3.7 Marine Vegetation

Supplemental Environmental Impact Statement/

Overseas Environmental Impact Statement

Mariana Islands Training and Testing

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3.7 Marine Vegetation

3.7.1 Affected Environment

The purpose of this section is to supplement the analysis of impacts on Marine Vegetation presented in the 2015 Mariana Islands Training and Testing (MITT) Final Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) with new information relevant to proposed changes in training and testing activities conducted at sea and on Farallon de Medinilla (FDM). New information made available since the publication of the 2015 MITT Final EIS/OEIS is included below to better understand potential stressors and impacts on Marine Vegetation resulting from training and testing activities. Comments received from the public during scoping related to Marine Vegetation are addressed in Section 3.7.3 (Public Scoping Comments).

3.7.1.1 General Threats

There is no new information on threats to marine vegetation in the MITT Study Area that would change the conclusions from the 2015 MITT Final EIS/OEIS.

3.7.1.2 Marine Vegetation Groups

There is no new information on marine vegetation groups (phylum Cyanobacteria [blue-green algae], phylum Dinophyta [dinoflagellates], phylum Chlorophyta [green algae], phylum Heterokontophyta [brown algae], phylum Rhodophyta [red algae], and phylum Spermatophyta [flowering plants]) that would change the basis of the conclusions from the 2015 MITT Final EIS/OEIS.

3.7.1.3 Seagrasses

There is no new information on seagrasses that would change the basis of the conclusions from the 2015 MITT Final EIS/OEIS.

3.7.1.4 Mangroves

There is no new information on mangroves that would change the basis of the conclusions from the 2015 MITT Final EIS/OEIS.

3.7.2 Environmental Consequences

The 2015 MITT Final EIS/OEIS considered training and testing activities that currently occur in the Study Area and considered potential stressors related to marine vegetation. With the exception of explosives, stressors analyzed are the same as those analyzed in the 2015 MITT Final EIS/OEIS. In the 2015 MITT Final EIS/OEIS, explosives were addressed under acoustic stressors; however, for purposes of this analysis, explosives are analyzed as a separate stressor. The following are stressors analyzed for marine vegetation from the 2015 MITT Final EIS/OEIS:

- Explosive (in-air explosions and in-water explosions)
- Physical disturbance and strike (vessels, in-water devices, military expended materials, and seafloor devices)
- Secondary stressors (impacts associated with sediments and water quality)

This section evaluates how and to what degree potential impacts on marine vegetation from stressors described in Section 3.0 (General Approach to Analysis) may have changed since the analysis presented in the 2015 MITT Final EIS/OEIS was completed. Proposed training and testing activities, the number of times each activity would be conducted annually, and the locations within the Study Area where the activity would typically occur under each alternative are presented in Tables 2.4-1 and 2.4-2 in Chapter 2 (Description of Proposed Action and Alternatives). The tables also present the same information for activities described in the 2015 MITT Final EIS/OEIS so that the proposed levels of training and testing under this Supplemental EIS (SEIS)/OEIS can be easily compared.

The Navy conducted a review of federal and state regulations and standards relevant to marine vegetation and reviewed literature published since 2015 for new information that could inform the analysis presented in the 2015 MITT Final EIS/OEIS. The analysis presented in this section also considers standard operating procedures, which are discussed in Section 2.3.3 (Standard Operating Procedures) of this Draft SEIS/OEIS, and mitigation measures that are described in Chapter 5 (Mitigation). The Navy implements these measures to avoid or reduce potential impacts on marine vegetation from stressors associated with training and testing activities.

3.7.2.1 Explosive Stressors

As stated in the 2015 MITT Final EIS/OEIS, the potential for an explosion to injure or destroy marine vegetation would depend on the amount of vegetation present, the number of munitions used, and their net explosive weight. In areas where marine vegetation and locations for explosions overlap, marine vegetation on the surface of the water, in the water column, or rooted in the seafloor may be impacted. Seafloor macroalgae and single-celled algae may overlap with underwater and sea surface explosion locations. If these vegetation types are near an explosion, only a small number of them are likely to be impacted. Much of the attached macroalgae grows on live hard bottom areas that would be mostly protected in accordance with Navy mitigation measures (see Chapter 5, Mitigation). Also, some seafloor macroalgae are resilient to high levels of wave action (Mach et al., 2007), which may aid in their ability to withstand underwater explosions that occur near them. Underwater explosions also may temporarily increase the turbidity (sediment suspended in the water) in nearby waters, incrementally reducing the amount of light available to marine vegetation. Reducing light availability decreases, albeit temporarily, the photosynthetic ability of marine vegetation.

Seagrasses may potentially be uprooted or damaged by sea surface or underwater explosions. Regrowth of seagrasses after uprooting can take up to 10 years (Dawes et al., 1997). Explosions may also temporarily increase the turbidity (sediment suspended in the water) in nearby waters, but the sediment would settle to pre-explosion conditions within a few hours to days. Sustained high levels of turbidity may reduce the amount of light that reaches vegetation, which it needs to survive. Seagrasses typically grow in waters that are sheltered from wave action, such as estuaries, lagoons, and bays (Phillips & Meñez, 1988), where most activities are not conducted Detonations are unlikely to occur in areas with mangroves or sea grasses and would continue to occur in disturbed areas over the unvegetated seafloor such as the Agat Bay site, Piti, and Outer Apra Harbor sites.

3.7.2.1.1 Impacts from Explosive Stressors Under Alternative 1

Under Alternative 1, there would be an overall decrease in the number of explosives used in the Study Area during training and testing activities events compared to the number analyzed in the 2015 MITT Final EIS/OEIS (Table 3.0-7). Under Alternative 1, underwater detonations would increase for underwater demolition qualification/certification (Table 2.4-1). However, these activities would continue to occur in the same areas and would have no appreciable change in the impact analysis or conclusions for explosive stressors as presented in the 2015 MITT Final EIS/OEIS. Therefore, the analysis in the 2015 MITT Final EIS/OEIS remains valid.

As described in the 2015 MITT Final EIS/OEIS, underwater explosions conducted for training and testing activities may destroy or remove marine vegetation. However, exposure to these detonations would be limited to the vicinity of the explosions. For example, the offshore underwater mine neutralization sites are located in areas with water depths that are unlikely for marine vegetation to occur. Underwater and surface explosions conducted for training and testing activities are not expected to pose a risk to seagrass because (1) the impact area of underwater explosions is very small relative to seagrass distribution and (2) the low number of charges reduces the potential for impacts.

Therefore, the use of explosives is not expected to impact the long-term survival, annual reproductive success, and lifetime reproductive success of marine vegetation.

3.7.2.1.2 Impacts from Explosive Stressors Under Alternative 2

Under Alternative 2, the number of explosives used during training and testing activities would decrease compared to the numbers analyzed in the 2015 MITT Final EIS/OEIS and increase compared to Alternative 1 (Table 3.0-7). Under Alternative 2, increases in the number of underwater explosives would have no appreciable change on the impact conclusions for explosive stressors as summarized above under Alternative 1 and as presented in the 2015 MITT Final EIS/OEIS.

Therefore, explosive impacts on marine vegetation under Alternative 2 would be negligible.

3.7.2.1.3 Impacts from Explosive Stressors Under the No Action Alternative

Under the No Action Alternative, proposed training and testing activities would not occur. Other military activities not associated with this Proposed Action would continue to occur. Explosive stressors as listed above would not be introduced into the marine environment. Therefore, existing environmental conditions would either remain unchanged or would improve slightly after cessation of ongoing training and testing activities.

Discontinuing the training and testing activities would result in fewer explosive stressors within the marine environment where training and testing activities have historically been conducted. Therefore, discontinuing training and testing activities under the No Action Alternative would lessen the potential for explosive impacts on marine vegetation, but would not measurably improve the overall distribution or abundance of marine vegetation.

3.7.2.2 Physical Disturbance and Strike Stressors

This section analyzes the potential impacts on marine vegetation of the various types of physical disturbance and strike stressors during training and testing activities within the Study Area. Three types of physical disturbance and strike stressors are evaluated for their impacts on marine vegetation, including (1) vessels and in-water devices, (2) military expended materials, and (3) seafloor devices.

The evaluation of the impacts of physical disturbance stressors on marine vegetation focuses on proposed activities that may cause vegetation to be damaged by an object that is moving through the water (e.g., vessels and in-water devices), or dropped to the seafloor (e.g., military expended materials, anchors). Not all activities are proposed throughout the Study Area. Wherever appropriate, specific geographic areas of potential impact are identified.

As described in the 2015 MITT Final EIS/OEIS, vessel disturbance of marine vegetation would be limited to floating marine algae. Vessel movements may disperse or injure algal mats. Because algal distribution is patchy and mats may re-form following a disturbance, training and testing activities involving vessel movement would not impact the general health of marine algae.

3.7.2.2.1 Impacts from Physical Disturbance and Strike Stressors Under Alternative 1

Under Alternative 1, the number of proposed training and testing events involving vessel movements would increase from those presented in the 2015 MITT Final EIS/OEIS (Table 3.0-12). In contrast, the use of towed in-water devices (Table 3.0-13) would decrease. The decrease in the number of in-water devices is unlikely to change the impact conclusion presented in the 2015 MITT Final EIS/OEIS. As stated in the 2015 MITT Final EIS/OEIS, the impact of vessels and in-water devices on marine vegetation would remain inconsequential because of (1) the quick recovery of most vegetation types; (2) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (3) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

Under Alternative 1, the number of military expended materials used for training and testing activities that has the potential to impact marine vegetation would generally increase (see Tables 3.0-14 through 3.0-17). However, these increases are not expected to pose a risk to marine algae or seagrasses because (1) the relative coverage of marine algae in the Study Area is low, (2) new growth may result from marine algae exposure to military expended materials, (3) the impact area of military expended materials is very small relative to marine algae distribution, and (4) seagrass overlap with areas where the stressor occurs is very limited. Based on these factors, potential impacts on marine algae and seagrass from military expended materials are not expected to result in detectable changes in their growth, survival, or propagation, and are not expected to result in population-level impacts.

Under Alternative 1, the number of seafloor devices used in shallow-water habitats during training and testing activities would decrease slightly from the number presented in the 2015 MITT Final EIS/OEIS (Table 3.0-18). Seafloor devices would pose a negligible risk to marine vegetation for the same reasons described above for military expended materials and no impacts on the long-term survival, reproductive success, and lifetime reproductive success would occur.

Therefore, physical disturbance and strike impacts on marine vegetation under Alternative 1 would be negligible.

3.7.2.2.2 Impacts from Physical Disturbance and Strike Stressors Under Alternative 2

Under Alternative 2, the combined number of proposed training and testing events involving vessels and in-water devices (Table 3.0-12 and Table 3.0-13) would decrease slightly from those presented in the 2015 MITT Final EIS/OEIS. Military expended materials (Table 3.0-14, Table 3.0-15, and Table 3.0-16) combined would increase, and seafloor devices (Table 3.0-18) would decrease slightly from the number in the 2015 MITT Final EIS/OEIS. Increases in some physical disturbance and strike stressors such as military expended materials could increase the impact risk on marine vegetation but does not appreciably change the analysis or impact conclusions presented in the 2015 MITT Final EIS/OEIS and those summarized above under Alternative 1.

Therefore, physical disturbance and strike impacts on marine vegetation under Alternative 2 would be negligible.

3.7.2.2.3 Impacts from Physical Disturbance and Strike Stressors Under the No Action Alternative

Under the No Action Alternative, proposed training and testing activities would not occur. Other military activities not associated with this Proposed Action would continue to occur. Physical disturbance and strike stressors as listed above would not be introduced into the marine environment. Therefore, existing environmental conditions would either remain unchanged or would improve slightly after cessation of ongoing training and testing activities.

Discontinuing the training and testing activities would result in fewer physical disturbance and strike stressors within the marine environment where training and testing activities have historically been conducted. Therefore, discontinuing training and testing activities under the No Action Alternative would lessen the potential for physical disturbance and strike impacts on marine vegetation, but would not measurably improve the overall distribution or abundance of marine vegetation.

3.7.2.3 Secondary Stressors

Stressors from Navy training and testing activities could pose secondary or indirect impacts on marine vegetation via habitat, sediment, or water quality. Potential impacts on marine vegetation exposed to secondary stressors could occur indirectly through sediments and water quality. Components of these stressors that could pose indirect impacts include (1) explosives and byproducts; (2) metals; (3) chemicals; and (4) other materials such as targets, chaff, and plastics.

Section 3.1 (Sediments and Water Quality) considered the impacts on marine sediments and water quality from explosives and explosive byproducts, metals, chemicals other than explosives, and other materials (marine markers, flares, chaff, targets, and miscellaneous components of other materials). As stated in the 2015 MITT Final EIS/OEIS, one example of a localized impact on marine vegetation associated with water quality impacts could be the increase of cyanobacteria associated with munitions deposits in marine sediments. Cyanobacteria may proliferate when the iron is introduced to the marine environment, and this proliferation can affect surrounding habitats by releasing toxins or stimulating the growth of nuisance species (Schils, 2012). Introducing iron into the marine environment from munitions or infrastructure is not associated with red tide events; rather, these harmful events are more associated with natural causes (e.g., upwellings) and the effects of human activities (e.g., agricultural runoff and other coastal pollution) (Hayes et al., 2007; Whitton & Potts, 2008).

Sediments entering the nearshore environment from FDM as a result of natural processes or explosives associated with strike warfare could cause temporary water quality impacts, some of which may be in foraging areas used by marine organisms. By limiting the location and extent of target areas, along with the types of ordnance allowed within specific impact areas, the military minimizes the potential for soil transport and, thus, water quality impacts. Erosion as a result of training activities at FDM may contribute to deposition of soils into the nearshore areas of FDM, causing increased turbidity. Turbidity can impact vegetation communities by reducing the amount of light that reaches these organisms. The impacts of explosive byproducts on sediment and water quality would be indirect, short term, and local. Explosive ordnance could loosen the soil on FDM and runoff from surface drainage areas containing soil, and explosive byproducts could contaminate sediments and the surrounding ocean water.

3.7.3 Public Scoping Comments

The public raised a number of issues during the scoping period in regard to marine vegetation. The issues are summarized in the list below.

- **Direct impacts on seagrass from sedimentation around FDM and military expended materials as marine debris –** Direct impacts on seagrass from sedimentation around FDM occur due to explosive stressors. Explosives may temporarily increase the turbidity (sediment suspended in the water) of nearby waters, but the sediment would settle to pre-explosion conditions within a short amount of time (e.g., a few hours to days). Sustained high levels of turbidity may reduce the amount of light that reaches vegetation, which it needs to survive. This scenario is not likely given the low number of explosions planned in areas with seagrass. Potential impacts on seagrass from military expended materials are not expected to result in detectable changes in their growth, survival, or propagation, and are not expected to result in population-level impacts. See Section 3.7.2.1 (Explosive Stressors) for further analysis of increased turbidity or sedimentation on marine vegetation including seagrasses in the Study Area including FDM. Military expended materials are discussed in Section 3.7.2.2 (Physical Disturbance and Strike Stressors) as a cause of physical disturbance and strike to marine vegetation.

- **Request survey of all seagrass beds in the Study Area and monitoring of the seagrass beds –** The analysis of impacts on marine vegetation, including seagrasses, concluded that increased turbidity may be caused by items used in training and testing activities; under the standard operating procedures, the Navy avoids the seafloor to the greatest extent practicable. Additionally, activities that have a greater potential to impact the seafloor, such as amphibious assaults, are conducted at high tide to limit such interactions. Anchorages are also scheduled to occur in specific locations, mainly areas that lack vegetation and that have been previously disturbed. Therefore, serious damage is not anticipated, and survey or mitigation measures are not warranted. In addition, the 2015 MITT Final EIS/OEIS includes maps showing areas of marine vegetation in Section 3.7 (Marine Vegetation).
- **Impact of unexploded ordnance on marine species –** Potential impacts on marine vegetation from unexploded ordnance are not expected to result in detectable changes in their growth, survival, or propagation, and are not expected to result in population-level impacts. The impact of unexploded ordnance to marine species, specifically to marine vegetation, is discussed in Section 3.7.2.2 (Physical Disturbance and Strike Stressors) as a cause of physical disturbance and strike to marine vegetation.
- **Impacts on marine species from chemical pollution and destruction of habitat –** The analysis concluded that neither state nor federal standards or guidelines for sediments or water quality would be violated as a result of the implementation of the proposed training and testing activities. Therefore, because these standards and guidelines are structured to protect human health and the environment, and the proposed activities do not violate them, no indirect impacts are anticipated on marine vegetation from the training and testing activities proposed in this SEIS/OEIS. Destruction of habitat is not anticipated to result from the implementation of training and testing activities proposed in this SEIS/OEIS. Impacts on marine species, specifically to marine vegetation from chemical pollution, is discussed in Section 3.7.2.5 (Secondary Stressors).
- **Impacts on marine species from the metals in the water (copper and lead) –** The analysis concluded that neither state nor federal standards or guidelines for sediments or water quality would be violated as a result of the implementation of the proposed training and testing activities. Therefore, because these standards and guidelines are structured to protect human health and the environment, and the proposed activities do not violate them, no indirect impacts are anticipated on marine vegetation from the training and testing activities proposed in this SEIS/OEIS. Impacts on marine species, specifically on marine vegetation, from metals in the water (such as copper and lead) are discussed in Section 3.7.2.3 (Secondary Stressors).

- **Deposition and resuspension of sediments to EFH from training activities –** The 2015 MITT EFHA concluded that any impacts from explosives or physical disturbance and strike stressors that could cause deposition or resuspension of sediments would be short term and minimal.
- **Erosion and sedimentation impacting EFH –** The 2015 MITT EFHA concluded that any impacts from explosives or physical disturbance and strike stressors that could cause erosion and sedimentation would be short term and minimal.
- **Unexploded ordnance being triggered after use and directly impacting EFH –** Unexploded ordnance that explodes due to being triggered post training and testing would be considered an explosive stressor and the 2015 MITT EFHA concluded that the impacts on attached macroalgae from explosives used during training and testing would be minimal and temporary to short term throughout the Study Area. This analysis remains valid. Given the available information, the impact of explosives used during training and testing on submerged rooted vegetation beds would be minimal.

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