operating procedures designed to reduce potential impacts. Sporadic and short-term noise from aviation and live-fire training, along with increased human presence, may induce startle responses or other temporary behavioral shifts in the Mariana common moorhen, Mariana fruit bat, and green turtle, but these impacts would be temporary and are not anticipated to jeopardize the continued existence of these species on Tinian. Endangered Species Act Section 7 determinations are pending as consultation with the U.S. Fish and Wildlife Service is occurring. The consultation will be complete and incorporated, as appropriate, into the Record of Decision.

4.4.3.4 Marine Communities

Training

Under Alternative 1 all proposed training activities would be conducted entirely on land. However, portions of the designated surface danger zone associated with the Multi-Purpose Maneuver Range would extend over adjacent coastal waters. USMC ranges are intentionally designed to minimize the likelihood of projectiles leaving the primary target area. Data from operational assessments and range clearance programs consistently show that nearly all projectiles remain within the land-based portion of the target area. This high level of containment is the result of several safety and design measures: all weapons and ammunition used meet strict DoD standards for performance and accuracy; every operator is certified on their weapon; the firing positions and target locations are arranged to ensure rounds remain within the intended land area; and targets are constructed with materials that help reduce the chance of ricochets.

Other factors that would limit the probability of a projectile entering coastal waters would include the native vegetation surrounding the range which would act as a natural buffer, further slowing or stopping projectiles before they could reach coastal waters, and the undulating terrain of the range that would likely stop or slow down ricocheting projectiles. In the event of a ricochet, a projectile would rapidly lose speed due to air resistance, significantly reducing its potential to travel beyond the range boundary.

On rare occasions, a projectile from the Multi-Purpose Maneuver Range may travel outside the target area but still land within the surface danger zone. In the unlikely event that a projectile enters coastal waters, the risk to marine habitats would remain very low. Once a projectile enters the water, it would further lose energy and sink through the water column to settle on the sea floor. Marine mammal data confirm that marine mammal densities in the waters surrounding the CNMI are consistently low (DON 2013, 2018). Therefore, it is highly unlikely that projectiles entering coastal waters would result in impacts to marine species.

At the Explosives Training Range, all training activities would occur on land, and the associated surface danger zone is entirely land-based. All explosive materials would be consumed upon detonation and not be available in the environment for entrainment in surface runoff, providing additional protection to the marine environment. Since no in-water live-fire training occurs and

indirect impacts such as minor debris would not measurably degrade habitat or water quality, impacts to marine communities would be considered less than significant.

Because explosive detonations occur on land away from the coast, and the presence of vegetation further reduces noise transfer off the range, most of the sound energy reflects off the water's surface, and only a small portion enters the water column. This limits the transmission of airborne sound into the marine environment. Research shows that sea turtles and marine mammals have limited sensitivity to airborne noise (Bartol and Ketten 2006; Popper et al. 2014; Piniak et al. 2016), and any sound that does enter the water would be significantly reduced by the time it reaches nearshore areas. Additionally, marine species would need to be both close to the shoreline and at the surface at the exact moment of detonation to experience any notable exposure. However, marine mammal and sea turtle densities in nearshore waters around Tinian are low. Under the proposed plan, smaller explosive training events would occur about 20 times per year, with each event using a set of small charges weighing 1.25 pounds each. Larger explosive events would happen less often, only two to four times per year, and could involve up to 40 pounds of explosives in a single event. Based on this combination of sound dispersion characteristics, biological sensitivity, low animal presence, and limited training frequency, the potential for adverse impacts to marine mammals or sea turtles from airborne noise is considered highly unlikely and less than significant.

On rare occasions, potential fragments from lead bullets from small arms may enter waters of the surface danger zone. However, given the very occasional nature of ricochet or fragment escapement, it is not likely that hazardous waste or chemical contamination would impact a marine species or habitat. Any fragment would sink to the seafloor relatively quickly and would not likely be encountered by marine animals.

Proposed aviation training would involve fixed-wing, rotary, tilt-rotor, and drone aircraft. Any in-water or at-sea effects from aviation operations extending from Tinian's highwater mark towards the sea, including overflights around Tinian's coastal waters, are analyzed in and covered under the *Mariana Islands Testing and Training EIS/OEISs* (DON 2010a, 2015a, 2020) and associated consultations and authorizations. Portions of aviation training operations occurring offshore from Tinian would follow applicable operational requirements and procedures specified in the environmental or permitting documents referenced above, within the Mariana Islands Range Complex, and are not further analyzed in this Final EIS.

Construction

There are no in-water construction activities proposed and no land-based construction activities that would directly impact the marine environment. The only construction activity identified as having the potential to impact marine species and habitat is the construction of two nearshore, surface radar towers to support training activities. Construction near Unai Babui would take place approximately 120 feet from the shoreline and at an elevation of 10 feet above sea level; while construction near Ushi Point would take place approximately 220 feet from the shoreline at an elevation of 36 feet above sea level.

Under Alternative 1, there would be the potential for short-term, indirect, negligible impacts to marine communities to occur from sedimentation, runoff, and potential spills during construction. Best management practices would be implemented to avoid and minimize risks to marine communities. These include erosion control measures during construction such as minimizing the

ground disturbance area and adoption of a Stormwater Pollution Prevention Plan and a Hazardous Materials Management Plan that would prevent pollution in water sources and other habitats and fueling of any equipment occurring at least 120 feet away from the water and preferably on an impervious surface. New surfaces resulting from construction under Alternative 1 would be designed to minimize surface water runoff through implementation of low-impact development and best management practices for stormwater management systems. These measures would be developed in accordance with all applicable CNMI regulations for stormwater management and water quality, including applying the principles from the *CNMI and Guam Stormwater Management Manual* (Horsley Witten Group, Inc. 2006). Refer to Appendix D for a list of all best management practices that would be implemented during the Proposed Action.

4.4.3.5 Marine Special Status Species

Training and Construction

Marine special status species (refer to Table 3.4-5) include marine mammals, sea turtles, fishes, corals, and invertebrates that may be present in the nearshore waters around Tinian. Marine mammal data confirm that marine mammal densities in the waters surrounding the CNMI are consistently low (DON 2013, 2018). Potential effects to species that primarily remain below the surface of the water, such as corals, invertebrates, and fishes including sharks and rays, would be the same as described above under Section 4.4.3.4. Given their documented occurrence within the area, green and hawksbill sea turtles presence is considered to be likely. From the MITT program's scientific field surveys and data, the Navy estimated the year-round density of green and hawksbill sea turtles, which was higher within nearshore waters around Tinian and lower in offshore waters. For marine mammals, scientific field surveys from the MITT program documented that most large whales and dolphins occur in deeper waters offshore. Humpback whales may be present at low densities during their breeding season only.

On rare occasions that a projectile may enter the coastal waters, the risk of ingestion to marine species including individual fish, mammals, or turtles that may be present in the area remains very low. Any fragment would sink to the seafloor relatively quickly, and would not likely be encountered by marine animals. This would make harm from ingestion to marine life highly unlikely in the rare event that a projectile could enter the water during training activities.

On rare occasions that a projectile may enter the coastal waters, the risk of a direct strike to marine species including individual fish, mammals, or turtles that may be present in the area remains very low. A projectile would travel only a few feet underwater before losing energy entirely and sinking to the bottom very quickly. In addition, considering the large geographic area over which a fragment may enter water, the low expected densities of marine mammals in the area, and the low likelihood of an animal being at the surface of the water at the very moment that the fragment strikes the water, strikes are extremely unlikely to occur and are thus discountable.

Marine Protected Areas

The only Marine Protected Area identified for Tinian is located along the southeast coast of the island, which is well outside of the Military Lease Area and remote from any proposed military training. Therefore, the proposed training and construction activities would not harm the natural or cultural resources that are protected within this Marine Protected Area.

Essential Fish Habitat

Potential impacts to Essential Fish Habitat from both training and construction would be the same as described under Section 4.4.3.4 Marine Communities. Alternative 1 would incorporate best management practices, standard operating procedures, and other measures to avoid or minimize impacts to marine resources and its crucial components, such as Essential Fish Habitat. These measures include erosion control measures during construction such as minimizing the ground disturbance area and adoption of a Stormwater Pollution Prevention Plan and a Hazardous Materials Management Plan that would prevent pollution in water sources and other habitats and fueling of any equipment occurring at least 120 feet away from the water and preferably on an impervious surface. New surfaces resulting from construction under Alternative 1 would be designed to minimize surface water runoff through implementation of low-impact development and best management practices for stormwater management systems. These measures would be developed in accordance with all applicable CNMI regulations for stormwater management and water quality, including applying the principles from the *CNMI and Guam Stormwater Management Manual* (Horsley Witten Group, Inc. 2006). Refer to Appendix D for a list of all best management practices that would be implemented during the Proposed Action. Therefore, potential adverse impacts would be minimal and temporary on water column and substrate Bottomfish Essential Fish Habitat and water column Pelagic Essential Fish Habitat. Bottomfish and Pelagic Habitat Areas of Potential Concern are outside the Action Area and would thus not be impacted. The USMC is consulting with the National Marine Fisheries Services on potential impacts to essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act. The consultation will be complete and incorporated, as appropriate, into the Record of Decision.

4.4.4 Alternative 2

Under Alternative 2, impacts associated with construction would be very similar to those described under Alternative 1. Under Alternative 2, training would continue and would increase over the No Action Alternative by approximately 5 percent, compared to a 15 percent increase under Alternative 1. The types of impacts to both terrestrial and marine biological resources from training events would remain the same under Alternative 2. However, the decreased training tempo would reduce the frequency of temporary impacts (e.g., noise and visual impacts associated with human, vehicular, and aircraft presence) to both terrestrial and marine biological resources, specifically wildlife species or marine special status species. Therefore, impacts to biological resources from Alternative 2 would be less than significant.

4.5 Cultural Resources

4.5.1 Approach to Analysis

This analysis considers the impacts of the Proposed Action to cultural resources. Cultural resources include historic properties that are eligible for the National Register of Historic Places and other cultural resources that are not eligible for the National Register of Historic Places but still hold traditional, religious, or cultural importance to the community, such as cemeteries, memorials, and places for growing and/or gathering medicinal plants as discussed in both the Socioeconomics and Biological Resources sections. NEPA incorporates the National Historic Preservation Act analysis