

## CHAPTER 10.

# TERRESTRIAL BIOLOGICAL RESOURCES

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### 10.1 INTRODUCTION

This chapter contains the discussion of the potential environmental consequences associated with implementation of the alternatives within the region of influence (ROI) for terrestrial biological resources. For a description of the affected environment, refer to the respective chapter of Volume 2 (Marine Corps Relocation – Guam). The locations described in that Volume include the ROI for the aircraft carrier berthing component of the proposed action (Apra Harbor), and the chapters are presented in the same order as the resource areas contained in this Volume. Potential impacts to marine species from proposed offshore activities are addressed in Chapter 11, *Marine Biological Resources*.

### 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 action 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., noise and lighting). Potential types of direct impacts include, but are not limited to:

- Loss of habitat due to vegetation removal during construction.
- Temporary loss of habitat during construction from noise, lighting, and human activity.
- Potential loss of habitat due to disturbance of species in areas surrounding operations from noise, lighting, and human activity.
- Injury or mortality to wildlife or special-status species.

*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, invasive 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 recovery habitat for special-status species.
- Introduction of new non-native, invasive species or increased dispersal of existing non-native, invasive species on Guam.
- Dispersal of existing non-native, invasive species from Guam to the Commonwealth of the Northern Mariana Islands (CNMI), Hawaii, or other destinations.
- Adverse effects from pollutants that are released from construction or military operations.

General principles used to evaluate impacts are:

- The extent, if any, that the action would permanently lessen ecological habitat qualities that Endangered Species Act (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 U.S. Fish and Wildlife Service (USFWS) recovery plans, Navy and Air Force Integrated Natural Resources Management Plans (INRMPs), or the Guam 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 as described in the previous section. Special-status species are defined as ESA- and Guam-listed species and species that are designated candidates for ESA listing. Specific significance criteria are discussed below. If significant impacts are determined, then mitigation may be proposed to offset the impacts. *Mitigation Measures* are discussed in Section 10.2.2.2.

##### 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 Guam. 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 diminished population sizes or distributions of regionally important native animal species. These wildlife species include those designated as Species of Greatest Conservation Need in the Guam CWCS. Non-native species that have the potential for direct or indirect impacts were evaluated. Historical impacts from non-native species have been severe, particularly from the brown tree snake (BTS) (see discussion in Volume 2). Although the proposed action would not result in additional impacts from BTS on Guam, the concern is that the BTS would be inadvertently introduced to other islands throughout the Pacific. This concern is addressed comprehensively for all actions proposed in this EIS with the mitigation measures described in Section 10.2.2.2.

##### *Migratory Birds*

The Migratory Bird Treaty Act (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 Code of Federal Regulations [CFR] Part 21).

The Department of Defense (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 Executive Order (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.

The following species that occur on Guam are considered non-migratory birds and are not covered under the MBTA: black francolin, black drongo, Eurasian tree sparrow, island-collard dove (previously known as Philippine turtle dove), common pigeon, and king quail; all other bird species occurring on Guam are covered under the MBTA.

#### Special-Status Species

The presence of special-status species in the project areas was described in Volume 2. 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 designated undeveloped Overlay Refuge lands or identified recovery 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. Potential indirect impacts would also include disturbing ESA- and Guam-listed species due to noise, lighting, or human activity. If unoccupied but suitable 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 were 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 Assessment (BA) has been prepared by the Navy to analyze the potential impacts on ESA-listed species. The Navy has also prepared a BA addressing potential impacts to marine species under the jurisdiction of the National Marine Fisheries Service (NMFS); refer to Chapter 11, Marine Biological Resources, for further discussion.

The BA and the subsequent Biological Opinion (BO) issued by the USFWS after their review of the BA would be the final determination of impacts to ESA-listed species that are being evaluated in this EIS. Candidate species were evaluated in the BA. However, if they are not formally listed by the time the BO is issued and the proposed action would not result in their listing, no determination for these species will be made in the BO. The BO may provide an Incidental Take Statement that lists the amount or extent of incidental take anticipated. The Incidental Take Statement specifies Terms and Conditions that the action proponent must comply with to be exempt from the prohibitions of Section 9 of the ESA. These are non-discretionary requirements. The BO may also specify 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

Terrestrial biological resource issues identified during the public scoping process, including by regulatory stakeholders, that are applicable to the proposed action include:

- Activities associated with the military expansion (i.e., construction, expansion, and 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. The 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. The Navy must assure funding to sustain a 100% inspection rate of all cargo, vehicles, munitions, and household goods. Guam Regulation Protocols 505 and 506 should be incorporated into a BTS control plan to be included as part of the EIS.
- Discuss streams and wetlands, including acreage and habitat type for mitigation areas, size and location of mitigation zones, and contingency plans.
- Concern that development along the shoreline has the potential to require removal of coastal marine and terrestrial habitat.

### 10.2.2 Alternative 1 Polaris Point (Preferred Alternative)

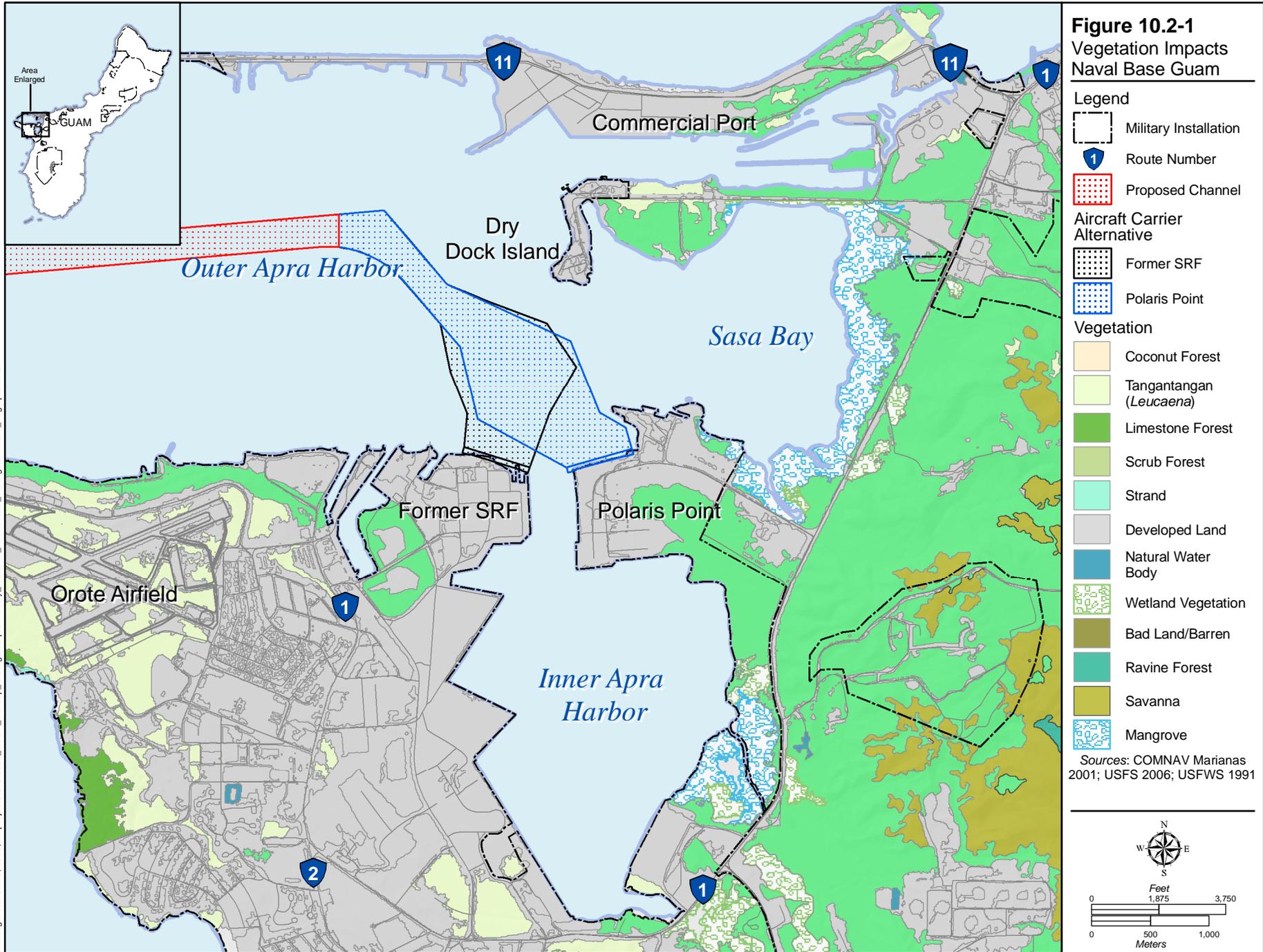
#### 10.2.2.1 Onshore and Offshore

##### Construction

##### *Vegetation*

Alternative 1 Polaris Point (referred to as Alternative 1) is located within a developed area (Figure 10.2-1). There would be no significant impacts to vegetation.

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### *Wildlife*

Terrestrial project areas are developed areas of the base with minimal bird habitat, particularly for the shorebirds that are some of the most common bird species in the general area. The Pacific golden plover, whimbrel, ruddy turnstone, and brown noddies were documented in the Polaris Point shoreline areas in 2008 and 2009 (Eggleston 2009; Vogt 2009). Approximately 1,200 feet (ft) (366 meters [m]) of shoreline would be developed for the aircraft carrier berth. The shoreline in this developed portion of the base can be described as semi-natural, consisting of mixed sand and gravel beach. This is a small amount of shoreline habitat in relation to the total amount available in the Apra Harbor area (National Oceanic and Atmospheric Administration [NOAA] 2005); therefore, any birds using this relatively small amount of shoreline would have other similar or less-developed shoreline areas to move to for feeding or resting. There would be no significant changes in population sizes or distributions of migratory birds or regionally important native animal species. Therefore, impacts to wildlife due to proposed removal of habitat from construction activities would be less than significant.

Potential indirect impacts include noise, general construction activity, pollutants and dredging sedimentation. Noise and activity from construction would force shorebird species to move, but there are other areas of suitable habitat nearby so that impacts would be less than significant. Noise and lighting from night-time dredging would impact migratory birds using or potentially using Sasa Bay and its extensive mangroves. The temporary dredging operations would adversely affect bird feeding, roosting, and nesting. In order to minimize impacts, Best Management Practices (BMPs) would be implemented, including measures to limit night-time lighting and noise from the dredging operations (see Chapter 11, Marine Biological Resources in this Volume). Before the start of construction, all personnel involved would receive a briefing on special-status species potentially present and avoidance measures. In addition, construction-related vessels would be restricted from the Sasa Bay Preserve so as to reduce potential impacts to wildlife species. With implementation of these measures, impacts would be less than significant.

Fueling of project-related construction or operations vehicles, watercraft, and equipment could result in accidental releases of petroleum products that would migrate within Apra Harbor. The Sasa Bay mangrove area is over 4,000 ft (1,220 m) from the proposed aircraft carrier dredging location (Figure 10.2-1). Required BMPs during construction would make it unlikely for a major spill to occur (see Chapter 4 on water resources and Chapter 11 on marine biological resources for further information). Fueling of project-related construction vehicles and equipment would take place away from the water when feasible. In addition, a Spill Prevention, Control, and Countermeasure Plan (SPCCP) would be in place and BMPs that are applicable during construction and operation would be detailed in the SPCCP. These BMPs would prevent or control discharges and spills that may potentially occur during Navy activities within and adjacent to Apra Harbor. Absorbent materials and containment booms would be stored on-site to facilitate the clean-up of potential petroleum spills. Various booms, skimmers, and sorbents are available to response agencies, and the Navy has a waste oil barge. Additional BMPs are listed in Volume 7. Implementation of the SPCCP and associated BMPs would result in less than significant impacts.

Proposed dredging, as well as shoreline activities, would result in suspension of sediments that could migrate to shorelines. However, modeling results show that a sediment plume would not migrate into Sasa Bay or only a very short distance into the bay, and sediments would largely be contained within silt curtains employed for the dredging and would not reach shoreline areas (Ericksen 2009). Silt curtains are typically required in U.S. Army Corps of Engineers (USACE) construction and dredging permits.

Therefore, BMPs would include use of appropriate silt curtains and/or other silt containment measures in the nearshore environment to enclose project areas where in-water activities would occur. In addition, there would be frequent monitoring of the effectiveness of the silt curtains. These sedimentation control measures would minimize or eliminate the potential for impacts to the mangrove community and the associated species it supports. Therefore, there would be no impacts to wetlands or shoreline areas from sedimentation.

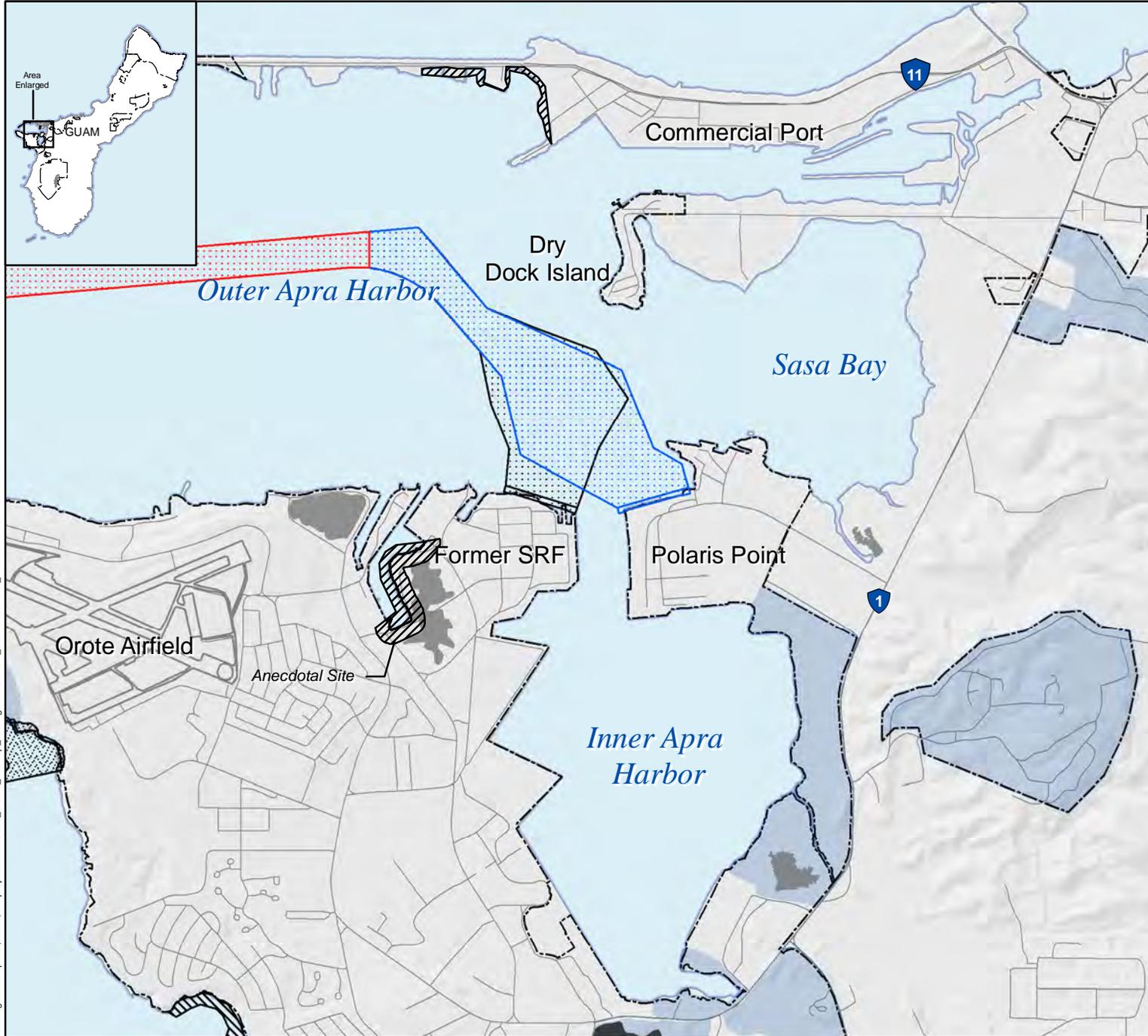
#### *Special-Status Species*

**Mariana Common Moorhen.** The ESA- and Guam-listed Mariana common moorhen is likely to use local wetland communities that are identified as secondary moorhen habitat in the USFWS recovery plan. These areas are located northwest and southeast of the Sumay inlet (Figure 10.2-2) and at the Atantano wetlands east of the inner harbor (USFWS 1991). These wetland habitats (not mangroves) are not directly adjacent to the harbor and would be unlikely to be affected by suspended sediments or potential small petroleum spills associated with the proposed action. Sasa wetlands behind the mangroves are also unlikely to be adversely impacted because the mangroves are 98 ft (30 m) to 574 ft (175 m) wide. Furthermore, there are no records of moorhens in the freshwater emergent portions of Sasa wetland behind the mangroves (Wiles and Ritter 1993). Impacts would be less than significant. Potential indirect impacts to the moorhen from construction include noise and activity. The moorhen may use the freshwater wetland area of the Sasa Bay wetlands well over a 0.5 mile (0.8 kilometer [km]) from where the dredging and construction would take place. Noise and activity from construction would be very unlikely to affect these areas. Therefore, impacts would be less than significant.

**Sea Turtles.** Green and hawksbill sea turtles are known to utilize Apra Harbor (Figure 10.2-2) but there are few records documenting use of beaches. Hawksbill turtles occasionally approach the edges of the mangroves to feed on sponges (G. Davis, pers. comm. cited in Wiles and Ritter 1993) (see Figure 10.2-1). Green sea turtles have nested along the northern beaches of Orote Point and there is a 1997 record of hawksbill nesting in or around Sumay inlet (G. Davis, pers. comm. cited in Grimm and Farley 2008). There is no documentation that sea turtles have ever used Polaris Point beaches (NAVFAC Marianas 2009). The potential for use of this beach by sea turtles is considered very low due to suboptimal beach morphology including the following features: minimal height above the water level, very narrow, and rubble substrate from dredge spoil origins (NAVFAC Marianas 2009). Indirect impacts from noise and artificial lighting is possible during dredging and pile-driving operations, but noise associated with pile driving at the proposed aircraft carrier berth is unlikely to be a concern because the distance to the nearest known nesting beach at Sumay Cove is approximately 3,800 ft (1,158 m). Potential impacts on sea turtles at beaches from lighting during dredging operations would be minimized through minimization of or lighting control and nesting beach monitoring. Nesting beach monitoring is currently being conducted. Details are described under the mitigation discussion in Section 10.2.2.2. Although sea turtles are not known to be particularly sensitive to noise, beach monitoring would help to evaluate any potential effects from noise (Bartol et al. 1999; Ketten and Bartol 2006). With these mitigation measures, impacts would be less than significant.

In accordance with Section 7 of the ESA, the Navy has prepared a BA and formal consultation has been completed regarding the potential impacts of the proposed action on ESA-listed species under the jurisdiction of the USFWS and NMFS.

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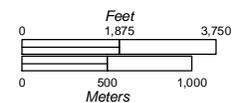


**Figure 10.2-2**  
Special-Status  
Species Impacts -  
Naval Base Guam

**Legend**

-  Military Installation
-  Route Number
-  Proposed Channel
- Aircraft Carrier Alternative**
-  Former SRF
-  Polaris Point
-  Overlay Refuge
-  Orote ERA
-  Sea Turtle Nesting
-  Potential Sea Turtle Nesting
- Mariana Common Moorhen Habitat**
-  Primary
-  Secondary

Source: USFWS 1991b;  
NOAA 2005; GDAWR 2007;  
Grimm and Farley 2008



## Operation

### *Vegetation*

There would be no direct or indirect impacts to vegetation. No native vegetation would remain in the area after construction.

### *Wildlife*

Very few terrestrial species use the area proposed for the aircraft carrier berth because it is a developed area. Direct impacts to terrestrial wildlife at the aircraft carrier berthing area would be less than significant.

The aircraft carrier wharf area is over 0.5 mile (0.8 km) from the Sasa Bay wetlands. Noise and activity from operations at the wharf would be very unlikely to affect these areas. Impacts would be less than significant. Ship operations out in the harbor would involve potential lighting and noise during night-time operations however these would not occur in Sasa Bay where mangroves and associated wildlife are abundant. Impacts would be less than significant.

Potential oil spills associated with Alternative 1 are unlikely given the history of Navy operations in Apra Harbor. However, if an oil spill were to occur and reach the mangroves, substantial damage to that community would be likely. The Sasa Bay mangrove area is approximately 4,000 ft (1,220 m) from the proposed wharf area project location. This wetland is a large natural wetland that fringes the bay in eastern Apra Harbor (Figure 10.2-2). The mangroves and associated wetlands further inland are supported by flows of the Sasa, Laguas, and Aguada rivers. Various mangrove species occupy the edge of the bay and there is a small grove of nipa near the Laguas River based on 2010 project-specific field reconnaissance observations. Other areas are occupied by dense, disturbed secondary forest that floods seasonally and in scattered areas are beds of reeds and an intertidal mudflat generally lacking in vegetation (Wiles and Ritter 1993). This wetland is important for aquatic organisms that are specific to mangroves, including molluscs, clams and oysters, fiddler crabs, land crabs, and mangrove crabs. The mangroves are also nursery grounds for various marine fishes (Wiles and Ritter 1993).

Mangrove responses to oil spills have been summarized by Hoff et al. (2002). Mangrove tree species themselves are highly susceptible to oil exposure and the lighter oils are more acutely toxic than heavier oils. Acute effects of oil (mortality) occur within 6 months of exposure and usually within a much shorter time frame (a few weeks). Common responses of mangrove tree species to oil include yellowing of leaves, defoliation, and tree death. Mangrove communities are complex but the available information suggests that the mangrove faunal community recovers faster than the mangrove trees themselves (Hoff et al. 2002).

The potential that oil spills at the berthing area would reach the mangroves is partly controlled by currents in Apra Harbor. Currents in the harbor are predominantly wind-driven, and occur as a two-layered system. Project area currents were found to be weak with surface currents of 4-8 centimeters per second (Eriksen 2009). Tidal effects within the harbor are small. The surface layer flows in the direction of the wind, and the deeper layer flows in the opposite direction. During typical trade wind conditions, surface flow is to the west out of the harbor, while deeper flow is to the east into the harbor. Surface flows to the west would move an oil spill away from the Sasa Bay mangroves. However, it is noted that during typhoons, when spills are more likely to occur based on historical records, surface water movements may be towards the mangroves. Minimization measures for responding to potential spills are discussed below.

The capability to respond to any spill resulting from the proposed action is substantial. NOAA has developed a modeling tool for spills called the General NOAA Operational Modeling Environment and has developed specific information for Apra Harbor (NOAA 2009). Other minimization is discussed in the mitigation measures section.

Additional BMPs and procedures that would be in place are outlined in the required SPCCP. With the combined prevention, response, and cleanup capabilities that would be in place, potential impacts from operations to the mangrove areas and migratory birds and other species it supports would be less than significant.

#### *Special-Status Species*

**Mariana Common Moorhen.** Noise and activity during operations would have less than significant impacts on the moorhen because the proposed berthing area is over 0.5 mile (0.8 km) from the nearest known moorhen habitat, the wetlands to the west of Sumay inlet. Potential petroleum spills would be unlikely to impact moorhen freshwater wetland habitat because the habitat areas are behind shorelines or behind mangroves. Impacts to the moorhen would be less than significant.

**Sea Turtles.** Sea turtles are known to use the marine environment in the area and these impacts are evaluated under in Chapter 11, Marine Biological Resources, of this Volume. As discussed under construction, the nearest known sea turtle nesting area is at Sumay Cove, approximately 3,800 ft (1,158 m) from the ship berthing area. Recommendations have been made in other studies that arm-mounted area lighting should not be closer than 500 ft (150 m) to a turtle nesting beach (Witherinton and Martin 1996) so there are unlikely to be significant indirect impacts to sea turtles from noise or lighting during operations in the berthing area. Potential petroleum spills (see also the discussion under wildlife above) would significantly impact the potential sea turtle nesting area at Sumay Cove and possibly other potential sea turtle beaches. With implementation of BMPs, spill plans, and with adequate spill equipment and response capabilities, impacts to terrestrial habitat used by sea turtles would be less than significant.

Table 10.2-1 summarizes Alternative 1 impacts.

**Table 10.2-1 Summary of Alternative 1 Impacts**

<i>Area</i>	<i>Activity</i>	<i>Project-Specific Impacts</i>
Apra Harbor, Polaris Point	Construction	Construction on land would occur in an area already developed with minimal or no native vegetation; wildlife use of this terrestrial area is also minimal or if used it is by species that are widespread on Guam; the nearest area with abundant wildlife is the GovGuam-designated Sasa Bay Preserve over 4,000 ft (1,220 m) away; noise and activity from night-time dredging of Apra Harbor would result in minor disturbance to migratory birds in terrestrial areas of Sasa Bay but impacts would be less than significant; potential impacts on the sea turtle nesting areas due to lighting during dredging operations would be minimized to less than significant.
	Operation	There would be less than significant impacts to wildlife at Sasa Bay from noise and lighting; there would be less than significant impacts to special-status species including sea turtles at Sumay Cove and other beaches from potential petroleum spills with implementation of standard BMPs.

#### 10.2.2.2 Alternative 1 Proposed Mitigation Measures

The following mitigation measures would be required for Alternative 1.

- Construction-related vessels would be restricted from the Sasa Bay Preserve so as to reduce potential impacts to wildlife species.

- To the maximum extent practical, while meeting minimum safety, anti-terrorism, and force protection requirements, lighting would be minimized and hooded or shielded lights will be used during construction and at all proposed new roads and facilities within sea turtle land-based habitat.
- During the period of night-time dredging activities, observers would monitor all potential nesting beaches and look for recent turtle tracks and signs of nesting activity. If a nest is observed, the area would be photographed and marked, and the date and location recorded; hatching from the nest would be monitored. Any observed disturbance to the species that was noted during monitoring and particularly during nesting or hatchling activity would be halted. Periodic monitoring of potential nesting beaches on Navy lands and recordkeeping during operations of the new facilities would also be conducted.
- A Micronesia Biosecurity Plan (MBP) is being developed to address potential non-native species impacts associated with this EIS as well as to provide a plan for a comprehensive regional approach. The MBP will include risk assessments for non-native 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 (NISC), U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS), the U.S. Geological Survey – Biological Resources Discipline (USGS-BRD), and the Smithsonian Environmental Research Center (SERC). 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 will include BTS control measures to prevent BTS movement off Guam and management within Guam. For actions proposed in this EIS, biosecurity measures would be implemented to supplement existing practices to address invasive species. For additional information on existing and proposed measures for non-native, invasive species control, refer to Volume 2, Chapter 10, Section 10.2.2.6.

In addition, another relevant mitigation measure, sea turtle natural history studies, would be conducted and is a mitigation measure in Volume 2, Chapter 10, Section 10.2.2.6. Refer to that section for additional information.

### **10.2.3 Alternative 2 Former Ship Repair Facility (SRF)**

#### **10.2.3.1 Onshore and Offshore**

All proposed activities under Alternative 2 Former SRF (referred to as Alternative 2) are the same as those proposed under Alternative 1 except that aircraft carrier berthing would occur at the Alternative 2 and not Alternative 1 (see Table 10.2-1). All proposed wharf and building construction actions under this alternative would be conducted in areas that are already developed and are currently used for existing Navy operations.

#### Construction

##### *Vegetation*

Impacts would be the same as for Alternative 1.

##### *Wildlife*

Impacts would be the same as for Alternative 1.

*Special-Status Species*

Mariana Common Moorhen. Impacts to the moorhen would be the same as for Alternative 1.

Sea Turtles. The potential Sumay Cove sea turtle nesting area is approximately 1,800 ft (549 m) from the Alternative 2 aircraft carrier berthing site. Although sea turtle nesting has been recorded only once (in 1997) and no activity has been recorded since that time at Sumay Cove, it is possible that the area could be used again. Artificial light sources at night during construction that shine on a nesting beach could result in a number of impacts including: deterring adult females from exiting the water to lay eggs on the beach, causing abandonment of nesting attempts, disorienting adult females after nesting, or disorienting hatchlings. Potential impacts on sea turtles from lighting during dredging operations would be reduced through minimization of or lighting control and nesting beach monitoring. Details are described under the mitigation discussion in Section 10.2.2.2. Nesting beach monitoring is currently being conducted at beaches in the vicinity.

Construction at the berthing area would generate noise. The Navy recognizes that there are many on-going and recent past studies on the subject of potential exposures to sea turtles from pile driving actions. Further research and validation of these studies are necessary prior to being able to determine the applicability of the methodologies and results to the proposed action within this EIS. The Navy will continue to research these studies. Applicability of these studies will also be coordinated through marine biological consultations with the NMFS. The monitoring that would be in place for potential sea turtle nesting areas would help to determine if there were any effects and, if necessary, noise reduction methods would be employed. With these BMPs and mitigation measures, impacts to sea turtles would be less than significant.

The same BMPs for Alternative 1 for construction at the berthing area would be employed for Alternative 2 to protect sea turtles during dredging.

Operation*Vegetation*

Impacts would be the same as for Alternative 1.

*Wildlife*

Impacts would be the same as for Alternative 1.

*Special-Status Species*

Impacts to special-status species would be similar to those described for Alternative 1. An additional potential impact for sea turtles would be as described below.

Sea Turtles. Artificial lighting during operations would potentially affect Sumay Cove in a similar manner to that described for construction above. Mitigation measures would be employed to eliminate or reduce the impacts of artificial night lighting such as minimizing lighting or the use of hooded lights. Observers would monitor potential sea turtle nesting at any beaches in the vicinity that are determined to be viable and activity and nests would be recorded and monitored through hatching. Any identified disturbances would be halted or corrected. With these measures, impacts to sea turtles would be less than significant.

**Table 10.2-2. Summary of Alternative 2 Impacts**

Area	Activity	Project Specific Impacts
Apra Harbor, Former SRF	Construction	Construction on land would occur in an area already developed with minimal or no native vegetation; wildlife use of this terrestrial area is also minimal or if used it is by species that are widespread on Guam; the nearest area with abundant wildlife is the GovGuam-designated Sasa Bay Preserve over 4,000 ft (1,220 m) away; noise and activity from night-time dredging of Apra harbor would result in disturbance to migratory birds in terrestrial areas of Sasa Bay but impacts would not be significant; potential impacts on the sea turtle nesting area at Sumay Cove due to lighting during dredging operations would be minimized to less than significant.
	Operation	There would be less than significant impacts to wildlife at Sasa Bay from noise and lighting; potential impacts to sea turtle beaches from lighting would be minimized to less than significant; there would be less than significant impacts to special-status species including sea turtles at Sumay Cove and other beaches from potential petroleum spills with implementation of standard BMPs.

10.2.3.2 Alternative 2 Proposed Mitigation Measures

Proposed mitigation measures would be the same as those previously described for Alternative 1.

**10.2.4 No-Action Alternative**

Existing terrestrial biological resources would remain unchanged under the no-action alternative.

**10.2.5 Summary of Impacts**

Table 10.2-3 summarizes the potential impacts of each action alternative and the no-action alternative.

**Table 10.2-3. Summary of Impacts**

Alternative 1	Alternative 2	No-Action Alternative
<b>Vegetation</b>		
• NI	• NI	• NI
<b>Wildlife</b>		
SI-M; LSI <ul style="list-style-type: none"> <li>• Significant potential indirect impact to Sasa Bay wildlife from noise and activity during night-time dredging and construction, mitigated to less than significant.</li> <li>• Less than significant potential indirect impact to Sasa Bay wildlife from night-time operations.</li> </ul>	SI-M; LSI <ul style="list-style-type: none"> <li>• Significant potential indirect impact to Sasa Bay wildlife from noise and activity during night-time dredging and construction, mitigated to less than significant.</li> <li>• Less than significant potential indirect impact to Sasa Bay wildlife from noise and activity during night-time operations.</li> </ul>	NI <ul style="list-style-type: none"> <li>• No impacts to terrestrial biological resources</li> </ul>
<b>Special-Status Species</b>		
SI-M;LSI <ul style="list-style-type: none"> <li>• Significant potential indirect impacts to sea turtles at Sumay Cove beaches from lights and noise during dredging, mitigated to less than significant.</li> <li>• Less than significant indirect impact during operations.</li> </ul>	SI-M <ul style="list-style-type: none"> <li>• Significant potential indirect impacts to sea turtles at Sumay Cove beaches from lights and noise during dredging and construction, mitigated to less than significant.</li> <li>• Significant potential indirect impact to sea turtles at Sumay Cove beaches from night lights and noise during operation, mitigated to less than significant.</li> </ul>	NI <ul style="list-style-type: none"> <li>• No impacts to terrestrial biological resources</li> </ul>

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

**10.2.6 Summary of Proposed Mitigation Measures**

Table 10.2-4 summarizes the proposed mitigation measures to compensate for the impacts.

**Table 10.2-4. Summary of Proposed Mitigation Measures**

<i>Alternatives 1 and 2</i>	<i>No-Action Alternative</i>
<b>Vegetation</b>	
None	None
<b>Wildlife and Special-Status Species</b>	
<ul style="list-style-type: none"> <li>• Before the start of construction, all personnel involved would receive a briefing on special-status species potentially present and avoidance measures.</li> <li>• Construction-related vessels would be restricted from the Sasa Bay Preserve so as to prevent potential impacts to wildlife species.</li> <li>• Lighting will be designed to meet minimum safety, anti-terrorism, and force protection requirements. To the maximum extent practical, hooded lights would be used at all proposed roads and facilities near sea turtle land-based habitat.</li> <li>• The Micronesia Biosecurity Plan is being developed to address potential invasive species impacts associated with the actions proposed in 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 NISC, USDA-APHIS, USGS-BRD, and SERC. 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. For actions proposed in this EIS, biosecurity measures would be implemented to supplement existing practices to address invasive species.</li> </ul>	None