

Supplemental Environmental Impact Statement/ Overseas Environmental Impact Statement Mariana Islands Training and Testing

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APPENDIX A TRAINING AND TESTING ACTIVITIES DESCRIPTIONS

A.1 TRAINING ACTIVITIES

The Navy's training activities are organized generally into eight primary mission areas and a miscellaneous category (Other Training) that includes those activities that do not fall within a primary mission area, but are an essential part of Navy training. In addition, because the Navy conducts a number of activities within larger training exercises, descriptions of those larger exercises are also included here. It is important to note that these larger exercises are comprised entirely of individual activities described in the primary mission areas.

A.1.1 MAJOR TRAINING EXERCISES

A major training exercise is comprised of several "unit level" range exercises conducted by several units operating together while commanded and controlled by a single commander. These exercises typically employ an exercise scenario developed to train and evaluate the strike group in naval tactical tasks. In a major training exercise, most of the operations and activities being directed and coordinated by the strike group commander are identical in nature to the operations conducted during individual, crew, and smaller-unit training events. In a major training exercise, however, these disparate training tasks are conducted in concert, rather than in isolation.

Major training exercises are listed below.

A.1.1.1 Joint Expeditionary Exercise

Major Training Exercises – Medium Integrated Anti-Submarine Warfare			
Joint Expeditionary Exercise			
Short Description	Typically a 10-day exercise that could include a Carrier Strike Group and Expeditionary Strike Group, Marine Expeditionary Units, Army Infantry Units, and Air Force aircraft together in a joint environment that includes planning and execution efforts as well as military training activities at sea, in the air, and ashore.	Typical Duration	
		10 days	
Long Description	Advanced joint level battle group and expeditionary amphibious warfare exercise designed to create a cohesive Carrier and Expeditionary Strike Group. Typically 15 surface ships, amphibious assault craft, helicopters, maritime patrol aircraft, strike fighter aircraft, two submarines, and various unmanned vehicles. More than 8,000 personnel may participate and could include the combined assets of a Carrier Strike Group and Expeditionary Strike Group, Marine Expeditionary Units, Army Infantry Units, and Air Force aircraft.		
Typical Components	Platforms: Aircraft carrier, amphibious warfare ship, fixed-wing aircraft, rotary-wing aircraft, support craft, surface combatant Targets: Submarines Systems being Trained/Tested: Mid-frequency sonar systems, sonobuoys		
Standard Operating Procedures (Section 2.3.3)	Aircraft safety Towed in-water device safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area Mariana Islands Range Complex	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Weapons noise Vessel noise Explosive: In-air explosions In-water explosions	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices In-water electromagnetic devices Entanglement: Decelerator/Parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Explosives	Other materials Chemicals
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike Explosives	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne acoustics	Public Health and Safety: Underwater energy In-air energy Physical interactions

Major Training Exercises – Medium Integrated Anti-Submarine Warfare			
Joint Expeditionary Exercise			
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, sonobuoy (non-explosive), sonobuoy wires	Military Recoverable Material	None
Sonar and Other Transducer Bins	Mid-Frequency: MF1 MF4 MF5 MF12	Anti-Submarine Warfare: ASW2 ASW3	
Explosive Bins	None. Presented in appropriate worksheets for unit-level activities that could be conducted during this exercise.		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices	
Assumptions Used for Analysis	All military expended materials, ordnance, and explosives use is included in individual events. Additional activities utilizing sources not listed in the Sonar and Other Transducer Bins section above may occur during this exercise. All acoustic sources which may be used during training and testing activities have been accounted for in the modeling and analysis presented in this SEIS/OEIS.		

A.1.1.2 Joint Multi-Strike Group Exercise

Major Training Exercises			
Joint Multi-Strike Group Exercise – Large Integrated Anti-Submarine Warfare			
Short Description	Typically a 10-day Joint exercise, in which up to three carrier strike groups would conduct training exercises simultaneously.	Typical Duration 10 days	
Long Description	The Joint Multi-Strike Group Exercise demonstrates the Navy’s ability to operate a large naval force of up to three Carrier Strike Groups in coordination with other Services. In addition to this joint warfare demonstration, it also fulfills the Navy’s requirement to maintain, train, and equip combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. The exercise would involve Joint assets engaging in a “free play” battle scenario, with U.S. forces pitted against a replicated opposition force. The exercise provides realistic in-theater training.		
Typical Components	Platforms: Aircraft carrier, fixed-wing aircraft, rotary-wing aircraft, submarines, surface combatant Targets: Sub-surface targets Systems being Trained/Tested: High and mid-frequency sonar systems, sonobuoys		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Towed in-water device safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area Mariana Islands Range Complex	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Weapons noise Explosive: In-air explosions In-water explosions	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Military expended materials Ingestion: Military expended materials – other than munitions	Energy: In-Air electromagnetic devices In-water electromagnetic devices Entanglement: Decelerator/Parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Explosives Other materials Chemicals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike Explosives	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne acoustics	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Acoustic countermeasures, expended bathythermograph, expended bathythermograph wire, sonobuoy (non-explosive), sonobuoy wires	Military Recoverable Material	None
Sonar and Other Transducer Bin	Mid-Frequency: MF1 MF3 MF4 MF5 MF11 MF12	Anti-Submarine Warfare: ASW2 ASW3 ASW4	High-Frequency: HF1

Major Training Exercises			
Joint Multi-Strike Group Exercise – Large Integrated Anti-Submarine Warfare			
Explosive Bins	None. Presented in appropriate worksheets for unit-level activities that could be conducted during this exercise.		
Procedural Mitigation Measures	<table border="0"> <tr> <td>Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar</td> <td>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices</td> </tr> </table>	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices
Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices		
Assumptions Used for Analysis	All military expended materials, ordnance, and explosive use is included in individual events. Additional activities utilizing sources not listed in the Sonar and Other Transducer Bins section above could be used during this exercise, and details can be found in the worksheets for those explosive events. All acoustic sources which may be used during training and testing activities have been accounted for in the modeling and analysis presented in this SEIS/OEIS.		

A.1.1.3 Marine Air Ground Task Force Exercise (Amphibious) - Battalion

Major Training Exercises – Medium Coordinated Anti-Submarine Warfare			
Marine Air Ground Task Force Exercise (Amphibious) -Battalion			
Short Description	Typically a 10-day exercise that conducts over the horizon, ship to objective maneuver for the elements of the Expeditionary Strike Group and the Amphibious Marine Air Ground Task Force. The exercise utilizes all elements of the Marine Air Ground Task Force (Amphibious), conducting training activities ashore with logistic support of the Expeditionary Strike Group and conducting amphibious landings.		Typical Duration 10 days
Long Description	This exercise conducts over the horizon, ship to objective maneuver of the elements of the Expeditionary Strike Group and the Amphibious Marine Air Ground Task Force. The exercise utilizes all elements of the task force to secure the battlespace (air, land, and sea), maneuver to and seize the objective, and conduct self-sustaining operations ashore with continual logistic support. Tinian is the primary training area for this exercise; however, elements of the exercise may be rehearsed nearshore and on Guam. The landing force is supported by all of the battalions assigned to a Marine Expeditionary Unit.		
Typical Components	Platforms: Amphibious warfare ship, rotary-wing aircraft, surface combatant Targets: None Systems being Trained/Tested: Sonar systems		
Standard Operating Procedures (Section 2.3.3)	Aircraft safety Towed in-water device safety Vessel safety		Typical Locations
			Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area to nearshore Mariana Islands Range Complex Tinian; Guam; Rota; Saipan; Farallon de Medinilla Bays/Estuaries/Pierside: Apra Harbor; Tinian; Guam
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Weapons noise Explosive: In-Air Explosions In-Water Explosions	Physical Disturbance and Strike: Aircraft and Aerial Targets Vessel and in-water devices Military expended materials Ingestion: Military Expended Materials – Other than Munitions	Energy: In-Air Electromagnetic Devices In-Water Electromagnetic Devices Entanglement: Decelerators/Parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Explosives Other materials Chemicals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne Acoustics	Public Health and Safety: Underwater energy In-air energy Physical interactions

Major Training Exercises – Medium Coordinated Anti-Submarine Warfare			
Marine Air Ground Task Force Exercise (Amphibious) -Battalion			
Military Expended Material	Ingestible Material: None Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire	Military Recoverable Material	None
Sonar and Other Transducer Bins	Mid-Frequency: MF1 MF4 MF12	Anti-Submarine Warfare: ASW3	
Explosive Bins	None. Presented in appropriate worksheets for unit-level activities that could be conducted during this exercise.		
Procedural Mitigation Measures	Acoustic Stressors: (Section 5.3.2) Active sonar	Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement Towed in-water devices	
Assumptions Used for Analysis	All military expended materials, ordnance, and explosive use is included in individual events. Additional activities utilizing sources not listed in the Sonar and Other Transducer Bins section above may occur during this exercise. All acoustic sources which may be used during training and testing activities have been accounted for in the modeling and analysis presented in this SEIS/OEIS.		

A.1.2 AIR WARFARE TRAINING

Air warfare is the primary mission area that addresses combat operations by air and surface forces against hostile aircraft. Navy ships contain an array of modern anti-aircraft weapon systems, including naval guns linked to radar-directed fire-control systems, surface-to-air missile systems, and radar-controlled guns for close-in point defense. Strike/fighter aircraft carry anti-aircraft weapons, including air-to-air missiles and aircraft guns. Air warfare training encompasses events and exercises to train ship and aircraft crews in employment of these weapons systems against simulated threat aircraft or targets. Air warfare training includes surface-to-air gunnery, surface-to-air and air-to-air missile exercises, and aircraft force-on-force combat maneuvers.

A.1.2.1 Air Combat Maneuver

Air Warfare			
Air Combat Maneuver (ACM)			
Short Description	Aircrews engage in flight maneuvers designed to gain a tactical advantage during combat.	Typical Duration 1–2 hours	
Long Description	Basic flight maneuvers in which fixed-wing aircrew engage in offensive and defensive maneuvering against each other. During air combat maneuver engagements, no ordnance is fired, however, countermeasures such as chaff and flares may be used. These maneuvers typically involve two aircraft; however, based upon the training requirement, air combat maneuver exercises may involve over a dozen aircraft.		
Typical Components	Platforms: Fixed-wing aircraft Targets: Aircraft targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise	Physical Disturbance and Strike: Aircraft and aerial targets	Energy: In-air electromagnetic devices
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Airborne acoustics Physical disturbance and strike	Public Health and Safety: None
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	None		
Assumptions Used for Analysis	No munitions fired. Flare and chaff may be used. All flare and chaff accounted for in flare exercise and chaff exercise events.		
	This activity occurs greater than 12 NM from land (FDM excepted).		

A.1.2.2 Air Defense Exercise

Air Warfare			
Air Defense Exercise (ADEX)			
Short Description	Aircrew and ship crews conduct defensive measures against threat aircraft or simulated missiles.	Typical Duration	
		1–4 hours	
Long Description	Aircrew and ship personnel perform measures designed to defend against attacking threat aircraft or missiles or reduce the effectiveness of such attack. This exercise involves full detection through engagement sequence. Aircraft operate at varying altitudes and speeds. This exercise may include Air Intercept Control exercises that involve aircraft controllers on vessels, in fixed-wing aircraft, or at land-based locations use search radars to track and direct friendly aircraft to intercept the threat aircraft, and Detect to engage exercises in which personnel on vessels use search radars in the process of detecting, classifying, and tracking enemy aircraft or missiles up to the point of engagement.		
Typical Components	Platforms: Surface vessels, fixed-wing aircraft Targets: Aircraft targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices	Energy: In-Air Electromagnetic Devices
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		

Air Warfare	
Air Defense Exercise (ADEX)	
Assumptions Used for Analysis	No munitions are fired.

A.1.2.3 Air Intercept Control

Air Warfare			
Air Intercept Control (AIC)			
Short Description	Aircrew and air controllers conduct aircraft intercepts of other aircraft.	Typical Duration 1–2 hours	
Long Description	Fighter jet aircrews maneuver to defend against threat aircraft. An event involves two or more fighter aircraft.		
Typical Components	Platforms: Fixed-wing aircraft Targets: Aircraft Targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Ingestion: None	Energy: None Entanglement: None
	Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Airborne acoustics Physical Disturbance and Strike	Public Health and Safety: None
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	None		
Assumptions Used for Analysis	No munitions are fired. This activity would occur greater than 12 NM from land (FDM excepted).		

A.1.2.4 Gunnery Exercise Air-to-Air Medium-Caliber

Air Warfare			
Gunnery Exercise Air-to-Air Medium-Caliber (GUNEX A-A)			
Short Description	Fixed-wing aircrews fire medium-caliber guns at air targets.	Typical Duration 1–2 hours	
Long Description	Fixed-wing aircrews maneuver aircraft in a gunnery pattern to achieve a weapons firing solution with integrated medium-caliber guns. Typically involves two or more fixed-wing aircraft and a target banner towed by a contract aircraft (e.g., Lear jet). The target banner is recovered after the event.		
Typical Components	Platforms: Fixed-wing aircraft Targets: Air targets Systems being Trained/Tested: None		
Standard Operating Procedures (Section 2.3.3)	Aircraft safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Weapons noise	Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials	Energy: In-air electromagnetic devices
	Explosive: None	Ingestion: Military expended materials – munitions	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: Medium-caliber projectiles (non-explosive), medium-caliber casings Non-Ingestible Material: None	Military Recoverable Material	Air target (towed target)
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	None		

Air Warfare	
Gunnery Exercise Air-to-Air Medium-Caliber (GUNEX A-A)	
Assumptions Used for Analysis	This activity is conducted at an altitude of 15,000 feet and above, during the daytime, and beyond 12 nautical miles from shore (FDM excepted). A towed air target is a banner target and will be recovered. Only non-explosive munitions used.

A.1.2.5 Gunnery Exercise Surface-to-Air Large Caliber

Air Warfare			
Gunnery Exercise Surface-to-Air Large-Caliber (GUNEX S-A)			
Short Description	Surface ship crews fire large-caliber guns at air targets.	Typical Duration	
		Up to 3 hours	
Long Description	<p>Surface ship crews defend against threat aircraft or missiles with large-caliber guns to disable or destroy the threat.</p> <p>An event involves one ship and a simulated threat aircraft or missile that is detected by the ship's radar. Large-caliber guns fire explosive and non-explosive projectiles at the threat before it reaches the ship. The target is towed by a contract air services jet.</p>		
Typical Components	<p>Platforms: Surface combatant</p> <p>Targets: Air targets</p> <p>Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Weapons noise Vessel noise</p> <p>Explosive: In-air explosions</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Other materials Explosives	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions In-air energy
Military Expended Material	<p>Ingestible Material: Large caliber projectile (explosive) fragments</p> <p>Non-Ingestible Material: Large caliber casings, Large caliber projectile (non-explosive)</p>	Military Recoverable Material	Air targets (towed target)
Sonar and Other Transducer Bins	None		
Explosive Bins	None. Only in-air detonations.		

Air Warfare		
Gunnery Exercise Surface-to-Air Large-Caliber (GUNEX S-A)		
Procedural Mitigation Measures	Acoustic Stressors (<i>Section 5.3.2</i>) Weapons firing noise	Physical Disturbance and Strike Stressors: (<i>Section 5.3.4</i>) Vessel movement
Assumptions Used for Analysis	The target is a fiberglass-finned target that is towed approximately 3 nautical miles behind the towing aircraft. All projectiles are assumed to be non-explosive or explode in-air well above the water's surface. This activity would occur greater than 12 NM from land (FDM excepted).	

A.1.2.6 Gunnery Exercise Surface-to-Air Medium-Caliber

Air Warfare			
Gunnery Exercise Surface-to-Air Medium-Caliber (GUNEX S-A)			
Short Description	Surface ship crews fire medium-caliber guns at air targets.	Typical Duration 1–2 hours	
Long Description	<p>Surface ship crews defend against threat aircraft or missiles with medium-caliber guns to disable or destroy the threat.</p> <p>An event involves one ship and a simulated threat aircraft or anti-ship missile that is detected by the ship's radar. Medium-caliber guns fire non-explosive projectiles to disable or destroy the threat before it reaches the ship. The target is towed by a contract air services jet.</p>		
Typical Components	<p>Platforms: Aircraft carrier, amphibious warfare ship, surface combatant</p> <p>Targets: Air targets</p> <p>Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Vessel noise Weapons noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	<p>Ingestible Material: Medium-caliber projectiles (non-explosive), medium-caliber casings</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	Air targets (towed target)
Sonar and Other Transducer Bins	None		
Explosive Bins	None.		
Procedural Mitigation Measures	None		

Air Warfare	
Gunnery Exercise Surface-to-Air Medium-Caliber (GUNEX S-A)	
Assumptions	The target is a fiberglass finned target that is towed approximately 3 nautical miles behind the towing aircraft.
Used for Analysis	This activity would occur greater than 12 NM from land (FDM excepted).

A.1.2.7 Missile Exercise Air-to-Air

Air Warfare			
Missile Exercise Air-to-Air (MISSILEX A-A)			
Short Description	Fixed-wing aircrews fire air-to-air missiles at air targets.	Typical Duration 1–2 hours	
Long Description	An event involves two or more fixed-wing aircraft and a target. Missiles are either high-explosive warheads or non-explosive practice munitions. The target is an unmanned aerial target drone a tactical air-launched decoy, or a parachute suspended illumination flare. Target drones deploy parachutes and are recovered by small boat or rotary-wing aircraft. Missiles may also be employed when training against threat missiles. These events typically occur at high altitudes.		
Typical Components	Platforms: Fixed-wing aircraft, support craft Targets: Air targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Vessel safety Target Deployment and Retrieval Safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Weapons noise Explosive: In-air explosions	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: Decelerators/parachutes
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Chemicals Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: Missile (explosive) fragments Non-Ingestible Material: Air target (decoy), illumination flares, decelerators/parachutes – medium and large, end caps, o-ring	Military Recoverable Material	Air targets (drones, air-launched decoy, or illumination flare, see Figure A-1, Figure A-2, Figure A-3)
Sonar and Other Transducer Bins	None		

Air Warfare	
Missile Exercise Air-to-Air (MISSILEX A-A)	
Explosive Bins	None. Only in-air detonations.
Procedural Mitigation Measures	None
Assumptions Used for Analysis	Assumes that all missiles are explosive, although non-explosive practice munitions may be used. All missiles explode at high altitude. All propellant and explosives are consumed. Tactical air-launched decoys and illumination flares are expended and not recovered. This activity would occur greater than 12 NM from land (FDM excepted).



Figure A-1: BQM-74 (Aerial Target)



Figure A-2: LUU-2B/B Illuminating Flare (Aerial Target)



Figure A-3: Tactical Air-Launched Decoy (Aerial Target)

A.1.2.8 Missile Exercise Surface-to-Air

Air Warfare			
Missile Exercise Surface-to-Air (MISSILEX S-A)			
Short Description	Surface ship crews fire surface-to-air missiles at air targets.	Typical Duration 1–2 hours	
Long Description	<p>Surface ship crews defend against threat missiles and aircraft with ship-launched surface-to-air missiles.</p> <p>The event involves a simulated threat aircraft or anti-ship missile which is detected by the ship's radar. Ship-launched surface-to-air missiles are fired (high-explosive) to disable or destroy the threat. The target typically is a remote-controlled drone. Surface-to-air missiles may also be used to train against land attack missiles.</p>		
Typical Components	<p>Platforms: Aircraft carrier, amphibious warfare ship, rotary-wing aircraft, surface combatant Targets: Air targets Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Vessel noise Weapons noise</p> <p>Explosive: In-air explosions</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: Decelerators/parachutes</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals Chemicals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	<p>Ingestible Material: Missile (explosive) fragments</p> <p>Non-Ingestible Material: decelerators/parachutes – medium and large</p>	Military Recoverable Material	Air targets (decoy or drone)
Sonar and Other Transducer Bins	None		
Explosive Bins	None. Only in-air detonations.		

Air Warfare	
Missile Exercise Surface-to-Air (MISSILEX S-A)	
Procedural Mitigation Measures	<p>Acoustic Stressors (<i>Section 5.3.2</i>) Weapons firing noise</p> <p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement</p>
Assumptions Used for Analysis	<p>Assumes that all surface-to-air missiles are high-explosive. Missile explodes well above surface. All explosive and propellant are consumed. Target typically not destroyed, unmanned drones are recovered when possible.</p> <p>This activity would occur greater than 12 NM from land (FDM exempt).</p>

A.1.3 AMPHIBIOUS WARFARE TRAINING

Amphibious warfare is a type of naval warfare involving the utilization of naval firepower, logistics, and Marine Corps landing forces to project military power ashore. Amphibious warfare encompasses a broad spectrum of activities involving maneuver from the sea to objectives ashore, ranging from reconnaissance or raid missions involving a small unit, to large-scale amphibious operations involving over one thousand Marines and Sailors, and multiple ships and aircraft embarked in a strike group.

Amphibious warfare training includes tasks at increasing levels of complexity, from individual, crew, and small unit events to large task force exercises. Individual and crew training include the operation of amphibious vehicles and naval gunfire support training. Small-unit training activities include shore assaults, boat raids, airfield or port seizures, and reconnaissance. Larger-scale amphibious exercises involve ship-to-shore maneuver, shore bombardment and other naval fire support, and air strike and close air support training.

A.1.3.1 Amphibious Rehearsal, No Landing

Amphibious Warfare			
Amphibious Rehearsal, No Landing			
Short Description	Amphibious shipping, landing craft, and aviation elements of the Marine Air Ground Task Force rehearse amphibious landing operations without conducting an actual landing on shore.		Typical Duration 1–2 days
Long Description	Amphibious vessels maneuver to position, flood well decks, and launch and recover landing craft including hovercraft, combat rubber raiding craft, armored amphibious craft, landing craft ship, and task force aircraft in assault landing rehearsals. Assault craft form landing waves and approach shore without landing.		
Typical Components	Platforms: Amphibious warfare ship, fleet support ship, small boat Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety		Typical Locations
			Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area and Nearshore Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	Acoustic: Vessel noise Explosive: None	Physical Disturbance and Strike: Vessel and in-water devices Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None

Amphibious Warfare	
Amphibious Rehearsal, No Landing	
Sonar and Other Transducer Bins	None
Explosive Bins	None
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	Amphibious vehicles train to launch from, and return to, amphibious ships. Amphibious vehicles approach surf zone but turn away before entering surf zone or landing zone. Typical participants: amphibious vessels (e.g., LHA or LHD, LPD, LSD), landing craft (Landing Craft, Air Cushioned; Landing Craft, Utility), and amphibious assault vehicles.

A.1.3.2 Amphibious Assault

Amphibious Warfare			
Amphibious Assault			
Short Description	Large unit forces move ashore from amphibious ships at sea for the immediate execution of inland objectives.	Typical Duration	
		Up to 2 weeks	
Long Description	<p>Landing forces embarked in vessels, craft, or tilt-rotor and helicopters launch an attack from the sea onto a hostile shore. Amphibious assault is conducted for the purposes of prosecuting further combat operations, obtaining a site for an advanced naval or airbase, or denying the enemy use of an area.</p> <p>Unit-Level Training exercises involve one or more amphibious ships, and their associated watercraft and aircraft, to move personnel and equipment from ship to shore without the command and control and supporting elements involved in a full-scale event. The goal is to practice loading, unloading, and movement, and to develop the timing required for a full-scale exercise.</p>		
Typical Components	<p>Platforms: Amphibious warfare ship, fixed-wing aircraft, rotary-wing aircraft, tilt-rotor aircraft, small boat Targets: None Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Amphibious assault and amphibious raid procedures	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex Tinian; Guam	Bays/Estuaries/Pierside: Tinian; Guam
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Vessel noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices</p> <p>Ingestion: None</p>	<p>Energy: None</p> <p>Entanglement: None</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: None</p>	
Stressors to Human Resources	<p>Cultural Resources: Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Physical disturbance and strike</p>	<p>Public Health and Safety: Physical interactions</p>
Military Expended Material	<p>Ingestible Material: None</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	<p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement</p>		

Amphibious Warfare	
Amphibious Assault	
Assumptions Used for Analysis	Typical event: 1–3 amphibious ships (e.g., LHA or LHD, LPD, LSD); 2-8 landing craft (landing craft, air cushioned; landing craft, utility); 4–14 amphibious assault vehicles; up to 22 aircraft (e.g., MH-53, H-46/MV-22, AH-1, UH-1, AV-8); a Marine Expeditionary Unit (2,200 Marines).

A.1.3.3 Amphibious Raid

Amphibious Warfare			
Amphibious Raid			
Short Description	Small unit forces move from amphibious ships at sea for a specific short-term mission. These are quick operations with as few personnel as possible.	Typical Duration	
		4–8 hours	
Long Description	<p>Small unit forces swiftly move from amphibious vessels at sea into hostile territory for a specific mission, including a planned withdrawal. Raids are conducted to inflict loss or damage, secure information, create a diversion, confuse the enemy, or capture or evacuate individuals or material. Amphibious raid forces are kept as small as possible to maximize stealth and speed of the operation.</p> <p>An event may employ assault amphibian vehicle units, small boats, combat swimmers, small unit live-fire and non-live-fire operations. Surveillance or reconnaissance unmanned surface and aerial vehicles may be used during this event.</p> <p>Events are also conducted to train in the delivery of humanitarian assistance to remote locations or areas requiring assistance after natural disasters.</p>		
Typical Components	<p>Platforms: Amphibious warfare ship, small boat, unmanned aerial system-fixed wing Targets: Land Targets Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Amphibious assault and amphibious raid procedures	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex Tinian; Guam; Rota	Bays/Estuaries/Pierside: Tinian; Guam
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices	Energy: None
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		

Amphibious Warfare	
Amphibious Raid	
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	Weapons firing (if conducted) during this event is discussed in appropriate activity descriptions (e.g., surface-to-surface and air-to-surface small-caliber gunnery exercises). During the conduct of amphibious raids personnel may exit the watercraft in the surf zone and divers and combat swimmers will stand in the surf zone and walk onto the beach.

A.1.3.4 Humanitarian Assistance Operations/Disaster Relief Operations

Amphibious Warfare			
Humanitarian Assistance Operations/Disaster Relief Operations			
Short Description	Military units provide humanitarian assistance in times of disaster.	Typical Duration Up to 2 weeks	
Long Description	Military units provide humanitarian assistance and disaster relief in times of natural disaster. Ships, aircraft, and amphibious landing crafts could be expected to participate in this operation during day or night. The rapid movement of relief supplies and logistics from ships and a logistic “hub” during extreme conditions is practiced during this event.		
Typical Components	Platforms: Amphibious warfare ship, fixed-wing aircraft, rotary-wing aircraft, tilt-rotor aircraft, and small boat Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex; Guam; Tinian; Rota; Saipan	Bays/Estuaries/Pierside: Guam; Tinian; Rota; Saipan
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices	Energy: In-air electromagnetic devices
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	Sea-, land-, and air-based activity. Logistics and aid distributed across island region via “hub” location.		

A.1.3.5 Naval Surface Fire Support Exercise – Land-Based Target

Amphibious Warfare			
Naval Surface Fire Support Exercise – Land-Based Target			
Short Description	Surface ship crews fire large-caliber guns at land-based targets in support of forces ashore.	Typical Duration 4–6 hours	
Long Description	Surface ship crews use large-caliber guns to support forces ashore. One or more ships position themselves offshore the target area and a land-based spotter relays type and exact location of the target. After observing the fall of the shot, the spotter relays any adjustments needed to reach the target. Once the rounds are on target, the spotter requests a sufficient number to effectively destroy the target. This exercise occurs on land ranges where high-explosive and non-explosive practice ordnance is authorized and may be supported by target shapes on the ground.		
Typical Components	Platforms: Surface combatant Targets: Land targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Weapons firing safety Farallon de Medinilla Access Restrictions	Typical Locations	
		Range Complexes/Testing Ranges: R-7201 and Farallon de Medinilla	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Weapons noise Explosive: In-air explosions	Physical Disturbance and Strike: Vessels and in-water devices Ingestion: None	Energy: In-water electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: Large caliber casings	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement	
Assumptions Used for Analysis	Projectile impact is on land; however, potential nearshore in-water impacts are considered.		

A.1.3.6 Noncombatant Evacuation Operation

Amphibious Warfare			
Noncombatant Evacuation Operation			
Short Description	Military units evacuate noncombatants from hostile or unsafe areas	Typical Duration 5 days	
Long Description	Military units evacuate noncombatants from hostile or unsafe areas to safe havens. Non-Combatant Evacuation Operation is conducted by military units, usually operating in conjunction with Navy ships and aircraft. Noncombatants are evacuated when their lives are endangered by war, civil unrest, or natural disaster. Expeditionary units train for evacuations in hostile environments that may require the use of force. Helicopters, landing crafts, and combat swimmers could be expected to participate in this operation during day or night.		
Typical Components	Platforms: Amphibious warfare ship, surface vessels, fixed-wing aircraft, rotary-wing aircraft, tilt rotor aircraft, unmanned aerial vehicles Targets: None Systems Being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety Unmanned aerial and underwater vehicle procedures	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex Guam; Tinian; Rota	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosives: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Ingestion: None	Energy: In-air electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Chemicals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
In-Water Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	Sea-, land-, and air-based activity		

A.1.3.7 Special Purpose Marine Air Ground Task Force Exercise

Amphibious Warfare			
Special Purpose Marine Air-Ground Task Force Exercise			
Short Description	Typically a 10-day exercise similar to Marine Air Ground Task Force (Amphibious) – Battalion, but task organized to conduct a specific mission (e.g., Humanitarian Assistance, Disaster Relief, Noncombatant Evacuation Operations).	Typical Duration	
		10 days	
Long Description	Special Purpose Marine Air Ground Task Force, operating in conjunction with Navy ships and aircraft, typically conduct humanitarian and disaster relief, or evacuation of noncombatants from foreign countries to safe havens or back to the United States when their lives are endangered by war, civil unrest, or natural disaster. Normally, there is no opposition from the host country; however, Marine Corps Special Purpose Marine Air Ground Task Force or Marine Expeditionary Unit (Special Operations Capable) normally trains for evacuation under a circumstance that requires the use of force in a hostile environment. Much like a raid, the event involves the rapid introduction of forces, the evacuation of noncombatants, and a planned withdrawal. The activity is conducted during day or night.		
Typical Components	Platforms: Amphibious warfare ship, fixed-wing aircraft, rotary-wing aircraft, tilt-rotor aircraft, small boat Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area to nearshore; Mariana Islands Range Complex; Tinian; Guam; Rota; Saipan	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Weapons noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Military expended materials	Energy: None
	Explosive: In-air explosions In-water explosions	Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals Chemicals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike Explosives	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne acoustics	Public Health and Safety: Physical interactions Underwater energy In-Air Energy
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None

Amphibious Warfare	
Special Purpose Marine Air-Ground Task Force Exercise	
Sonar and Other Transducer Bins	None
Explosive Bins	None
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	Impacts from land based targeting are not analyzed. Only the at-sea components of this activity are analyzed in this document. Additional activities utilizing sources not listed in the Sonar and Other Transducer Bins section above may occur during this exercise. All acoustic sources that may be used during training and testing activities have been accounted for in the modeling and analysis presented in this EIS/OEIS.

A.1.3.8 Unmanned Aerial Vehicle – Intelligence, Surveillance, and Reconnaissance

Amphibious Warfare			
Unmanned Aerial Vehicle – Intelligence, Surveillance, and Reconnaissance			
Short Description	Military units employ unmanned aerial vehicles to launch, operate, and gather intelligence for specified amphibious missions.		Typical Duration
			Varies
Long Description	Unmanned aerial vehicles may be launched from ships, boats, submarines, or ground and are used to gather tactical or theater-level intelligence.		
Typical Components	Platforms: Fixed-wing aircraft, unmanned aerial system – fixed wing, unmanned aerial system – rotary wing Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Unmanned aerial and underwater vehicle procedures		Typical Locations
			Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area
Stressors to Biological Resources	Acoustic: Aircraft noise	Physical Disturbance and Strike: Aircraft and aerial targets	Energy: None
	Explosives: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne acoustics	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
In-Water Explosive Bins	None		
Procedural Mitigation Measures	None		
Assumptions Used for Analysis	Sea-, land-, and air-based activity. Unmanned Aerial vehicles are typically recovered; however, units may be damaged and lost. Small expendable units may also be used.		

A.1.4 ANTI-SUBMARINE WARFARE TRAINING

Anti-submarine warfare involves helicopter and maritime patrol aircraft, ships, and submarines. These units operate alone or in combination to locate, track, and neutralize submarines. Controlling the undersea battlespace is a unique naval capability and a vital aspect of sea control. Undersea battlespace dominance requires proficiency in anti-submarine warfare. Every deploying strike group and individual surface combatant must possess this capability.

Various types of active and passive sonar are used by the Navy to determine water depth, and identify, track, and target submarines. Passive sonar “listens” for sound waves by using underwater microphones, called hydrophones, which receive, amplify, and process underwater sounds. No sound is introduced into the water when using passive sonar. Passive sonar can indicate the presence, character, and movement of submarines. However, passive sonar provides only a bearing (direction) to a sound-emitting source; it does not provide an accurate range (distance) to the source. Active sonar is needed to locate objects because active sonar provides both bearing and range to the detected contact (such as an enemy submarine).

The Navy’s anti-submarine warfare training plan, including the use of active sonar in at-sea training scenarios, includes multiple levels of training. Individual-level anti-submarine warfare training addresses basic skills such as detection and classification of contacts, distinguishing discrete acoustic signatures including those of ships, submarines, and marine life, and identifying the characteristics, functions, and effects of controlled jamming and evasion devices.

More advanced, integrated anti-submarine warfare training exercises involving active sonar are conducted in coordinated, at-sea operations during training events involving submarines, ships, aircraft, and helicopters. This training integrates the full anti-submarine warfare continuum from detecting and tracking a submarine to attacking a target using either exercise torpedoes or simulated weapons. Training events include detection and tracking exercises against “enemy” submarine contacts; torpedo employment exercises against the target; and exercising command and control tasks in a multi-dimensional battlespace.

A.1.4.1 Torpedo Exercise – Helicopter

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Exercise – Helicopter (TORPEX)			
Short Description	Helicopter crews search for, track, and detect submarines. Recoverable air launched torpedoes are employed against submarine targets.	Typical Duration	
		2–5 hours	
Long Description	Helicopters using sonobuoys and dipping sonar search for, detect, classify, localize, and track a simulated threat submarine with the goal of determining a firing solution that could be used to launch a torpedo and destroy the submarine. The exercise may be conducted on a portable underwater tracking range. Sonobuoys (both passive and active) are typically employed by a helicopter operating at altitudes below 3,000 feet (ft.). Dipping sonar (both passive and active) is employed from an altitude of about 50 ft. after the search area has been narrowed based on the sonobuoy search. The anti-submarine warfare target used for this exercise may be a MK-39 Expendable Mobile Anti-submarine Warfare Training Target, a MK-30 target, or a live submarine. This exercise may involve a single aircraft, or occur during a coordinated larger exercise involving multiple aircraft and ships, including a major range event. Unmanned aerial systems, such as the MQ-8 Fire Scout, may also be used. The exercise torpedo is recovered by a special recovery helicopter or small craft. The preferred range for this exercise is an instrumented underwater range, but it may be conducted anywhere within the Study Area depending on training requirements and available assets.		
Typical Components	Platforms: Rotary-wing aircraft, unmanned aerial system - rotary wing, surface vessels, small boats Targets: Sub-surface targets Systems being Trained/Tested: Mid-frequency sonar, torpedoes		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Unmanned aerial and underwater vehicle procedures Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: Decelerators/parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Chemicals Metals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Exercise – Helicopter (TORPEX)			
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, expendable transponder anchors, lightweight torpedo accessories, sonobuoy (non-explosive), sonobuoy wires, sub-surface target (mobile)	Military Recoverable Material	Lightweight torpedo (non-explosive), sub-surface target (mobile)
Sonar and Other Transducer Bins	Mid-Frequency: MF4 MF5	Torpedoes: TORP1	
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement	
Assumptions Used for Analysis	This activity occurs greater than 3 NM from land. Submarine may provide service as the target.		

A.1.4.2 Torpedo Exercise – Maritime Patrol Aircraft

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Exercise – Maritime Patrol Aircraft (TORPEX)			
Short Description	Maritime patrol aircraft crews search for, track, and detect submarines. Recoverable air launched torpedoes are employed against submarine targets.	Typical Duration	
		2–8 hours	
Long Description	<p>Fixed-wing maritime patrol aircraft employ sonobuoys to search for, detect, classify, localize, and track a simulated threat submarine with the goal of determining a firing solution that could be used to launch a torpedo and destroy the submarine. The exercise may be conducted on a portable underwater tracking range.</p> <p>Sonobuoys (both passive and active) are typically employed by a maritime patrol aircraft operating at altitudes below 3,000 feet. However, sonobuoys may be released at higher altitudes. Sonobuoys are deployed in specific patterns based on the expected threat submarine and specific water conditions. Depending on these two factors, these patterns will cover many different size areas. For certain sonobuoys, tactical parameters of use may be classified. The anti-submarine warfare target used for this exercise may be a MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, a MK-30 target, or a live submarine. This exercise may involve a single aircraft, or be undertaken in the context of a coordinated larger exercise involving multiple aircraft and vessels, including a major range event. The exercise torpedo is recovered by helicopter or small craft. The preferred range for this exercise is an instrumented underwater range, but it may be conducted anywhere within the Study Area depending on training requirements and available assets.</p>		
Typical Components	<p>Platforms: Fixed-wing aircraft Targets: Sub-surface targets Systems being Trained/Tested: Mid-frequency sonar, torpedoes</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Aircraft noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials Vessels and in-water devices</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: Decelerators/parachutes Wires and cables</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Chemicals Metals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Exercise – Maritime Patrol Aircraft (TORPEX)			
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, lightweight torpedo accessories, sonobuoy (non-explosive), sonobuoy wires, sub-surface target (mobile)	Military Recoverable Material	Lightweight torpedo (non-explosive), sub-surface target (mobile)
Sonar and Other Transducer Bins		Mid-Frequency: MF5	Torpedoes: TORP1
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: (Section 5.3.2) Active sonar		
Assumptions Used for Analysis	Submarine may provide service as the target. If target is air-dropped, one parachute per target. This activity occurs greater than 3 NM from land.		

A.1.4.3 Torpedo Exercise – Submarine

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Exercise – Submarine (TORPEX)			
Short Description	Submarine crews search for, track, and detect submarines. Exercise torpedoes are used during this event.	Typical Duration	
		8 hours	
Long Description	<p>Submarine crews search for, detect and track a threat submarine to develop firing position to launch a torpedo. A single submerged submarine operates at slow speeds and various depths while using its hull mounted or towed array sonar to track a threat submarine. While passive sonar is most typically used for this training event, some active sonar may be used on occasion. Non-explosive exercise torpedoes may also be fired during training.</p> <p>This exercise may involve a single submarine, or be undertaken in the context of a coordinated larger exercise involving multiple aircraft, ships, and submarines, including a major range event. The exercise torpedo is recovered by helicopter or small craft. The preferred range for this exercise is an instrumented underwater range, but it may be conducted anywhere within the Study Area depending on training requirements and available assets.</p>		
Typical Components	<p>Platforms: Submarines, support boat, support aircraft Targets: Sub-surface targets Systems being Trained/Tested: Mid-frequency and high-frequency sonar, torpedoes</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Vessel noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – other than munitions</p>	<p>Energy: None</p> <p>Entanglement: Wires and cables</p>
Stressors to Physical Resources	Air Quality: None	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	<p>Ingestible Material: None</p> <p>Non-Ingestible Material: Acoustic countermeasures, expended bathythermograph, expended bathythermograph wire, guidance wire, heavyweight torpedo accessories</p>	Military Recoverable Material	Heavyweight (non-explosive) torpedo, sub-surface target (mobile)
Sonar and Other Transducer Bins	Anti-Submarine Warfare: ASW4	High Frequency: HF1	Mid-Frequency: MF3
	Torpedoes: TORP2		

Anti-Submarine Warfare							
Anti-Submarine Warfare Torpedo Exercise – Submarine (TORPEX)							
Explosive Bins	None						
Procedural Mitigation Measures	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Acoustic Stressors: <i>(Section 5.3.2)</i></td> <td style="width: 50%;">Physical Disturbance and Strike Stressors:</td> </tr> <tr> <td>Active sonar</td> <td><i>(Section 5.3.4)</i></td> </tr> <tr> <td></td> <td>Vessel movement</td> </tr> </table>	Acoustic Stressors: <i>(Section 5.3.2)</i>	Physical Disturbance and Strike Stressors:	Active sonar	<i>(Section 5.3.4)</i>		Vessel movement
Acoustic Stressors: <i>(Section 5.3.2)</i>	Physical Disturbance and Strike Stressors:						
Active sonar	<i>(Section 5.3.4)</i>						
	Vessel movement						
Assumptions Used for Analysis	<p>Torpedoes are recovered.</p> <p>Guidance wire has a low breaking strength and breaks easily. Weights and flex tubing sink rapidly.</p> <p>This activity occurs greater than 3 NM from land.</p>						

A.1.4.4 Torpedo Exercise – Surface

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Exercise – Surface (TORPEX)			
Short Description	Surface ship crews search for, track, and detect submarines. Exercise torpedoes are used during this event.	Typical Duration	
		2–5 hours	
Long Description	<p>Surface ships search for, detect, and track threat submarines to determine a firing position to launch a torpedo and attack the submarine. The exercise may be conducted on a portable underwater tracking range. A surface ship operates at slow speeds while employing hull mounted or towed array sonar. Passive or active sonar is employed depending on the type of threat submarine, the tactical situation, and environmental conditions. The anti-submarine warfare target used for this exercise is a MK-39 Expendable Mobile Anti-Submarine Warfare (ASW) Training Target, MK-30 Target, or live submarine. This exercise may involve a single ship, or be undertaken in the context of a coordinated larger exercise involving multiple aircraft, ships, and submarines, including a major range event.</p> <p>The exercise torpedo is recovered by helicopter or small craft. The preferred area for this exercise is an instrumented underwater range, but it may be conducted anywhere within the Study Area depending on training requirements and available assets.</p>		
Typical Components	<p>Platforms: Surface combatant Targets: Sub-surface targets Systems being Trained/Tested: Mid-frequency sonar, torpedoes</p>		
Standard Operating Procedures (Section 2.3.3)	Towed in-water device safety Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Vessel noise	Physical Disturbance and Strike: Vessels and in-water devices Military expended materials	Energy: In-air electromagnetic devices
	Explosive: None	Ingestion: Military expended materials – other than munitions	Entanglement: Decelerator/Parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants		Sediments and Water Quality: Metals
	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	Ingestible Material: Decelerators/parachutes - small	Military Recoverable Material	Lightweight torpedo (non-explosive), sub-surface target (mobile)
	Non-Ingestible Material: Expendable bathythermograph, expended bathythermograph wire, lightweight torpedo accessories, sonobuoy (non-explosive), sonobuoy wires		

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Exercise – Surface (TORPEX)			
Sonar and Other Transducer Bins	Anti-Submarine Warfare: ASW3	Mid-Frequency: MF1 MF5	Torpedoes: TORP1
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar		Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed In-water devices
Assumptions Used for Analysis	Submarines may provide service as the target. Torpedoes are recovered. This activity occurs greater than 3 NM from land.		

A.1.4.5 Tracking Exercise – Helicopter

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise – Helicopter (TRACKEX)			
Short Description	Helicopter crews search for, track, and detect submarines.	Typical Duration	
		2–4 hours	
Long Description	<p>Helicopters using sonobuoys and dipping sonar search for, detect, classify, localize, and track a simulated threat submarine with the goal of determining a firing solution that could be used to launch a torpedo and destroy the submarine.</p> <p>Sonobuoys (both passive and active) are typically employed by a helicopter operating at altitudes below 3,000 ft. Dipping sonar (both passive and active) is employed from an altitude of about 50 ft. after the search area has been narrowed based on the sonobuoy search.</p> <p>The anti-submarine warfare target used for this exercise may be a MK-39 Expendable Mobile Anti-submarine Warfare Training Target, a MK-30 target, or a live submarine. This exercise may involve a single aircraft, or occur during a coordinated larger exercise involving multiple aircraft and ships, including a major range event. Unmanned aerial systems, such as the MQ-8 Fire Scout, may also be used. The preferred range for this exercise is an instrumented range, but it may be conducted anywhere within the Study Area depending on training requirements and available assets.</p>		
Typical Components	<p>Platforms: Rotary-wing aircraft Targets: Sub-surface targets Systems being Trained/Tested: Mid Frequency Sonar (sonobuoys, dipping sonar)</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area Transit Corridor	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Aircraft noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: Decelerators/parachutes Wires and cables</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Chemicals Metals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise – Helicopter (TRACKEX)			
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, sonobuoy (non-explosive), sonobuoy wires, sub-surface target (mobile)	Military Recoverable Material	None
Sonar and Other Transducer Bins	Mid-Frequency: MF4 MF5		
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar		
Assumptions Used for Analysis	Submarines may provide service as the target. This activity occurs greater than 3 NM from land.		

A.1.4.6 Tracking Exercise – Maritime Patrol Aircraft

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft (TRACKEX)			
Short Description	Maritime patrol aircraft crews search for, track, and detect submarines.	Typical Duration 2–8 hours	
Long Description	<p>Fixed-wing maritime patrol aircraft employ sonobuoys to search for, detect, classify, localize, and track a simulated threat submarine with the goal of determining a firing solution that could be used to launch a torpedo and destroy the submarine.</p> <p>Sonobuoys (both passive and active) are typically employed by a maritime patrol aircraft operating at altitudes below 3,000 feet. However, sonobuoys may be released at higher altitudes. Sonobuoys are deployed in specific patterns based on the expected threat submarine and specific water conditions. Depending on these two factors, these patterns will cover many different size areas. For certain sonobuoys, tactical parameters of use may be classified. The anti-submarine warfare target used for this exercise may be a MK-39 Expendable Mobile Anti-Submarine Warfare (ASW) Training Target, a MK-30 target, or a live submarine. This exercise may involve a single aircraft, or be undertaken in the context of a coordinated larger exercise involving multiple aircraft and vessels, including a major range event.</p>		
Typical Components	<p>Platforms: Fixed-wing aircraft Targets: Sub-surface targets Systems being Trained/Tested: Mid-frequency sonar</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Target Deployment and Retrieval Safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Aircraft noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: Decelerators/parachutes Wires and cables</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Chemicals Metals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	<p>Ingestible Material: Decelerators/parachutes - small</p> <p>Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, sonobuoy (non-explosive), sonobuoy wires</p>	Military Recoverable Material	Sub-surface target (mobile)

Anti-Submarine Warfare	
Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft (TRACKEX)	
Sonar and Other Transducer Bins	Mid-Frequency: MF5
Explosive Bins	None
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar
Assumptions Used for Analysis	Submarine may provide service as the target. If target is air-dropped, one parachute per target. This activity occurs greater than 3 NM from land.

A.1.4.7 Tracking Exercise – Submarine

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise – Submarine (TRACKEX)			
Short Description	Submarine crews search for, track, and detect submarines.	Typical Duration	
		8 hours	
Long Description	Submarine crews search for, detect and track a threat submarine to develop firing position to launch a torpedo.		
	<p>A single submerged submarine operates at slow speeds and various depths while using its hull mounted or towed array sonar to track a threat submarine. Passive sonar is used almost exclusively. The target for this exercise is either an MK 39 expendable mobile anti-submarine warfare training target, MK 30 recoverable training target, or live submarine.</p> <p>This exercise could occur anywhere throughout the MITT Study Area. This exercise may involve a single submarine, or be undertaken in the context of a coordinated larger exercise involving multiple aircraft, ships, and submarines, including a major range event.</p>		
Typical Components	<p>Platforms: Submarines Targets: Sub-surface targets Systems being Trained/Tested: Mid-frequency and high-frequency sonar</p>		
Standard Operating Procedures (Section 2.3.3)	Vessel safety Target Deployment and Retrieval Safety	Typical Locations	
		<p>Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area Transit Corridor</p>	<p>Bays/Estuaries/Pierside: None</p>
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Vessel noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Vessel and in-water devices Military expended materials</p> <p>Ingestion: None</p>	<p>Energy: None</p> <p>Entanglement: Wires and cables</p>
	<p>Air Quality: None</p>	<p>Sediments and Water Quality: Metals</p>	
Stressors to Physical Resources			
Stressors to Human Resources	<p>Cultural Resources: Physical disturbance and strike</p>	<p>Socioeconomic Resources: Physical disturbance and strike</p>	<p>Public Health and Safety: Underwater energy Physical interactions</p>
Military Expended Material	<p>Ingestible Material: None</p>	Military Recoverable Material	Sub-surface target (mobile)
	<p>Non-Ingestible Material: Acoustic countermeasures, expended bathythermograph, expended bathythermograph wire</p>		
Sonar and Other Transducer Bins	<p>Anti-Submarine Warfare: ASW4</p>	<p>High-Frequency: HF1 HF3</p>	<p>Mid-Frequency: MF3</p>
Explosive Bins	None		

Anti-Submarine Warfare	
Anti-Submarine Warfare Tracking Exercise – Submarine (TRACKEX)	
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar
Assumptions Used for Analysis	This activity occurs greater than 3 NM from land.

A.1.4.8 Tracking Exercise – Surface

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise – Surface (TRACKEX)			
Short Description	Surface ship crews search for, track, and detect submarines.	Typical Duration	
		2–4 hours	
Long Description	<p>Surface ships search for, detect, and track threat submarines to determine a firing position to launch a torpedo and attack the submarine.</p> <p>A surface ship operates at slow speeds while employing sonobuoys, hull mounted sonar, or towed array sonar. Passive or active sonar is employed depending on the type of threat submarine, the tactical situation, and environmental conditions. The target for this exercise is either a MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, MK-30 Recoverable Training Target, or live submarine.</p> <p>Anti-Submarine Warfare (ASW) Tracking exercise – Ship could occur anywhere throughout the MITT Study Area. This exercise may involve a single ship, or be undertaken in the context of a coordinated larger exercise involving multiple aircraft, ships, and submarines, including a major range event.</p>		
Typical Components	<p>Platforms: Surface combatant</p> <p>Targets: Sub-surface targets</p> <p>Systems being Trained/Tested: Mid-frequency sonar</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Towed in-water device safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area Transit Corridor	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Vessel noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Military Expended Materials</p> <p>Ingestion: None</p>	<p>Energy: In-air electromagnetic devices In-water electromagnetic devices</p> <p>Entanglement: Wires and cables</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: None</p>	
Stressors to Human Resources	<p>Cultural Resources: Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: Underwater energy Physical interactions</p>
Military Expended Material	<p>Ingestible Material: None</p> <p>Non-Ingestible Material: Buoy (non-explosive), expended bathythermograph, expended bathythermograph wire, sub-surface target (mobile)</p>	Military Recoverable Material	Sub-surface target (mobile)

Anti-Submarine Warfare									
Anti-Submarine Warfare Tracking Exercise – Surface (TRACKEX)									
Sonar and Other Transducer Bins	<table border="0"> <tr> <td>Anti-Submarine Warfare:</td> <td>Mid-Frequency:</td> </tr> <tr> <td>ASW1 ASW3</td> <td>MF1 MF11</td> </tr> <tr> <td></td> <td>MF12</td> </tr> </table>	Anti-Submarine Warfare:	Mid-Frequency:	ASW1 ASW3	MF1 MF11		MF12		
Anti-Submarine Warfare:	Mid-Frequency:								
ASW1 ASW3	MF1 MF11								
	MF12								
Explosive Bins	None								
Procedural Mitigation Measures	<table border="0"> <tr> <td>Acoustic Stressors: <i>(Section 5.3.2)</i></td> <td>Physical Disturbance and Strike Stressors:</td> </tr> <tr> <td>Active sonar</td> <td><i>(Section 5.3.4)</i></td> </tr> <tr> <td></td> <td>Vessel movement</td> </tr> <tr> <td></td> <td>Towed in-water devices</td> </tr> </table>	Acoustic Stressors: <i>(Section 5.3.2)</i>	Physical Disturbance and Strike Stressors:	Active sonar	<i>(Section 5.3.4)</i>		Vessel movement		Towed in-water devices
Acoustic Stressors: <i>(Section 5.3.2)</i>	Physical Disturbance and Strike Stressors:								
Active sonar	<i>(Section 5.3.4)</i>								
	Vessel movement								
	Towed in-water devices								
Assumptions Used for Analysis	A submarine may provide service as the target. This activity occurs greater than 3 NM from land.								

A.1.4.9 Surface Warfare Advanced Tactical Training

Small Integrated Anti-Submarine Warfare Training			
Surface Warfare Advanced Tactical Training			
Short Description	Multiple ships and aircraft coordinate the use of sensors, including sonobuoys, to search, detect, and track a threat submarine. Surface Warfare Advanced Tactical Training exercises are not dedicated Anti-Submarine Warfare events and involve multiple warfare areas.	Typical Duration	
		Up to 15 days	
Long Description	<p>Surface Warfare Advanced Tactical Training (SWATT) is an intermediate training exercise designed primarily to increase operator proficiency and exercise combined force responses to surface warfare, anti-submarine warfare, air warfare and electromagnetic spectrum operations.</p> <p>Surface Warfare Advanced Tactical Training is conducted after a carrier strike group’s first Group Sail, and before Composite Training Unit Exercise, and consists of multiple surface warfare, anti-submarine, and air warfare live-fire events. Multiple ships and aircraft search for, locate, and track one submarine. Occurs once per carrier strike group training cycle.</p> <p>All other warfare area training conducted during SWATT was analyzed as unit-level training (gunnery, missile exercise, etc.).</p>		
Typical Components	<p>Platforms: Multiple Surface Combatants, fixed-wing aircraft, helicopters, unmanned vehicles, and submarines</p> <p>Targets: All surface, air and anti-submarine warfare targets (e.g., MK-30s, MK-39 Expendable Mobile Training Targets, recoverable or expendable floating targets)</p> <p>Systems being Trained/Tested: Mid-frequency sonar, high-frequency sonar, lightweight torpedoes, high-frequency acoustic modems</p>		
Standard Operating Procedures (Section 2.3.3)	Vessel safety Aircraft safety Weapons firing safety Towed in-water device safety	Typical Locations	
		Range Complexes/Testing Ranges: Hawaii Range Complex Southern California Range Complex	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Aircraft noise Vessel noise Weapons noise</p> <p>Explosive: In-air explosions</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: Wires and cables Decelerators/parachutes</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p> <p>Habitats: Physical disturbance and strike – military expended material</p>	<p>Sediments and Water Quality: Explosives Metals</p>	<p>Chemicals</p>
Stressors to Human Resources	<p>Cultural Resources: Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: Physical interactions</p>

Small Integrated Anti-Submarine Warfare Training			
Surface Warfare Advanced Tactical Training			
Military Expended Material	<p>Ingestible Material: Target fragments, small-caliber projectiles, small decelerators/parachutes</p> <p>Non-Ingestible Material: Sonobuoys, large and medium-caliber projectiles, acoustic countermeasures</p>	Military Recoverable Material	Anti-submarine warfare targets Air warfare targets Surface warfare targets
Sonar and Other Transducer Bins	<p>Mid-Frequency: MF1 MF1K MF3 MF4 MF5 MF6 MF12</p> <p>High-Frequency: HF1</p>	<p>Anti-Submarine Warfare: ASW2 ASW3 ASW4</p> <p>Torpedoes: TORP1 TORP2</p> <p>Acoustic Modems: Yes</p>	
Explosive Bins	None		
Procedural Mitigation Measures	<p>Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar</p>	<p>Physical Disturbance and Strike: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices</p>	
Assumptions Used for Analysis	All other warfare area training conducted during SWATT was analyzed as unit-level training (gunnery, missile exercise, etc.). All military expended materials, munitions, explosives and sonar use is included in individual unit-level events. Additional activities utilizing sources not listed in the Sonar and Other Transducer Bins section above may occur during this exercise. All acoustic sources which may be used during training and testing activities have been accounted for in the modeling and analysis presented in this EIS/OEIS.		

A.1.4.10 Small Joint Coordinated ASW exercise (Multi-Sail/GUAMEX)

Anti-Submarine Warfare			
Small Joint Coordinated ASW Exercise (Multi-Sail/GUAMEX)			
Short Description	Typically a 5-day exercise with multiple ships, aircraft and submarines integrating the use of their sensors, including sonobuoys, to search, detect, and track threat submarines.	Typical Duration	
		5 days	
Long Description	This is an Anti-Submarine Warfare (ASW) exercise conducted by the forward deployed Navy Strike Groups to sustain and assess their ASW proficiency while located in the Seventh Fleet area of operations. The exercise is designed to assess the Strike Groups' ability to conduct ASW in the most realistic environment, against the level of threat expected, in order to effect changes to both training and capabilities (e.g., equipment, tactics, and changes to size and composition) of U.S. Navy Strike Groups. The Strike Group receives significant sustainment training value in ASW and other warfare areas, as training is inherent in all at-sea exercises. Additional unit-level activities, such as MISSILEX may be conducted during these events.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, submarines, surface combatant Targets: Surface targets, sub-surface targets Systems being Trained/Tested: Mid-frequency Sonar		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Towed in-water device safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended material – other than munitions	Energy: In-air electromagnetic devices Entanglement: Decelerator/Parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Other materials Chemicals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne acoustics	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Acoustic countermeasures, aircraft stores and ballast, expended bathythermograph, expended bathythermograph wire, sonobuoy (non-explosive), sonobuoy wires, sub-surface target (mobile)	Military Recoverable Material	None

Anti-Submarine Warfare			
Small Joint Coordinated ASW Exercise (Multi-Sail/GUAMEX)			
Sonar and Other Transducer Bins	Anti-Submarine Warfare: ASW2 ASW3 ASW4	High-Frequency: HF1	Mid-Frequency: MF1 MF3 MF4 MF5 MF11 MF12
Explosive Bins	None. Presented in appropriate worksheets for unit-level activities that could be conducted during this exercise..		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices	
Assumptions Used for Analysis	This activity occurs at least 3 NM from land (FDM excepted). Additional activities utilizing sources not listed in the Sonar and Other Transducer Bins section above may occur during this exercise. All acoustic sources which may be used during training and testing activities have been accounted for in the modeling and analysis presented in this EIS.		

A.1.5 ELECTRONIC WARFARE

Electronic warfare is the mission area of naval warfare that aims to control use of the electromagnetic spectrum and to deny its use by an adversary. Typical electronic warfare activities include threat avoidance training, signals analysis for intelligence purposes, and use of airborne and surface electronic jamming devices to defeat tracking systems.

A.1.5.1 Counter Targeting Chaff Exercise – Aircraft

Electronic Warfare			
Counter Targeting Chaff Exercise – Aircraft			
Short Description	Fixed-wing aircraft and helicopter aircrews deploy chaff to disrupt threat targeting and missile guidance radars.	Typical Duration	
		1–2 hours	
Long Description	<p>Fixed-wing aircraft and helicopter aircrews deploy chaff to disrupt threat targeting and missile guidance radars.</p> <p>Fixed-wing aircraft and helicopter aircrews detect electronic targeting signals from threat radars or missiles, dispense chaff, and immediately maneuver to defeat the threat. The chaff cloud deceives the inbound missile and the aircraft clears away from the threat.</p> <p>Chaff is a radar reflector material made of thin, narrow, metallic strips cut in various lengths to elicit frequency responses, which deceive enemy radars. Chaff is employed to create a target that will lure enemy radar and weapons system away from the actual friendly platform.</p>		
Typical Components	<p>Platforms: Fixed-wing aircraft, rotary-wing aircraft</p> <p>Targets: None</p> <p>Systems being Trained/Tested: None</p>		
Standard Operating Procedures (Section 2.3.3)	Aircraft safety	Typical Locations	
		<p>Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area</p>	<p>Bays/Estuaries/Pierside: None</p>
Stressors to Biological Resources	<p>Acoustic: Aircraft noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials</p> <p>Ingestion: Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: Other materials</p>	
Stressors to Human Resources	<p>Cultural Resources: None</p>	<p>Socioeconomic Resources: Airborne acoustics</p>	<p>Public Health and Safety: Physical interactions</p>
Military Expended Material	<p>Ingestible Material: Per chaff: one chaff-air cartridge, one plastic endcap, chaff fibers</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	None

Electronic Warfare	
Counter Targeting Chaff Exercise – Aircraft	
Sonar and Other Transducer Bins	None
Explosive Bins	None
Procedural Mitigation Measures	None
Assumptions Used for Analysis	Chaff is usually expended while conducting other training activities, such as air combat maneuvering. Potential effects are analyzed under this activity. This activity occurs greater than 12 NM from land.

A.1.5.2 Counter Targeting Chaff Exercise – Ship

Electronic Warfare			
Counter Targeting Chaff Exercise – Ship			
Short Description	Surface ship crews deploy chaff to disrupt threat targeting and missile guidance radars.	Typical Duration 1–2 hours	
Long Description	<p>Surface ship crews deploy chaff to disrupt threat targeting and missile guidance radars to defend against an attack.</p> <p>Surface ship crews detect electronic targeting signals from threat radars or missiles, dispense chaff, and immediately maneuver to defeat the threat. The chaff cloud deceives the inbound missile and the vessel clears away from the threat. The typical event duration is approximately one and one-half hours.</p> <p>Chaff is a radar reflector material made of thin, narrow, metallic strips cut in various lengths to elicit frequency responses, which deceive enemy radars. Chaff is employed to create a target that will lure enemy radar and weapons system away from the actual friendly platform. Ships may also train with advanced countermeasure systems, such as the MK 53 Decoy Launching System (Nulka).</p>		
Typical Components	<p>Platforms: Navy Ships Targets: None Systems being Trained/Tested: None</p>		
Standard Operating Procedures (Section 2.3.3)	Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Vessel noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Other materials	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility	Public Health and Safety: Physical interactions
Military Expended Material	<p>Ingestible Material: Chaff-ship fibers</p> <p>Non-Ingestible Material: Chaff-ship cartridge</p>	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		

Electronic Warfare	
Counter Targeting Chaff Exercise – Ship	
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	This activity occurs greater than 12 NM from land.

A.1.5.3 Counter Targeting Flare Exercise – Aircraft

Electronic Warfare			
Counter Targeting Flare Exercise - Aircraft			
Short Description	Fixed-wing aircraft and helicopter aircrews deploy flares to disrupt threat infrared missile guidance systems.	Typical Duration	
		1–2 hours	
Long Description	<p>Fixed-wing aircraft and helicopter aircrews deploy flares to disrupt threat infrared missile guidance systems. Range personnel acting as opposition forces may use pyrotechnics to simulate missile launch.</p> <p>Aircraft detect electronic targeting signals from threat radars or missiles, or a threat missile plume, when launched and dispense flares and immediately maneuver to defeat the threat. This exercise trains aircraft personnel in the use of defensive flares designed to confuse infrared sensors or infrared homing missiles, thereby causing the sensor or missile to lock onto the flares instead of the real aircraft. Typically an aircraft will expend five flares in an exercise while operating above 3,000 feet. Flare exercises are often conducted with chaff exercises, rather than as a stand-alone exercise.</p>		
Typical Components	<p>Platforms: Fixed-wing aircraft, rotary-wing aircraft Targets: None Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Aircraft noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials</p> <p>Ingestion: Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Other materials	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Airborne acoustics	Public Health and Safety: Physical interactions
Military Expended Material	<p>Ingestible Material: Per flare: one casing, one compression pad or one plastic piston, one plastic endcap, one O-ring</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		

Electronic Warfare	
Counter Targeting Flare Exercise - Aircraft	
Explosive Bins	None
Procedural Mitigation Measures	None
Assumptions Used for Analysis	Approximately five flares per aircraft. This activity typically occurs greater than 12 NM from land. However, rotary-wing events may occur closer to land (up to 3 NM when crew-served EW threat emitters [MANPADS] are employed).

A.1.5.4 Electronic Warfare Operations

Electronic Warfare			
Electronic Warfare Operations			
Short Description	Aircraft and surface ship crews control portions of the electromagnetic spectrum used by enemy systems to degrade or deny the enemy’s ability to take defensive actions.	Typical Duration 1–2 hours	
Long Description	Aircraft and surface ship crews control the electromagnetic spectrum used by enemy systems to degrade or deny the enemy’s ability to take defensive actions. Electronic Warfare Operations can be active or passive, offensive or defensive. Fixed-wing aircraft employ active jamming and deception against enemy search radars to mask the friendly inbound strike aircraft mission. Surface ships detect and evaluate enemy electronic signals from enemy aircraft or missile radars, evaluate courses of action concerning the use of passive or active countermeasures, then use ship maneuvers and either chaff, flares, active electronic countermeasures, or a combination of them to defeat the threat.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, surface combatant Targets: Aircraft targets; electronic warfare targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Ingestion: None	Energy: In-air electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Other materials	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: Expendable decoys	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		

Electronic Warfare	
Electronic Warfare Operations	
Assumptions Used for Analysis	All chaff and flares involved in this event are covered under chaff exercise and flare exercises, respectively.

A.1.6 EXPEDITIONARY WARFARE

A.1.6.1 Parachute Insertion

Expeditionary Warfare			
Parachute Insertion			
Short Description	Military personnel train for covert insertion into target areas using parachutes.	Typical Duration 2–8 hours	
Long Description	These operations will vary in length depending on the transportation method and systems being used. Target areas are parachute drop zones that may be at sea or on land.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, tilt-rotor aircraft, small boat Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex parachute drop zones; Guam; Tinian; Rota	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne acoustics	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Decelerators/parachutes
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	Combat swimmers inserted at sea may transit through surf zone onto beach.		

A.1.6.2 Personnel Insertion/Extraction

Expeditionary Warfare			
Personnel Insertion/Extraction			
Short Description	Military personnel train for covert insertion and extraction into target areas using helicopters, fixed-wing (insertion only), small boats, and submersibles.	Typical Duration	
		2–8 hours	
Long Description	Personnel train to approach or depart an objective area using various transportation methods and tactics. These operations train forces to insert and extract personnel and equipment day or night. Tactics and techniques employed include insertion from aircraft by parachute, by rope, or from low, slow-flying helicopters from which personnel jump into the water. Parachute training is required to be conducted on surveyed drop zones to enhance safety. Insertion and extraction methods also employ small inflatable boats.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, tilt-rotor aircraft, small craft, submersibles Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex; Guam; Tinian; Rota; Saipan	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices	Energy: None
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None	Military Recoverable Material	Decelerators/parachutes
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	During the conduct of insertion/extraction activities personnel may exit the watercraft in the surf zone and divers and combat swimmers will stand in the surf zone and walk onto the beach.		

A.1.7 MINE WARFARE

Mine warfare is the naval warfare area involving the detection, avoidance, and neutralization of mines to protect Navy ships and submarines, and offensive mine laying in naval operations. A naval mine is a self-contained explosive device placed in water to destroy ships or submarines. Naval mines are deposited and left in place until triggered by the approach of an enemy ship, or are destroyed or removed. Naval mines can be laid by purpose-built minelayers, other ships, submarines, or airplanes. Mine warfare training includes mine countermeasures exercises and mine laying exercises.

A.1.7.1 Civilian Port Defense

Mine Warfare			
Civilian Port Defense			
Short Description	Maritime security personnel train to protect civilian ports and harbors against enemy efforts to interfere with access to those ports.	Typical Duration Multiple days	
Long Description	<p>Naval forces provide Mine Warfare capabilities to support Department of Homeland Security sponsored events. The three pillars of mine warfare, airborne (helicopter), surface (surface ships), and undersea (divers, marine mammals, and unmanned vehicles) mine countermeasures will be brought to bear in order to ensure strategic U.S. ports remain free of mine threats. Various mine warfare sensors, which utilize active acoustics, will be employed in the detection, classification, and neutralization of mines. Along with traditional mine warfare techniques, such as helicopter towed mine countermeasures, new technologies (unmanned vehicles) will be utilized.</p> <p>Event locations and scenarios will vary according to Department of Homeland Security strategic goals and evolving world events.</p>		
Typical Components	<p>Platforms: Mine warfare ship, rotary-wing aircraft, small boat, unmanned underwater vehicle Targets: Mine shapes Systems being Trained/Tested: Mine detection systems, towed mine neutralization systems, airborne mine neutralization system</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Unmanned aerial and underwater vehicle procedures Towed in-water device safety Laser Procedures Target deployment and retrieval safety Pierside testing safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex	Bays/Estuaries/Pierside: Mariana littorals Inner and Outer Apra Harbor
Stressors to Biological Resources	<p>Acoustic: Sonar and other transducers Aircraft noise Vessel noise</p> <p>Explosive: In-air explosions In-water explosions</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Seafloor devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: In-water electromagnetic devices In-air electromagnetic devices</p> <p>Entanglement: Wires and cables Decelerators/Parachutes</p>

Mine Warfare			
Civilian Port Defense			
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals Chemicals Other materials	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: In-air energy Underwater energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	High-Frequency: HF4	Synthetic Aperture Sonar: SAS2	
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices	
Assumptions Used for Analysis	Non-permanent mine shapes will be laid in various places on the bottom and will be retrieved. Shapes are varied, from about 1 m circular to about 2.5 meters long by 1 meter wide. They will be recovered using normal assets, with diver involvement.		

A.1.7.2 Limpet Mine Neutralization System

Mine Warfare			
Limpet Mine Neutralization System			
Short Description	Navy Explosive Ordnance Disposal divers place a small charge on a simulated underwater mine.	Typical Duration 2 hours	
Long Description	A metal sheet containing a non-explosive limpet mine is lowered into the water, sometimes from the side of a small vessel, such as an LCM- 8 craft. Navy Explosive Ordnance Divers place a single shock wave generator of Limpet Mine Neutralizing Systems on the mine that is located mid-water column, within water depths of 10 to 20 feet. A bag is placed over the mine to catch falling debris.		
Typical Components	Platforms: Support craft Targets: Mine Shapes Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: None	Bays/Estuaries/Pierside: Mariana littorals Inner and Outer Apra Harbor
Stressors to Biological Resources	Acoustic: Vessel noise	Physical Disturbance and Strike: Vessels and in-water devices	Energy: None
	Explosive: In-water explosions (<i>de minimis</i>)	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality:	
		Explosives Metals	Chemicals
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike Airborne acoustics	Public Health and Safety: Physical interactions Underwater energy
Military Expended Material	Ingestible Material: None	Military Recoverable Material	Sub-surface target (stationary)
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	<i>De minimis</i> small explosive charges would be used during this activity and not quantitatively analyzed and therefore are not included under munitions.		

A.1.7.3 Mine Neutralization – Remotely Operated Vehicle Sonar

Mine Warfare			
Mine Neutralization – Remotely Operated Vehicle Sonar			
Short Description	Ship, small boat, and helicopter crews locate and disable mines using remotely operated underwater vehicles.	Typical Duration	
		1–4 hours	
Long Description	Ship, small boat, and helicopter crews utilize remotely operated vehicles to neutralize potential mines. Remotely operated vehicles will use sonar and optical systems to locate and target mine shapes. Explosive mine neutralizers may be used during live-fire events.		
Typical Components	Platforms: Rotary-wing aircraft, surface combatants, small boat Targets: Mine shapes Systems being Trained/Tested: Towed sonar systems, underwater explosives		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Towed in-water device safety Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Mariana littorals and Outer Apra Harbor
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Explosive: In-water explosions	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Seafloor devices Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices In-water electromagnetic devices Entanglement: Wires and cables
	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	Ingestible Material: Neutralizer fragments Non-Ingestible Material: Fiber optic cable, fiber optic can	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	None		
Explosive Bins	E4		
Procedural Mitigation Measures	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive Mine Countermeasure and Neutralization Activities	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices	

Mine Warfare	
Mine Neutralization – Remotely Operated Vehicle Sonar	
Assumptions Used for Analysis	Fiber optic cable is only expended during use of explosive mine neutralizers.

A.1.7.4 Mine Countermeasure Exercise – Surface Ship Sonar

Mine Warfare			
Mine Countermeasure Exercise – Surface Sonar			
Short Description	Ship crews detect, locate, identify, and avoid mines while navigating restricted areas or channels, such as while entering or leaving port.	Typical Duration Up to 15 hours	
Long Description	This event trains ship crews to detect mines for future neutralization or to alert other ships. Training utilizes simulated minefields constructed of moored or bottom mines, or instrumented mines that can record effectiveness of mine detection efforts. Ships will use active sonar to search the area ahead of the ship for moored mines or other hazards of navigation.		
Typical Components	Platforms: Mine sweeper, Surface combatant Targets: Mine shapes Systems being Trained/Tested: High-frequency sonar, mid-frequency sonar		
Standard Operating Procedures (Section 2.3.3)	Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	Acoustic: Sonar and other transducers Vessel noise Explosive: None	Physical Disturbance and Strike: Vessels and in-water devices Seafloor devices Ingestion: None	Energy: In-air electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	High-Frequency Sonar HF4	Mid-Frequency Sonar MF1K	
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: (Section 5.3.2) Active sonar		Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement
Assumptions Used for Analysis	Existing placed mine shapes or targets of opportunity (buoys) to be used. There is potential for temporarily placed mine shapes to be used.		

A.1.7.5 Mine Countermeasure – Towed Mine Neutralization

Mine Warfare			
Mine Countermeasures – Towed Mine Neutralization			
Short Description	Helicopter aircrews, manned and unmanned vehicles tow systems through the water which are designed to disable or trigger mines.	Typical Duration	
		Up to 12 hours	
Long Description	<p>Helicopter, vehicle operators and unmanned vehicles use towed devices to trigger mines that are designed to detonate when they detect ships/submarines by engine/propeller sounds or magnetic (steel construction) signature. Towed devices can also employ cable cutters to detach floating moored mines. Training will be conducted either with non-explosive training mine shapes or without any mine shapes. A high degree of pilot skill is required in deploying devices, safely towing them at relatively low speeds and altitudes, and then recovering devices.</p> <p>Devices used may include the following: Organic Airborne and Surface Influence Sweep (OASIS). The Organic Airborne and Surface Influence Sweep is a towed device that imitates the magnetic and acoustic signatures of naval ships and submarines. MK 105 sled: the MK 105 sled, similar to the Organic Airborne and Surface Influence Sweep, creates a magnetic field used to trigger mines. The MK 105 sled can also be used in conjunction with the MK 103 cable cutter system and the MK 104 acoustic countermeasure. AN/SPU-1/W “Magnetic Orange Pipe”: As the name implies, the AN/SPU-1/W is a magnetic pipe that is used to trigger magnetically influenced mines.</p>		
Typical Components	<p>Platforms: Mine warfare ship, rotary-wing aircraft, unmanned surface vehicle Targets: Mine Shapes Systems being Trained/Tested: Electromagnetic devices</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Towed in-water device safety Vessel safety Unmanned surface vehicle safety Pierside testing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Vessel noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Seafloor devices</p> <p>Ingestion: None</p>	<p>Energy: In-water electromagnetic devices In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: None</p>	
Stressors to Human Resources	<p>Cultural Resources: Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: Underwater energy In-air energy Physical interactions</p>

Mine Warfare			
Mine Countermeasures – Towed Mine Neutralization			
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Mine shape (non-explosive)
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices		
Assumptions Used for Analysis	Mechanical sweeping (cable cutting), acoustic and magnetic influence sweeping devices are towed from helicopters, surface vessels, and unmanned vehicles. Cable cutters utilize an insignificant charge (similar to a shotgun shell). Acoustic sweeps generate ship type noise via a mechanical system. Towing systems through minefields (or without mines, to train to deploy, tow, and recover) may involve instrumented mines. Mine shapes would be recovered.		

A.1.7.6 Mine Countermeasure – Towed Mine Detection

Mine Warfare			
Mine Countermeasures – Towed Mine Detection			
Short Description	Helicopter aircrews, manned and unmanned vehicles detect mines using towed or laser mine detection systems.	Typical Duration	
		Typically 1.5 hours up to 4 hours	
Long Description	<p>Helicopter aircrews, manned and unmanned vehicles use towed and airborne devices to detect, locate, and classify potential mines. Towed devices employ active acoustic sources, such as high-frequency and side scanning sonar. These devices are similar in function to systems used to map the seafloor or locate submerged structures/items. Airborne devices utilize laser systems to locate mines located below the surface.</p> <p>Devices used include the ANAQS-20/A, towed mine-hunting sonar used to detect and classify bottom and floating/moored mines in deep and shallow water, and the Airborne Laser Mine Detection System, developed to detect and classify floating and near-surface, moored mines.</p>		
Typical Components	<p>Platforms: Mine warfare ship, rotary-wing aircraft, unmanned surface vehicles Targets: Mine shapes Systems being Trained/Tested: Mine detection systems</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety Unmanned surface vehicle safety Laser Procedures Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Vessel noise</p> <p>Explosive: None</p>	<p>Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Seafloor devices</p> <p>Ingestion: None</p>	<p>Energy: None</p> <p>Entanglement: None</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: None</p>	
Stressors to Human Resources	<p>Cultural Resources: Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: Underwater energy In-air energy Physical interactions</p>
Military Expended Material	<p>Ingestible Material: None</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	None		
Explosive Bins	None		

Mine Warfare	
Mine Countermeasures – Towed Mine Detection	
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: (Section 5.3.4) Towed in-water devices Vessel movement
Assumptions Used for Analysis	Sonar mine detection systems towed from helicopters and surface vessels. Airborne laser systems used to detect mine shapes. Laser systems are similar to commercial Light Detection And Ranging systems. The in-air low energy laser stressor was used in analysis of potential impacts on human resources. Mine shapes may be deployed via ship and will be recovered.

A.1.7.7 Mine Countermeasure Exercise – Towed Sonar

Mine Warfare			
Mine Countermeasure Exercise – Towed Sonar			
Short Description	Surface ship crews detect and avoid mines while navigating restricted areas or channels using towed active sonar systems.	Typical Duration 1–4 hours	
Long Description	Surface vessel crews detect and avoid mines or other underwater hazardous objects while navigating restricted areas or channels using active sonar. Littoral Combat Ship utilizes unmanned surface vehicles and remotely operated vehicles to tow mine detection (hunting) equipment. Systems will operate from shallow zone greater than 40 feet to deep water. Events could be embedded in major training events.		
Typical Components	Platforms: Surface combatant, unmanned aerial vehicles, unmanned surface vehicles Targets: Mine shapes Systems being Trained/Tested: High frequency sonar		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Unmanned aerial, surface, and subsurface vehicle safety	Typical Locations	
	Vessel safety Laser Procedures Target deployment and retrieval safety	Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	Acoustic: Sonar and other transducers Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Seafloor devices Ingestion: None	Energy: In-air electromagnetic devices In-water electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	High Frequency: HF4		
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed-in water devices	

Mine Warfare	
Mine Countermeasure Exercise – Towed Sonar	
Assumptions Used for Analysis	No explosives used. Constraints: Assume system will be operated in areas free of obstructions, and will be towed well above the seafloor. Towed system will be operated in a manner to avoid entanglement and damage. Events will take place in water depths 40 feet and greater. Existing placed mine shapes to be used. Potential for temporary placement of mine shapes.

A.1.7.8 Mine Laying

Mine Warfare			
Mine Laying			
Short Description	Fixed-wing aircraft drop non-explosive mine shapes.	Typical Duration 1 hour	
Long Description	Fixed-wing aircraft lay offensive or defensive mines for a tactical advantage for friendly forces. Fixed-wing aircraft lay a precise minefield pattern for specific tactical situations. The aircrew typically makes multiple passes in the same flight pattern, and drop one or more training shapes per pass (four shapes total). Training shapes are non-explosive and are recovered when possible.		
Typical Components	Platforms: Fixed-wing aircraft, support vessels Targets: Mine shapes Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace, nearshore FDM.	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials Seafloor devices Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: Mine shapes (non-explosive)	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Non-explosive bombs and mine shapes		
Assumptions Used for Analysis	Mine laying is similar to a non-explosive bombing exercise. While some mine shapes will be recovered if possible, assume they will not for the analysis. Nearshore/shallow water events will be planned to minimize/avoid coral impacts.		

A.1.7.9 Mine Neutralization – Explosive Ordnance Disposal

Mine Warfare			
Mine Neutralization Explosive Ordnance Disposal			
Short Description	Personnel disable threat mines using explosive charges.	Typical Duration Up to 4 hours	
Long Description	<p>Navy divers, typically explosive ordnance disposal personnel, disable threat mines with explosive charges to create a safe channel for friendly vessels to transit.</p> <p>Personnel detect, identify, evaluate, and neutralize mines in the water with an explosive device and may involve detonation of one or more explosive typically up to 20 pounds (lb.) of TNT equivalent. These operations are normally conducted during daylight hours for safety reasons.</p> <p>Time delay fuses may be used for these events.</p>		
Typical Components	<p>Platforms: Rotary-wing aircraft, small boats</p> <p>Targets: Mine shapes</p> <p>Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Underwater detonation safety Aircraft safety Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Agat Bay underwater detonation site Piti and Outer Apra Harbor underwater detonation sites	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Vessel noise</p> <p>Explosive: In-water explosions</p>	<p>Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Seafloor devices</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: None</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	<p>Sediments and Water Quality: Explosives Chemicals Metals Other materials</p>	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	<p>Ingestible Material: Target fragments</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	None		

Mine Warfare			
Mine Neutralization Explosive Ordnance Disposal			
Explosive Bins	E5 E6		
Procedural Mitigation Measures	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Explosive Stressors: <i>(Section 5.3.3)</i> Explosive Mine Neutralization Activities Involving Navy Divers</td> <td style="width: 50%; border: none;">Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement</td> </tr> </table>	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive Mine Neutralization Activities Involving Navy Divers	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Explosive Stressors: <i>(Section 5.3.3)</i> Explosive Mine Neutralization Activities Involving Navy Divers	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	<p>Charge placed anywhere in water column, including bottom.</p> <p>Mine shapes will be recovered when practicable. Some will explode, and fragments will not be recovered.</p> <p>Agat Bay underwater detonation site has a maximum charge size of 20 lb. net explosive weight (NEW). Piti and Outer Apra Harbor underwater detonation sites have a maximum charge size of 10 lb. NEW.</p>		

A.1.7.10 Submarine Mine Exercise

Mine Warfare			
Submarine Mine Exercise			
Short Description	Submarine crews practice detecting mines in a designated area.	Typical Duration Varies	
Long Description	Submarine crews use active sonar to detect and avoid mines or other underwater hazardous objects, while navigating restricted areas or channels, such as while entering or leaving port. This event trains submarine crews to detect and avoid mines. Training utilizes simulated minefields constructed of moored or bottom mines, or instrumented mines that can record effectiveness of mine detection efforts. In a typical training exercise, submarine crews will use high-frequency sonar to locate and avoid the mine shapes. Each mine avoidance exercise involves one submarine operating the high-frequency sonar to navigate through the training minefield		
Typical Components	Platforms: Submarines Targets: Mine shapes Systems being Trained/Tested: High-frequency sonar (hull mounted)		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area; nearshore, littorals	Bays/Estuaries/Pierside:
Stressors to Biological Resources	Acoustic: Sonar and other transducers Explosive: None	Physical Disturbance and Strike: Vessels and in-water devices Military expended materials Seafloor Devices Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: None	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: None	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	High Frequency: HF1		
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar		Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement

Mine Warfare	
Submarine Mine Exercise	
Assumptions Used for Analysis	There is potential for temporarily placed mine shapes to be used.

A.1.7.11 Surface Ship Object Detection

Mine Warfare			
Surface Ship Object Detection			
Short Description	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar.	Typical Duration	
		Up to 15 hours	
Long Description	Surface ship crews detect and avoid mines or other underwater hazardous objects while navigating restricted areas or channels using active sonar. A Littoral Combat Ship utilizes unmanned surface vehicles and remotely operated vehicles to tow mine detection (hunting) equipment. Systems will operate from a shallow zone greater than 40 feet (ft.) to deep water. Events could be embedded within major training exercises.		
Typical Components	Platforms: Surface combatant, unmanned surface vehicle Targets: Sub-surface targets (mine shapes), targets of opportunity (buoys, fish aggregating devices) Systems being Trained/Tested: High-frequency sonar, mid-frequency sonar, towed sonar systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Unmanned aerial and underwater vehicle procedures Towed in-water device safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	Acoustic: Sonar and other transducers Vessel noise Explosive: None	Physical Disturbance and Strike: Vessels and in-water devices Seafloor devices Ingestion: None	Energy: None Entanglement: None
	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	Mid-Frequency: MF1K	High-Frequency: None	
Explosive Bins	None		

Mine Warfare	
Surface Ship Object Detection	
Procedural Mitigation Measures	<p>Acoustic Stressors: Active sonar</p> <p>Physical Disturbance and Strike: Vessel movement Towed in-water devices</p>
Assumptions Used for Analysis	<p>No explosives are used.</p> <p>Constraints: Assume system will be operated in areas free of obstructions, and will be towed well above the seafloor. Towed system will be operated in a manner to avoid entanglement and damage. Events will take place in water depths 40 ft. and greater.</p> <p>Existing placed mine shapes/targets of opportunity to be used. There is the potential for temporary placement of mine shapes.</p> <p>Potential locations for this activity include Mariana Littorals and Apra Harbor.</p>

A.1.7.12 Underwater Demolition Qualification and Certification

Mine Warfare			
Underwater Demolition Qualification and Certification			
Short Description	Navy divers conduct various levels of training and certification in placing underwater demolition charges.	Typical Duration Varies	
Long Description	Underwater explosive charges, up to 20 lb. net explosive weight are detonated to complete training qualification or certification.		
Typical Components	Platforms: Rotary-wing aircraft, small boats Targets: Mine shapes Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety Underwater detonation safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Agat Bay underwater detonation site Piti and Outer Apra Harbor underwater detonation sites	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosive: In-air explosions In-water explosions	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Seafloor devices Ingestion: Military expended materials – other than munitions	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals Chemicals Other materials	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	Ingestible Material: Target fragments Non-Ingestible Material: Mine shape (non-explosive)	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	E5 E6		
Procedural Mitigation Measures	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive mine neutralization activities involving Navy divers	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement	

Mine Warfare	
Underwater Demolition Qualification and Certification	
Assumptions Used for Analysis	Agat Bay underwater detonation site has a maximum charge size of 20 lb. net explosive weight (NEW). Piti and Outer Apra Harbor underwater detonation sites have a maximum charge size of 10 lb. NEW.

A.1.8 STRIKE WARFARE

A.1.8.1 Bombing Exercise (Air-to-Ground)

Strike Warfare			
Bombing Exercise (Air-to-Ground)			
Short Description	Fixed-wing aircraft drop bombs against a land target.	Typical Duration 1–2 hours	
Long Description	Bombing exercise involves training of bomber or strike fighter aircraft delivery of ordnance against land targets in day or night conditions. The bombing exercise may involve close air support training in direct support of and in close proximity to forces on the ground, such as Navy or Marine forces engaged in training exercises on land, and may include the use of targeting laser.		
Typical Components	Platforms: Fixed-wing aircraft Targets: Land targets Systems being Trained/Tested: Targeting laser systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety	Typical Locations	
	Laser Procedures	Range Complexes/Testing Ranges: Farallon de Medinilla, R-7201, R-7201A	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Military expended material Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Airborne acoustics	Public Health and Safety: None
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	None		
Assumptions Used for Analysis	Bombs are released in accordance with range standard operating procedures. Land targets only.		

A.1.8.2 Gunnery Exercise (Air-to-Ground)

Strike Warfare			
Gunnery Exercise (Air-to-Ground)			
Short Description	Helicopter crews fire guns at stationary land targets; fixed-wing aircraft also strafe land targets.	Typical Duration	
		1 hour	
Long Description	Fixed-wing aircraft and helicopter crews use guns to attack ground targets, day or night, with the goal of destroying or disabling enemy vehicles, structures, or personnel. Aircraft will fire a burst of rounds, then break off and reposition for another strafing run until each aircraft expends its exercise ordnance allowance. This exercise may include the use of targeting laser.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft Targets: Land targets Systems being Trained/Tested: Targeting laser systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Laser procedures	Typical Locations	
		Range Complexes/Testing Ranges: Farallon de Medinilla, R 7201, R 7201A	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Weapons noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials Ingestion: Military expended materials – munitions	Energy: None Entanglement: None
	Air Quality: Criteria pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Airborne acoustics	Public Health and Safety: None
Military Expended Material	Ingestible Material: Projectile casings Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	None		
Assumptions Used for Analysis	Land based targets only		

A.1.8.3 Missile Exercise

Strike Warfare			
Missile Exercise (MISSILEX)			
Short Description	Missiles or rockets are launched against a land target.	Typical Duration	
		1–2 hours	
Long Description	Fixed-wing aircraft, helicopter, ship or submarine crews use missiles to attack ground targets, day or night, with the goal of destroying or disabling enemy vehicles, structures, or personnel.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, surface ships, submarines Targets: Land targets Systems being Trained/Tested: Targeting Lasers		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Vessel safety Laser Procedures	Typical Locations	
		Range Complexes/Testing Ranges: Farallon de Medinilla, R 7201, R 7201A	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Weapons noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial target Military expended materials Vessel and in-water device	Energy: None
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Airborne acoustics	Public Health and Safety: None
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: Missile booster sections		
Sonar and Other Transducer Bins	None		
Explosive Bins	Land based, various munitions included.		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	Land based targets only		

A.1.9 SURFACE WARFARE TRAINING

Surface warfare is a type of naval warfare in which aircraft, surface ships, and submarines employ weapons and sensors in operations directed against enemy surface ships or small boats. Aircraft-to-surface warfare is conducted by long-range attacks using air-launched cruise missiles, precision guided munitions, or aircraft guns. Surface warfare also is conducted by warships employing torpedoes, naval guns, and surface-to-surface missiles. Submarines attack surface ships using torpedoes or submarine-launched, anti-ship cruise missiles. Training in surface warfare includes surface-to-surface gunnery and missile exercises, air-to-surface gunnery and missile exercises, and submarine missile or torpedo launch events. Gunnery and missile training generally involves expenditure of ordnance against a towed target. A sinking exercise is a specialized training event that provides an opportunity for ship, submarine, and aircraft crews to use multiple weapons systems to deliver high-explosive ordnance on a deactivated vessel, which is deliberately sunk.

Surface warfare also encompasses maritime security, that is, the interception of a suspect surface ship by a Navy ship for the purpose of boarding-party inspection or the seizure of the suspect ship. Training in these tasks is conducted in visit, board, search and seizure exercises.

A.1.9.1 Bombing Exercise Air-to-Surface

Surface Warfare			
Bombing Exercise Air-to-Surface			
Short Description	Fixed-wing aircrews deliver bombs against surface targets.	Typical Duration 1 hour	
Long Description	<p>Fixed-wing aircraft conduct bombing exercises against stationary floating targets (e.g., MK-58 smoke buoy), towed targets, or maneuvering targets. An aircraft clears the area, deploys a smoke buoy, and then delivers high-explosive or non-explosive practice munitions bomb(s) on the target. A range boat may be used to deploy towed or maneuvering targets for an aircraft to attack.</p> <p>Exercises for strike fighters typically involve a flight of two aircraft delivering unguided or guided munitions that may be either high-explosive or non-explosive. The following munitions may be employed by strike fighter aircraft in the course of bombing exercise: Unguided munitions include non-explosive subscale bombs (MK-76 and BDU-45), explosive and non-explosive general purpose bombs (MK-80 series), MK-20 cluster bomb (explosive, non-explosive). Precision-guided munitions include laser-guided bombs (explosive, non-explosive), laser-guided training rounds (non-explosive), Joint Direct Attack Munition (explosive, non-explosive).</p>		
Typical Components	<p>Platforms: Fixed-wing aircraft, support craft Targets: Surface targets Systems being Trained/Tested: Aircraft platforms, bombs, non-explosive practice munitions, targeting lasers</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Laser Procedures	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Vessel noise Aircraft noise Weapons noise</p> <p>Explosive: In-water explosions</p>	<p>Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: None</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	<p>Ingestible Material: Bomb fragments, target fragments</p> <p>Non-Ingestible Material: Bomb (non-explosive), marine marker, surface target (stationary)</p>	Military Recoverable Material	None

Surface Warfare			
Bombing Exercise Air-to-Surface			
Sonar and Other Transducer Bins	None		
Explosive Bins	E9 E10 E12		
Procedural Mitigation Measures	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> Explosive Stressors: (Section 5.3.3) Explosive bombs </td> <td style="width: 50%; vertical-align: top;"> Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement Non-explosive bombs and mine shapes </td> </tr> </table>	Explosive Stressors: (Section 5.3.3) Explosive bombs	Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement Non-explosive bombs and mine shapes
Explosive Stressors: (Section 5.3.3) Explosive bombs	Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement Non-explosive bombs and mine shapes		
Assumptions Used for Analysis	Explosive bombs are assumed to explode just below the surface. This activity would occur at least 12 NM from land (FDM excepted).		

A.1.9.2 Gunnery Exercise Air-to-Surface Medium-Caliber

Surface Warfare			
Gunnery Exercise Air-to-Surface Medium-Caliber			
Short Description	Fixed-wing and helicopter aircrews fire medium-caliber guns at surface targets.	Typical Duration 1 hour	
Long Description	Fighter and helicopter aircrew, engage surface targets with medium-caliber guns. Targets simulate enemy ships, boats, swimmers, and floating/near- surface mines. Fighter aircraft descend on a target firing high-explosive or non-explosive practice munitions medium-caliber projectiles. Helicopters will fly a racetrack pattern around an at-sea target. Aircrew will engage the target with medium-caliber weapons. Targets range from a smoke float, or an empty steel drum, to high speed remote controlled boats and jet-skis.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, support vessels Targets: Surface targets Systems being Trained/Tested: Medium-caliber gun systems		
Standard Operating Procedures (Section 2.3.3)	Aircraft safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Aircraft noise Weapons noise Explosive: In-air explosions In-water explosions	Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Explosives	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike Explosives	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	Ingestible Material: Medium-caliber casings, medium caliber projectiles Non-Ingestible Material: Marine marker	Military Recoverable Material	Surface target (mobile and stationary)
Sonar and Other Transducer Bins	None		
Explosive Bins	EO (<i>de minimis</i>), E1, and E2		

Surface Warfare			
Gunnery Exercise Air-to-Surface Medium-Caliber			
Procedural Mitigation Measures	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles </td> <td style="width: 50%; vertical-align: top;"> Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions </td> </tr> </table>	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions
Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions		
Assumptions Used for Analysis	<p>Most medium-caliber air-to-surface gunnery exercises will be with non-explosive training projectiles. High-explosive rounds will supplement when non-explosive training projectiles are not available. Fixed-wing casings remain with aircraft, and helicopter shell casings are expended into the water.</p> <p>This activity occurs greater than 3 NM from land (FDM excepted).</p>		

A.1.9.3 Gunnery Exercise Air-to-Surface Small-Caliber

Surface Warfare			
Gunnery Exercise Air-to-Surface Small-Caliber			
Short Description	Helicopter and tilt-rotor aircrews, use small-caliber guns to engage surface targets.	Typical Duration	
		1 hour	
Long Description	Helicopters and tilt-rotor aircraft, fly a racetrack pattern around an at-sea target. Targets simulate enemy ships, boats, and floating/near-surface mines. Each gunner will engage the target with small-caliber weapons. Targets range from a smoke float, an empty steel drum, to high speed remote controlled boats and jet-skis.		
Typical Components	Platforms: Rotary-wing aircraft, tilt-rotor aircraft Targets: Surface targets (e.g., MK 58 marine marker, empty steel drum, high speed remote controlled boats and jet-skis) Systems being Trained/Tested: Small-caliber gun systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Weapons noise	Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials	Energy: None
	Explosive: None	Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: Small-caliber projectile (non-explosive), small-caliber casings Non-Ingestible Material: MK 58 marine marker	Military Recoverable Material	Surface target (mobile)
Sonar and Other Transducer Bins	None		
Explosive Bins	None		

Surface Warfare	
Gunnery Exercise Air-to-Surface Small-Caliber	
Procedural Mitigation Measures	<p>Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise</p> <p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions</p>
Assumptions Used for Analysis	<p>One target used per event. Expendable smoke float (50 percent), stationary target (45 percent), or remote controlled target (5 percent). This activity occurs greater than 12 NM from land.</p>

A.1.9.4 Gunnery Exercise Surface-to-Surface Boat Medium-Caliber

Surface Warfare			
Gunnery Exercise Surface-to-Surface Boat Medium-Caliber			
Short Description	Small boat crews fire medium-caliber guns at surface targets.	Typical Duration	
		1 hour	
Long Description	<p>Small boat crews fire medium-caliber guns at surface targets. Boat crews may use high or low speeds to approach and engage targets simulating other boats, floating mines, or nearshore land targets with medium-caliber (up to and including 40 millimeter [mm]) weapons. A commonly used target is an empty steel drum. This event also includes use of anti-swimmer grenades, which may be employed within harbors.</p> <p>A number of different types of boats are used depending on the unit using the boat and their mission. Boats are most used to protect ships in harbors and high value units, such as: aircraft carriers, nuclear submarines, liquid natural gas tankers, etc., while entering and leaving ports, as well as to conduct riverine operations, and various naval special warfare operations. The boats used by these units include small unit river craft, combat rubber raiding craft, rigid-hull inflatable boats, patrol craft, and many other versions of these types of boats. These boats use inboard or outboard, diesel or gasoline engines with either propeller or water jet propulsion.</p>		
Typical Components	<p>Platforms: Small boat Targets: Surface targets Systems being Trained/Tested: Medium-caliber gun systems</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Vessel noise Weapons noise</p> <p>Explosive: In-air explosions In-water explosions</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: None</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions
Military Expended Material	<p>Ingestible Material: Grenade (explosive) fragments, medium-caliber projectiles (non-explosive), medium-caliber casings, target fragments</p> <p>Non-Ingestible Material: Surface target (stationary)</p>	Military Recoverable Material	Surface target (stationary and mobile)

Surface Warfare			
Gunnery Exercise Surface-to-Surface Boat Medium-Caliber			
Sonar and Other Transducer Bins	None		
Explosive Bins	E2		
Procedural Mitigation Measures	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise</p> <p>Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles Maritime security operations – anti swimmer grenades</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions</p> </td> </tr> </table>	<p>Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise</p> <p>Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles Maritime security operations – anti swimmer grenades</p>	<p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions</p>
<p>Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise</p> <p>Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles Maritime security operations – anti swimmer grenades</p>	<p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions</p>		
Assumptions Used for Analysis	<p>Assume all events include the use of some explosive rounds. Most events will involve boat crews training with MK 203 40 mm grenade launcher.</p> <p>One target used per event, typically a stationary target such as a 50-liter steel drum.</p> <p>Explosive rounds would be fired greater than 12 NM from land. Non-explosive rounds would be fired greater than 3 NM from land.</p>		

A.1.9.5 Gunnery Exercise Surface-to-Surface Boat Small-Caliber

Surface Warfare			
Gunnery Exercise Surface-to-Surface Boat Small-Caliber			
Short Description	Small boat crews fire small-caliber guns at surface targets.	Typical Duration 1 hour	
Long Description	<p>Small boat crews fire small-caliber guns at surface targets. Boat crews may use high or low speeds to approach and engage targets simulating other boats, swimmers, floating mines, or nearshore land targets with small-caliber (up to and including .50-caliber) weapons. A commonly used target is an empty steel drum.</p> <p>A number of different types of boats are used depending on the unit using the boat and their mission. Boats are most used to protect ships in harbors and high value units, such as: aircraft carriers, nuclear submarines, liquid natural gas tankers, etc., while entering and leaving ports, as well as to conduct riverine operations, and various naval special warfare operations. The boats used by these units include small unit river craft, combat rubber raiding craft, rigid-hull inflatable boats, patrol craft, and many other versions of these types of boats. These boats use inboard or outboard, diesel or gasoline engines with either propeller or water jet propulsion.</p>		
Typical Components	<p>Platforms: Small Boat Targets: Surface Targets Systems being Trained/Tested: Small-caliber gun systems</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	<p>Acoustic: Vessel noise Weapons noise</p> <p>Explosive: In-air explosions</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: None</p> <p>Entanglement: None</p>
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	<p>Ingestible Material: Small caliber projectile (non-explosive), small caliber casings</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	Surface target (mobile and stationary)
Sonar and Other Transducer Bins	None		

Surface Warfare			
Gunnery Exercise Surface-to-Surface Boat Small-Caliber			
Explosive Bins	None		
Procedural Mitigation Measures	<table border="0"> <tr> <td style="vertical-align: top;"> Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise </td> <td style="vertical-align: top;"> Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions </td> </tr> </table>	Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions
Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions		
Assumptions Used for Analysis	Events will occur relatively nearshore due to short range of boats and safety concerns. Events mostly occur within 3 nautical miles of the shoreline, but can occur further from shore.		

A.1.9.6 Gunnery Exercise Surface-to-Surface Ship Large-Caliber

Surface Warfare			
Gunnery Exercise Surface-to-Surface Ship – Large-Caliber			
Short Description	Surface ship crews fire large-caliber guns at surface targets.	Typical Duration	
		Up to 3 hours	
Long Description	<p>This exercise involves ships' gun crews engaging surface targets at sea with their main battery large-caliber (typically 57 millimeter [mm], 76 mm, and 5-inch) guns. Targets include the QST-35 seaborne powered target, high speed maneuverable surface target, or a specially configured remote-controlled water craft. Some targets are expended during the exercise and are not recovered.</p> <p>The exercise proceeds with the target boat approaching from about 10 nautical miles distance. The target is tracked by radar and when within a predetermined range, it is engaged first with large-caliber "warning shots." As threats get closer all weapons may be used to disable the threat.</p> <p>This exercise may involve a single firing ship, or be undertaken in the context of a coordinated larger exercise involving multiple ships, including a major training exercise.</p> <p>Large-caliber guns will also be fired during weapon certification events and in conjunction with weapon maintenance.</p> <p>During all events, either high-explosive or non-explosive rounds may be used. High-explosive rounds can either be fused for detonation on impact (with water surface or target), or for proximity to the target (in-air detonation).</p>		
Typical Components	<p>Platforms: Surface combatant</p> <p>Targets: Surface targets</p> <p>Systems being Trained/Tested: Large-caliber gun systems</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Weapons firing safety	Typical Locations	
		<p>Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace</p>	<p>Bays/Estuaries/Pierside: None</p>
Stressors to Biological Resources	<p>Acoustic: Vessel noise Weapons noise</p> <p>Explosive: In-air explosions In-water explosions</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: Explosives Metals</p>	
Stressors to Human Resources	<p>Cultural Resources: Explosives Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: In-air energy Underwater energy Physical interactions</p>

Surface Warfare			
Gunnery Exercise Surface-to-Surface Ship – Large-Caliber			
Military Expended Material	<p>Ingestible Material: Large caliber projectile (explosive) fragments, target fragments</p> <p>Non-Ingestible Material: Large caliber projectile (non-explosive), large caliber casings Surface target (stationary)</p>	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	E5		
Procedural Mitigation Measures	<p>Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise</p> <p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions</p>	<p>Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles</p>	
Assumptions Used for Analysis	<p>For analytical purposes assume all high explosive rounds are fused to detonate upon impact with water surface or target. After impacting the water, the high explosive rounds are expected to detonate within three feet of the surface. Non-explosive rounds and fragments from the high explosive rounds will sink to the bottom of the ocean. This activity would occur greater than 12 NM from land (FDM excepted).</p>		

A.1.9.7 Gunnery Exercise Surface-to-Surface Ship Small- and Medium-Caliber

Surface Warfare			
Gunnery Exercise Surface-to-Surface Ship Small- and Medium-Caliber			
Short Description	Surface ship crews fire medium and small-caliber guns at surface targets.	Typical Duration	
		2–3 hours	
Long Description	Ships use small- and medium-caliber weapons to practice defensive marksmanship, typically against a stationary floating target (a 10 foot diameter red balloon [Killer Tomato]) and high speed mobile targets. Some targets are expended during the exercise and are not recovered. Shipboard protection systems (Close-In Weapon System) utilizing medium-caliber projectiles would train against high speed mobile targets.		
Typical Components	Platforms: Small boat, surface combatant Targets: Surface Targets (e.g., stationary floating target, high speed mobile target) Systems being Trained/Tested: Medium and small-caliber gun systems		
Standard Operating Procedures (Section 2.3.3)	Vessel safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Weapons noise Explosive: In-air explosions In-water explosions	Physical Disturbance and Strike: Vessels and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutant	Sediments and Water Quality: Explosives Metals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: In-air energy Underwater energy Physical interactions
Military Expended Material	Ingestible Material: Medium-caliber projectiles (non-explosive), medium-caliber projectile (explosive) fragments, small caliber projectile (explosive) fragments, small caliber projectile (non-explosive), small caliber casings, target fragments Non-Ingestible Material: Surface target (stationary)	Military Recoverable Material	Surface target (mobile) surface target (stationary)
Sonar and Other Transducer Bins	None		

Surface Warfare			
Gunnery Exercise Surface-to-Surface Ship Small- and Medium-Caliber			
Explosive Bins	E1		
Procedural Mitigation Measures	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions </td> <td style="width: 50%; border: none; vertical-align: top;"> Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles </td> </tr> </table>	Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles
Acoustic Stressors: <i>(Section 5.3.2)</i> Weapons firing noise Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Small-, medium-, and large-caliber non-explosive practice munitions	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive medium-caliber and large-caliber projectiles		
Assumptions Used for Analysis	One target used per event. Approximately 50 percent of targets are “Killer Tomatoes” (usually recovered). Approximately 35 percent are high-speed maneuvering targets, which are recovered. Approximately 15 percent of targets are other stationary targets such as a steel drum. This activity would occur greater than 12 NM from land (FDM excepted).		

A.1.9.8 Laser Targeting – At-Sea

Surface Warfare			
Laser Targeting – At-Sea			
Short Description	Fixed-wing and helicopter aircrews and shipboard personnel illuminate enemy targets with lasers.	Typical Duration	
		1–2 hours	
Long Description	Fixed-wing and helicopter aircrew and shipboard personnel illuminate enemy targets with lasers for engagement by aircraft with laser guided bombs or missiles. This exercise may be conducted alone or in conjunction with other events utilizing precision guided munitions, such as surface missiles and guided rockets. Events where weapons are fired are addressed in the appropriate activity (e.g., air-to-surface missile exercise). Lower powered lasers may also be used as non-lethal deterrents during maritime security operations (force protection).		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, navy ships and boats, unmanned aerial system – rotary-wing Targets: Surface targets Systems being Trained/Tested: Aircraft platforms, lasers		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Unmanned aerial and underwater vehicle procedures Vessel safety Laser procedures Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial target Vessel and in-water devices Ingestion: None	Energy: Lasers Entanglement: None
	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Physical Resources			
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics	Public Health and Safety: In-air energy Physical interactions
Military Expended Material	Ingestible Material: None	Military Recoverable Material	Surface target (mobile)
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		

Surface Warfare	
Laser Targeting – At-Sea	
Assumptions Used for Analysis	Laser targeting for missile/rocket guidance will occur in areas where these events also occur. Use of lasers as force protection non-lethal deterrents will primarily occur proximate to Navy homeports.

A.1.9.9 Maritime Security Operations

Surface Warfare			
Maritime Security Operations			
Short Description	Helicopter, surface ship, and small boat crews conduct a suite of maritime security operations at sea, to include visit, board, search and seizure, maritime interdiction operations, force protection, and anti-piracy operations.	Typical Duration	
		Up to 3 hours	
Long Description	<p>Helicopter and surface ship crews conduct a suite of maritime security operations (e.g., visit, board, search and seizure, maritime interdiction operations, force protection, and anti-piracy operations). These activities involve training of boarding parties delivered by helicopters and surface ships to surface vessels for the purpose of simulating vessel search and seizure operations. Various training scenarios are employed and may include small arms with non-explosive blanks, explosive Anti-Swimmer Grenades, and surveillance or reconnaissance unmanned surface and aerial vehicles. The entire exercise may last 2–3 hours.</p> <p>Vessel Visit, Board, Search, and Seizure: Military personnel from ships and aircraft board suspect vessels, potentially under hostile conditions.</p> <p>Maritime Interdiction Operations: Ships and aircraft train in pursuing, intercepting, and ultimately detaining suspect vessels.</p> <p>Maritime Infrastructure Protection and Harbor Defense: Naval personnel train to defend oil platforms, similar at-sea structures, harbors, piers, and other infrastructure.</p> <p>Warning Shot/Disabling Fire: Naval personnel train in the use of weapons to force fleeing or threatening small boats (typically operating at high speeds) to come to a stop.</p> <p>Ship Force Protection: Ship crews train in tracking multiple approaching, circling small craft, assessing threat potential, and communicating amongst crewmates and other vessels to ensure ships are protected against attack.</p> <p>Anti-Piracy Training: Naval and U.S. Coast Guard personnel train in deterring and interrupting piracy activity. Training includes large vessels (pirate “mother ships”), and multiple small, maneuverable, and fast craft.</p>		
Typical Components	<p>Platforms: Amphibious warfare ship, rotary-wing aircraft, small boat, surface combatant, unmanned aerial vehicle, unmanned surface vehicle</p> <p>Targets: Surface targets</p> <p>Systems being Trained/Tested: Targeting systems, non-lethal deterrents, unmanned systems</p>		
Standard Operating Procedures (Section 2.3.3)	Vessel safety Aircraft safety Unmanned aerial and underwater vehicle procedures Unmanned surface vehicle safety Laser procedures Target deployment and retrieval safety	Typical Locations	
		<p>Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area Mariana Islands Range Complex</p>	<p>Bays/Estuaries/Pierside: Apra Harbor</p>
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices	Energy: None
	Entanglement:		

Surface Warfare			
Maritime Security Operations			
	Weapons noise Explosive: In-air explosions In-water explosions	Military expended materials Ingestion: Military Expended Materials – Munitions	None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: In-air energy Underwater energy Lasers Physical interactions
Military Expended Material	Ingestible Material: Grenade (explosive) fragments Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	E2		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement	Explosive Stressors: (Section 5.3.3) Maritime security operations – Anti-swimmer grenades	
Assumptions Used for Analysis	Maritime Security Operations is a broad term used to describe activities intended train naval forces in the skills necessary to protect naval vessels from small boat attack, counter piracy and drug operations (maritime interdiction operations and visit, board, search, and seizure), and protect key infrastructure (e.g., oil platforms). Maritime security operations need to remain broad as naval forces need to be able to tailor training events to respond to emergent threats. Maritime Security Operations events typically do not involve live fire of weapons; however, the use of various non-lethal deterrents is likely. All maritime security operations events involve vessel movement, sometimes at high rates of speed (naval vessels maneuvering to overtake suspect vessel or small boats (targets) closing in and maneuvering around naval vessels), and some event involve helicopters and boarding parties. Maritime security operations training events are conducted proximate to naval homeports including during times of transit in and out of port, as well as during major training exercises.		

A.1.9.10 Missile Exercise Air-to-Surface

Surface Warfare			
Missile Exercise Air-to-Surface (MISSILEX)			
Short Description	Fixed-wing and helicopter aircrews fire air-to-surface missiles at surface targets.	Typical Duration	
		2 hours	
Long Description	<p>Fighter, maritime patrol aircraft, and helicopter aircrews fire precision-guided missiles against surface targets. Aircraft involved may be unmanned.</p> <p>Fixed-wing aircraft (fighters or maritime patrol aircraft) approach an at-sea surface target from high altitude, and launch high-explosive precision guided missiles.</p> <p>Helicopters designate at-sea surface targets with a laser or optics for a precision guided missiles. Helicopter launched missiles typically pass through the target's "sail," and, if explosive, detonate at or just below, the water's surface.</p>		
Typical Components	<p>Platforms: Fixed-wing aircraft, rotary-wing aircraft, support vessel</p> <p>Targets: Surface targets</p> <p>Systems being Trained/Tested: Aircraft platforms</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Laser procedures Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		<p>Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace</p>	<p>Bays/Estuaries/Pierside: None</p>
Stressors to Biological Resources	<p>Acoustic: Vessel noise Aircraft noise Weapons noise</p> <p>Explosive: In-air explosions In-water explosions</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Aircraft and aerial target Military expended materials</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: None</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: Explosives Metals</p>	<p>Chemicals: Chemicals</p>
Stressors to Human Resources	<p>Cultural Resources: Explosives Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: Underwater energy In-air energy Physical interactions</p>
Military Expended Material	<p>Ingestible Material: Missile (explosive) fragments, target fragments</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	Surface target (mobile and stationary)
Sonar and Other Transducer Bins	None		
Explosive Bins	E6	E8	E10

Surface Warfare	
Missile Exercise Air-to-Surface (MISSILEX)	
Procedural Mitigation Measures	<p>Acoustic Stressors (<i>Section 5.3.2</i>) Weapons firing noise</p> <p>Explosive Stressors: (<i>Section 5.3.3</i>) Explosive missiles and rockets</p> <p>Physical Disturbance and Strike Stressors: (<i>Section 5.3.4</i>) Non-explosive missiles and rockets</p>
Assumptions Used for Analysis	<p>Assume one missile and one target per event.</p> <p>While missiles could explode above the water's surface after contacting targets, analysis assumes all warheads explode at or just below the water's surface.</p> <p>Targets are usually recovered but could be lost due to damage.</p> <p>This activity occurs greater than 12 NM from land (FDM excepted).</p>

A.1.9.11 Missile Exercise Air-to-Surface – Rocket

Surface Warfare			
Missile Exercise Air-to-Surface – Rocket			
Short Description	Helicopter aircrews fire both precision-guided and unguided rockets at surface targets.	Typical Duration 1 hour	
Long Description	Helicopters designate an at-sea surface target with a laser or optics for precision-guided high explosive or non-explosive practice munitions rockets. Unguided rockets may also be used during this event.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, support vessel, unmanned aerial system - rotary wing Targets: Surface targets Systems being Trained/Tested: Aircraft platforms		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety laser safety Weapons firing safety Laser procedures Unmanned aerial and underwater vehicle procedures Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Aircraft noise Weapons noise Explosive: In-air explosions In-water explosions	Physical Disturbance and Strike: Vessels and in-water devices Aircraft and aerial target Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices Lasers Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals Chemicals	
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: Rocket (explosive) fragments, target fragments Non-Ingestible Material: Mk 58 marine marker, rocket (non-explosive)	Military Recoverable Material	Surface target (mobile and stationary)
Sonar and Other Transducer Bins	None		
Explosive Bins	E3		

Surface Warfare	
Missile Exercise Air-to-Surface – Rocket	
Procedural Mitigation Measures	<p>Acoustic Stressors (Section 5.3.2) Weapons firing noise</p> <p>Explosive Stressors: (Section 5.3.3) Explosive missiles and rockets</p> <p>Physical Disturbance and Strike Stressors: (Section 5.3.4) Non-explosive missiles and rockets</p>
Assumptions Used for Analysis	<p>Assume all explosive rockets detonate in water. Rockets may be used in conjunction with force protection events. The in-air low energy laser stressor was used in analysis of potential impacts on human resources. Targets are usually recovered but could be lost due to damage. This activity would occur greater than 12 NM from land (FDM excepted).</p>

A.1.9.12 Missile Exercise Surface-to-Surface

Surface Warfare			
Missile Exercise Surface-to-Surface			
Short Description	Surface ship crews defend against surface threats (ships or small boats) and engage them with missiles.	Typical Duration	
		2–5 hours	
Long Description	<p>Surface ships launch missiles at surface maritime targets with the goal of destroying or disabling enemy ships or boats.</p> <p>After detecting and confirming a surface threat, the ship will fire a precision guided surface missile.</p> <p>Events with destroyers and cruisers will involve long range (over the horizon) Harpoon (or similar) surface missiles. While past Harpoon events occurred during sinking exercises, the requirement exists for non-sinking exercise events to certify ship crews. If a sinking exercise target is unavailable, a towed sled would likely be used.</p> <p>Events with littoral combat and patrol combatant ships will involve shorter range surface missiles, such as Hellfire and Griffin. Events with littoral combat and patrol combatant ships would be to certify ship’s crew to defend against “close-in” (less than 10 miles) surface threats.</p> <p>These exercises are live fire, meaning that a missile is fired down range. Surface missiles could be equipped with either high-explosive or non-explosive warheads.</p>		
Typical Components	<p>Platforms: Surface combatant</p> <p>Targets: Surface targets</p> <p>Systems being Trained/Tested: None</p>		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		<p>Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace</p>	<p>Bays/Estuaries/Pierside: None</p>
Stressors to Biological Resources	<p>Acoustic: Vessel noise Weapons noise</p>	<p>Physical Disturbance and Strike: Vessels and in-water devices Military expended materials</p>	<p>Energy: In-air electromagnetic devices</p>
	<p>Explosive: In-air explosions In-water explosions</p>	<p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Entanglement: None</p>
Stressors to Physical Resources	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: Explosives Metals</p>	<p>Chemicals</p>
Stressors to Human Resources	<p>Cultural Resources: Explosives Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: In-air energy Underwater energy Physical interactions</p>

Surface Warfare			
Missile Exercise Surface-to-Surface			
Military Expended Material	<p>Ingestible Material: Missile (explosive) fragments, target fragments</p> <p>Non-Ingestible Material: None</p>	Military Recoverable Material	Surface target (mobile and stationary)
Sonar and Other Transducer Bins	None		
Explosive Bins	E6 E10		
Procedural Mitigation Measures	<p>Acoustic Stressors (<i>Section 5.3.2</i>) Weapons firing noise</p> <p>Physical Disturbance and Strike Stressors(<i>Section 5.3.4</i>) Vessel movement</p> <p>Explosive Stressors (<i>Section 5.3.3</i>) Explosive missiles and rockets</p>		
Assumptions Used for Analysis	<p>Assume one missile and one target used per event. While missile could explode above water's surface after contacting target, analysis assumes all warheads explode at or just below surface. Targets are usually recovered but could be lost due to damage. This activity would occur greater than 50 NM from land (FDM excepted).</p>		

A.1.9.13 Sinking Exercise

Surface Warfare			
Sinking Exercise			
Short Description	Aircraft, ship, and submarine crews deliberately sink a seaborne target, usually a decommissioned ship made environmentally safe for sinking according to U.S. Environmental Protection Agency standards, with a variety of ordnance.	Typical Duration	
		4–8 hours, possibly over 1–2 days	
Long Description	<p>Ship personnel and aircrew deliver high-explosive ordnance on a seaborne target, (large deactivated vessel), which is deliberately sunk using multiple weapon systems. A sinking exercise is typically conducted by aircraft, surface vessels, and submarines to train in live ordnance delivery on a full size ship target.</p> <p>The target is typically a decommissioned ship made environmentally safe for sinking according to U.S. Environmental Protection Agency standards. The location is greater than 50 nautical miles from shore and in water depths greater than 6,000 feet (ft.).</p> <p>Ship, aircraft, and submarine crews attack with coordinated tactics and deliver a variety of inert and high-explosive ordnance. Typically, the exercise lasts for 4 to 8 hours and possibly over 1 to 2 days; however, it is unpredictable and ultimately ends when the target ship sinks.</p>		
Typical Components	<p>Platforms: Fixed-wing aircraft, submarines, support craft, surface combatant</p> <p>Targets: Ship hulk</p> <p>Systems being Trained/Tested: Large-caliber gun systems, missile systems, bombs, torpedoes, small-caliber gun systems, targeting systems</p>		
Standard Operating Procedures (Section 2.3.3)	Vessel safety Aircraft safety Weapons firing safety Sinking exercise safety	Typical Locations	
		<p>Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area</p>	<p>Bays/Estuaries/Pierside: None</p>
Stressors to Biological Resources	<p>Acoustic: Aircraft noise Vessel noise Weapons noise</p> <p>Explosive: In-air explosions In-water explosions</p>	<p>Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials Seafloor devices</p> <p>Ingestion: Military expended materials – munitions Military expended materials – other than munitions</p>	<p>Energy: In-air electromagnetic devices</p> <p>Entanglement: Wires and cables</p>
	<p>Air Quality: Criteria air pollutants</p>	<p>Sediments and Water Quality: Explosives Metals</p>	<p>Chemicals</p>
Stressors to Physical Resources			
Stressors to Human Resources	<p>Cultural Resources: Explosives Physical disturbance and strike</p>	<p>Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike</p>	<p>Public Health and Safety: In-air energy Underwater energy Physical interactions</p>

Surface Warfare				
Sinking Exercise				
Military Expended Material	Ingestible Material: Bomb (explosive) fragments, heavyweight torpedo (explosive) fragments, large caliber projectile (explosive) fragments, missile (explosive) fragments, small caliber projectile (non-explosive), small caliber casings Non-Ingestible Material: Ship hulk, heavyweight torpedo accessories, guidance wire, large caliber projectile (non-explosive), large caliber casings		Military Recoverable Material	None
Sonar and Other Transducer Bins	Torpedoes: TORP2			
Explosive Bins	E5	E8	E10	E11 E12
Procedural Mitigation Measures	Acoustic Stressors: (Section 5.3.2) Weapons firing noise Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement		Explosive Stressors: (Section 5.3.3) Sinking Exercises	
Assumptions Used for Analysis	Events occur greater than 50 nautical miles from shore and in water depths greater than 6,000 ft. during daylight hours only. The participants and assets typically include: <ul style="list-style-type: none"> • 1 full-size target ship hulk • 1–5 CG, DDG, or LCS ships • 1-10 Fixed-wing aircraft (e.g., F/A-18, or maritime patrol aircraft) • 1 or 2 MH-60 helicopters • 1 E-2 aircraft for Command and Control • 1 submarine • 1–3 range clearance aircraft For purposes of analysis, the below represents the types of munitions that might be employed. Actual SINKEX ordnance expenditures will vary. <ul style="list-style-type: none"> • 1–2 Harpoon surface-to-surface or air-to-surface missiles • 2–4 Maverick or Hellfire air-to-surface missiles • 2–12 MK-80 series general purpose bombs • 200 rounds large-caliber projectiles • 1–2 MK-48 heavyweight submarine-launched torpedo • Assume 2 guidance wires expended per event Acoustic effects modeling assumed only a percentage of munitions missed target and exploded in water. Precision guided munitions are assumed to impact target well above waterline and are not modeled (or reported) as in water explosions.			

A.1.10 OTHER TRAINING EXERCISES

A.1.10.1 Direct Action (Tactical Air Control Party)

Other Training Exercises			
Direct Action (Tactical Air Control Party)			
Short Description	Military personnel train for controlling of combat support aircraft; providing airspace de-confliction and terminal control for Close Air Support.	Typical Duration	
		Multiple days	
Long Description	Tactical Air Control personnel, once at Farallon de Medinilla, participate in tactical air control training in conjunction with an Air-to-Ground bombing or missile exercise, They may also employ small arms, grenades, mortars, and crew served weapons in direct action against targets on the island.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, small boats Targets: None Systems being Trained/Tested: Small-caliber rounds, explosive grenades and mortars		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety Laser procedures Target Deployment and Retrieval Safety Farallon de Medinilla Access Restrictions	Typical Locations	
		Range Complexes/Testing Ranges: Farallon de Medinilla	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices	Energy: None Entanglement: None
	Explosive: None	Ingestion: None	
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: None	Public Health and Safety: None
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	May involve overnight camping on FDM.		

A.1.10.2 Intelligence, Surveillance, Reconnaissance

Other Training Exercises			
Intelligence, Surveillance, Reconnaissance			
Short Description	Personnel train to collect and report battlefield intelligence.	Typical Duration Multiple days	
Long Description	Personnel conduct event to evaluate the battlefield, enemy forces, and gather intelligence. For training of assault forces, "red cell" units may be positioned ahead of the assault force and permitted a period of time to conduct surveillance and prepare defenses to the assaulting force.		
Typical Components	Platforms: Fixed-wing aircraft, small boat, unmanned aerial systems, submarines Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Unmanned Aerial and Underwater Vehicle Procedures Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex; Guam; Tinian; Rota; Saipan	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Ingestion: Military expended materials – other than munitions	Energy: None Entanglement: Decelerator/parachute Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: Decelerator/parachute Non-Ingestible Material: Sonobuoys (non-explosive), sonobuoy wires	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	None		

A.1.10.3 Precision Anchoring

Other Training Exercises			
Precision Anchoring			
Short Description	Surface ship crews release and retrieve anchors in designated locations.	Typical Duration Up to 1 hour	
Long Description	Ship crews choose the best available anchoring sites. The ship uses all means available to determine its position when anchor is dropped to demonstrate calculating and plotting the anchor's position within 100 yards of center of planned anchorage.		
Typical Components	Platforms: Navy Ships Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands anchorages	Bays/Estuaries/Pierside: Apra Harbor
Stressors to Biological Resources	Acoustic: Vessel noise Explosive: None	Physical Disturbance and Strike: Vessels and in-water devices Seafloor devices Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Chemicals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	Anchors
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	None		

A.1.10.4 Search and Rescue At Sea

Other Training Exercises			
Search and Rescue At Sea			
Short Description	Helicopter and ship crews rescue military personnel at sea.	Typical Duration	
		Up to 3 days	
Long Description	Helicopter, ship, and submarine crews practice the skills required to recover personnel lost at sea. Helicopters locate survivors and deploy rescue swimmer and rescue basket. Survivors are winched up to the hovering helicopter. Surface ships would conduct man overboard drills and deploy a dummy figure in the water. Ship crews would launch a small boat, direct the recovery of the dummy, and recover the small boat. Submarine crews would maneuver submarine to effect recovery of personnel.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, surface ships, unmanned aerial vehicles Targets: None Systems being Trained/Tested:		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Unmanned Aerial and Underwater Vehicle Procedures Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Test and Training Study Area	Bays/Estuaries/Pierside: Apra Harbor and Mariana littorals
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessel and in-water devices Military expended materials Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	None		

A.1.10.5 Small Boat Attack

Other Training Exercises			
Small Boat Attack			
Short Description	Afloat units defend against small boat or personal water craft attack	Typical Duration 6 hours	
Long Description	For this activity, one or two small boats or personal watercraft conduct attack activities on units afloat, training ship crews how to respond to small boat attack in harbors, restricted channels, and nearshore areas using non-lethal means or armament appropriate to the threat and location.		
Typical Components	Platforms: Small boat, unmanned surface vehicle, ships Targets: Surface targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Unmanned Aerial and Underwater Vehicle Procedures Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor and Mariana littorals
Stressors to Biological Resources	Acoustic: Vessel noise Explosive: None	Physical Disturbance and Strike: Vessel and in-water devices Military expended materials Ingestion: Military Expended Materials – Munitions Military Expended Materials – Other than munitions	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions In-air energy
Military Expended Material	Ingestible Material: Small caliber projectile (non-explosive), small caliber casings, small caliber blanks Non-Ingestible Material: None	Military Recoverable Material	Surface target (stationary)
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		

Other Training Exercises	
Small Boat Attack	
Assumptions Used for Analysis	

A.1.10.6 Submarine Navigation

Other Training Exercises			
Submarine Navigation			
Short Description	Submarine crews operate sonar for navigation and detection while transiting into and out of port during reduced visibility.	Typical Duration	
		Up to 2 hours	
Long Description	Submarine crews train to operate sonar for navigation. The ability to navigate using sonar is critical for detection while transiting into and out of port during periods of reduced visibility. During this activity the submarine will be surfaced.		
Typical Components	Platforms: Submarines Targets: None Systems being Trained/Tested: High-frequency sonar, mid-frequency sonar (hull-mounted)		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor and Mariana littorals
Stressors to Biological Resources	Acoustic: Sonar and other transducers	Physical Disturbance and Strike: Vessels and in-water devices	Energy: None
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: None	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions Underwater energy
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	High Frequency: HF1	Mid-Frequency: MF3	
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar		Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement

Other Training Exercises	
Submarine Navigation	
Assumptions Used for Analysis	None

A.1.10.7 Submarine Sonar Maintenance

Other Training Exercises			
Submarine Sonar Maintenance			
Short Description	Maintenance of submarine sonar and other system checks are conducted pierside or at sea.	Typical Duration Up to 1 hour	
Long Description	A submarine performs periodic maintenance on the AN/BQQ-10 and submarine high-frequency sonar systems while in port or at sea. Submarines conduct maintenance to their sonar systems in shallow water near their homeport, however, sonar maintenance could occur anywhere as the system's performance may warrant.		
Typical Components	Platforms: Submarines Targets: None Systems being Trained/Tested: Mid-frequency hull mounted sonar		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Pierside testing safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor and Mariana littorals
Stressors to Biological Resources	Acoustic: Sonar and other transducers	Physical Disturbance and Strike: Vessels and in-water devices	Energy: None
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: None	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Airborne acoustics	Public Health and Safety: Underwater energy
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	Mid-Frequency: MF3		
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar		Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
	Assumptions Used for Analysis Conducted at pier or while underway		

A.1.10.8 Surface Ship Sonar Maintenance

Other Training Exercises			
Surface Ship Sonar Maintenance			
Short Description	Maintenance of surface ship sonar and other system checks are conducted pierside or at sea.	Typical Duration Up to 4 hours	
Long Description	This scenario consists of surface ships performing periodic maintenance to the AN/SQS-53 sonar and other ship systems while in port or at sea. This maintenance takes up to four hours. Surface ships operate active sonar systems for maintenance while in shallow water near their homeport, however, sonar maintenance could occur anywhere as the system's performance may warrant.		
Typical Components	Platforms: Surface combatant Targets: None Systems being Trained/Tested: Mid-frequency hull mounted		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Pierside testing safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor and Mariana littorals
Stressors to Biological Resources	Acoustic: Sonar and other transducers Vessel noise Explosive: None	Physical Disturbance and Strike: Vessels and in-water devices Ingestion: None	Energy: In-air electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: None	Public Health and Safety: Underwater energy
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	Mid-Frequency: MF1		
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement	
Assumptions Used for Analysis	Conducted at pier or while underway		

A.1.10.9 Underwater Survey

Other Training Exercises			
Underwater Survey			
Short Description	Navy divers train in survey of underwater conditions and features in preparation for insertion, extraction, or intelligence, surveillance, and reconnaissance activities.	Typical Duration	
		4 hours	
Long Description	A survey of underwater terrain conditions nearshore and a report of findings to provide precise analysis for amphibious landings. Personnel perform methodical reconnoitering of beaches and surf conditions during the day and night to find and clear underwater obstacles and determine the feasibility of landing an amphibious force on a particular beach.		
Typical Components	Platforms: Small boats Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Bays/Estuaries/Pierside: Apra Harbor and Mariana littorals
Stressors to Biological Resources	Acoustic: Vessel noise	Physical Disturbance and Strike: Vessel and in-water devices	Energy: None
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	Hand-held (or similar) <i>de minimis</i> sonar sources may be used. During the conduct of underwater survey activities personnel may stand in the surf zone and walk onto the beach.		

A.1.10.10 Unmanned Aerial Vehicle Training and Certification

Other Training Exercises			
Unmanned Aerial System Training and Certification			
Short Description	Units conduct training with unmanned aerial vehicles from a variety of platforms including surface ships and submarines.	Typical Duration	
		2 days	
Long Description	Conduct unmanned aerial vehicle activity in support of tactical and theater requirements. During training, personnel use radio frequency communications to control and communicate with the unmanned aerial system during its flight.		
Typical Components	Platforms: Submarines, surface ship, unmanned aerial system-fixed wing Targets: Land targets, surface targets Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Unmanned aerial and underwater vehicle procedures Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area Mariana Islands Range Complex airfields (Orote Point Airfield, Guam; Northwest Airfield, Guam; North Airfield, Tinian) Mariana Islands Special Use Airspace	Bays/Estuaries/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials Vessel and in-water devices Ingestion: None	Energy: None Entanglement: None
	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Physical Resources			
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: None	Public Health and Safety: None
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: Canister, weight, flotation collar		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		

Other Training Exercises	
Unmanned Aerial System Training and Certification	
Assumptions Used for Analysis	Unmanned aerial vehicles are typically recovered; however, some units may be lost and some are designed to be expendable. Submarine launched unmanned aerial systems result in expenditure of ballast weight and launched capsule.

A.1.10.11 Unmanned Underwater Vehicle Training

Other Training Exercises			
Unmanned Underwater Vehicle Training			
Short Description	Units conduct training with unmanned underwater vehicles from a variety of platforms including surface ships, small boats, and submarines.	Typical Duration	
		Up to 24 hours	
Long Description	Conduct unmanned underwater vehicle activities in support of tactical and theater requirements. Unmanned underwater vehicle activities involves training with unmanned platforms on which various sensors and payloads are attached and used for different purposes, such as mine warfare, bottom mapping, and other missions. Vehicles may be crew served or mechanically launched from ships and submarines.		
Typical Components	Platforms: Surface ships, small boats, submarines, support craft, unmanned underwater vehicle Targets: Mine shapes Systems being Trained/Tested: Acoustic modem, high-frequency sonar, synthetic aperture sonar		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Unmanned aerial and underwater vehicle procedures Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex	Bays/Estuaries/Pierside: Apra Harbor and Mariana littorals
Stressors to Biological Resources	Acoustic: Sonar and other transducers Vessel noise Explosive: None	Physical Disturbance and Strike: Vessels and in-water devices Military expended materials Seafloor devices Ingestion: None	Energy: None Entanglement: None
	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Physical Resources			
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions In-air energy Underwater energy
	Ingestible Material: None Non-Ingestible Material: Anchors	Military Recoverable Material	Mine shapes (non-explosive)
Sonar and Other Transducer Bins	Forward Looking Sonar: FLS2	Acoustic Modems: M3	Synthetic Aperture Sonar: SAS2 SAS4

Other Training Exercises	
Unmanned Underwater Vehicle Training	
Explosive Bins	None
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	None

A.2 TESTING ACTIVITIES

A.2.1 NAVAL AIR SYSTEMS COMMAND TESTING ACTIVITIES

Naval Air Systems Command activities will generally fall under Fleet primary mission areas, such as the testing of airborne mine warfare and anti-submarine warfare weapons and systems. Naval Air Systems Command activities include, but are not limited to, the testing of new aircraft platforms (e.g., the P-8 maritime patrol aircraft), weapons, and systems (e.g., newly developed sonobuoys) that will ultimately be integrated into Fleet training activities. In addition to testing new platforms, weapons, and systems, Naval Air Systems Command also conducts lot acceptance testing of sonobuoys and follow-on testing and evaluation of updated systems in support of Fleet operational units. In general, the potential environmental effects from most Naval Air Systems Command testing events are similar to the associated Fleet training events.

While many of these systems tested by Naval Air Systems Command will ultimately be used by the Fleet, testing activities involving the same or similar systems may be conducted in different locations and manners than when conducted by the Fleet. Because of these differences, the results of the analysis for testing activities may differ from the results for training activities.

A.2.1.1 Anti-Submarine Warfare

A.2.1.1.1 Anti-Submarine Warfare Torpedo Test

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Test			
Short Description	This event is similar to the training event torpedo exercise. Test evaluates anti-submarine warfare systems onboard rotary-wing and fixed-wing aircraft and the ability to search for, detect, classify, localize, track, and attack a submarine or similar target.	Typical Duration	
		2–6 flight hours per event	
Long Description	Similar to a torpedo exercise, an anti-submarine warfare (ASW) torpedo test evaluates anti-submarine warfare systems onboard rotary-wing (e.g., MH-60R helicopter) and fixed-wing (marine patrol aircraft P-8, P-3) aircraft and the ability to search for, detect, classify, localize, track, and attack a submarine or similar target (e.g., MK-39 expendable mobile ASW training target [EMATT], or MK-30). The focus of the anti-submarine warfare torpedo test is the operation of non-explosive torpedoes (e.g., MK-46 or MK-54), but other anti-submarine warfare systems are often used during the test. MK-39 (EMATT) or MK-30 targets simulate a submarine threat and are deployed at varying depths and speeds. If available, tests may be conducted using an actual submarine as the target. This activity can be conducted in shallow or deep waters and aircraft can originate from a land base or from a surface ship. The torpedo test culminates with the release of an exercise torpedo against the target and is intended to evaluate the targeting, release, and tracking process of deploying torpedoes from aircraft. All exercise torpedoes used in testing are either running or non-running and are non-explosive. Eighty-five percent of torpedoes are recovered. A parachute assembly used for aircraft-launched torpedoes is jettisoned and sinks. Ballast (typically lead weights) may be released from the torpedoes to allow for recovery, and sink to the bottom.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, range support craft Targets: Sub-surface targets Systems being Trained/Tested: Torpedoes/torpedo launching systems		
Standard Operating Procedures (Section 2.3.3)	Aircraft safety Target Deployment and Retrieval Safety Weapons firing safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise	Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials Seafloor devices	Energy: In-air electromagnetic devices
	Explosive: None	Ingestion: Military expended materials – other than munitions	Entanglement: Decelerators/parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Chemicals Other materials	
	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions

Anti-Submarine Warfare			
Anti-Submarine Warfare Torpedo Test			
Military Expended Material	<p>Ingestible Material: Decelerators/parachutes - small</p> <p>Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, lightweight torpedo accessories, sonobuoy (non-explosive), sonobuoy wires,</p>	Military Recoverable Material	Lightweight torpedo (non-explosive), sub-surface target (mobile)
Sonar and Other Transducer Bins	Mid-Frequency: MF5	Torpedoes: TORP1	
Explosive Bins	None		
Procedural Mitigation Measures	<p>Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar Vessel movement</p> <p>Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement</p>		
Assumptions Used for Analysis	<p>Assume one torpedo accessory package (parachute, ballast) per torpedo. Assume one target per torpedo.</p> <p>This activity would occur greater than 3 NM from land.</p>		

A.2.1.1.2 Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft			
Short Description	The test evaluates the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements.	Typical Duration	
		8 flight hours per event	
Long Description	Similar to an anti-submarine warfare (ASW) tracking exercise-maritime patrol aircraft, an anti-submarine warfare tracking test – maritime patrol aircraft evaluates the sensors and systems used to detect and track submarines and to ensure that platform systems used to deploy the tracking systems perform to specifications and meet operational requirements. P-3 or P-8 fixed-wing aircraft conduct anti-submarine warfare testing using non-impulsive sonobuoys (e.g., AN/SSQ-62 DICASS), explosive sonobuoys (e.g., MK-61 SUS), passive sonobuoys (e.g., AN/SSQ-53 DIFAR), and smoke devices (e.g., MK-58). Targets (e.g., MK-39 Expendable Mobile ASW Training Target) may also be employed during an anti-submarine warfare scenario. If available, tests may be conducted using an actual submarine as the target. This activity would be conducted in deep (typically beyond 100 feet) waters. Some anti-submarine warfare maritime patrol aircraft tracking tests could be conducted as part of a coordinated event with Fleet training activities.		
Typical Components	Platforms: Fixed-wing aircraft, range support craft Targets: Sub-surface targets Systems being Trained/Tested: Sonobuoys/sonobuoy launching systems, data transmission systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Vessel safety Target Deployment and Retrieval Safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Explosive: In-air explosions In-water explosions	Physical Disturbance and Strike: Aircraft and aerial target Vessels and in-water devices Military expended materials Ingestion: Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: Decelerators/parachutes Wires and cables
	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals	Chemicals Other materials
Stressors to Physical Resources			
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy Physical interactions

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft			
Military Expended Material	<p>Ingestible Material: Sonobuoy (explosive) fragments, decelerators/parachutes – small</p> <p>Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, sonobuoy (non-explosive), sonobuoy wires</p>	Military Recoverable Material	Sub-surface target (mobile)
Sonar and Other Transducer Bins	<p>Anti-Submarine Warfare: ASW2 ASW5</p> <p>Mid-Frequency: MF5 MF6</p>		
Explosive Bins	E1 E3		
Procedural Mitigation Measures	<p>Acoustic Stressors: (Section 5.3.2) Active sonar</p> <p>Explosive Stressors: (Section 5.3.3) Explosive Sonobuoys</p>		
Assumptions Used for Analysis	This activity would occur greater than 3 NM from land.		

A.2.1.2 Electronic Warfare

A.2.1.2.1 Intelligence Surveillance Reconnaissance/Electronic Warfare Testing

Electronic Warfare			
ISR/EW Testing			
Short Description	Aircrews use all available sensors to collect data on threat vessels.	Typical Duration 2–20 flight hours per event	
Long Description	An air warfare intelligence, surveillance, and reconnaissance (ISR) test involves evaluating communications capabilities of aircraft, including unmanned aerial systems that can carry cameras, sensors, communications equipment, or other payloads. New systems are tested at sea to ensure proper communications between aircraft and ships. ISR aircraft systems act as eyes in the sky, relaying raw imagery back to military personnel on the ground or to ships at sea. The data is processed, analyzed, and shared with U.S. Navy or other U.S. military aircraft or vessels. New ISR technology systems provide combat identification (friend or foe) and are used for aircraft and ship-based communications.		
Typical Components	Platforms: Unmanned aerial system – fixed-wing Targets: None Systems being Trained/Tested: ISR systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Unmanned aerial and underwater vehicle procedures	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex; Guam; Tinian; Rota; Saipan	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: None Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Ingestion: None	Energy: In-air electromagnetic devices Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Airborne acoustics	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	None		
Assumptions Used for Analysis	None		

A.2.1.3 Surface Warfare

Surface warfare is a type of naval warfare in which aircraft, surface ships, and submarines employ weapons, sensors, and operations directed against enemy surface vessels. Naval Air Systems Command surface warfare tests include air-to-surface missile, gunnery, and bombing tests, rocket tests, laser targeting tests, and high-energy laser weapons tests.

A sinking exercise is a specialized Fleet training event that provides an opportunity for Naval Air Systems Command aircrew along with ship and submarine crews to deliver explosive ordnance on a deactivated vessel that has been cleaned and environmentally remediated. The vessel is deliberately sunk using multiple weapons systems. A Naval Air Systems Command testing event may take place in conjunction with a sinking exercise to test aircraft or aircraft systems in the delivery of explosive ordnance on a surface target.

A.2.1.3.1 Air-to-Surface Missile Test

Surface Warfare			
Air-to-Surface Missile Test			
Short Description	This event is similar to the training event missile exercise air-to-surface. Test may involve both fixed-wing and rotary-wing aircraft launching missiles at surface maritime targets to evaluate the weapons system or as part of another systems integration test.	Typical Duration	
		2–4 flight hours per event	
Long Description	Similar to a missile exercise air-to-surface, an air-to-surface missile test may involve both fixed-wing and rotary-wing aircraft launching missiles at surface maritime targets to evaluate the weapons system or as part of another systems integration test. Air-to-surface missile tests can include high explosive, non-explosive, or non-firing (captive air training missile) weapons. Laser targeting systems may also be used. Both stationary and mobile targets would be utilized during testing		
Typical Components	Platforms: Fixed-wing aircraft Targets: Surface targets Systems being Trained/Tested: Missile firing/launching systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Aircraft safety Laser Procedures Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Weapons noise	Physical Disturbance and Strike: Aircraft and aerial targets Military expended materials	Energy: In-air electromagnetic devices
	Explosive: In-air explosions In-water explosions	Ingestion: Military expended materials – munitions Military expended materials – Other than munitions	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants		Sediments and Water Quality: Explosives Metals Chemicals Other materials
	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: Missile (explosive) fragments, target fragments Non-Ingestible Material: None	Military Recoverable Material	Surface target (mobile and stationary)
Sonar and Other Transducer Bins	None		

Surface Warfare	
Air-to-Surface Missile Test	
Explosive Bins	E10
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: Explosive Stressors: <i>(Section 5.3.3)</i> <i>(Section 5.3.4)</i> Explosive missiles and rockets Non-explosive missiles and rockets
Assumptions Used for Analysis	This activity would typically occur greater than 50 NM from shore.

A.2.2 NAVAL SEA SYSTEMS COMMAND TESTING ACTIVITIES

A.2.2.1 Anti-Submarine Warfare

A.2.2.1.1 Anti-Submarine Warfare Mission Package Testing

Anti-Submarine Warfare			
Anti-Submarine Warfare Mission Package Testing			
Short Description	Ships and their supporting platforms (e.g., helicopters and unmanned aerial systems) detect, localize, and prosecute submarines.	Typical Duration	
		1–2 weeks, with 4–8 hours of active sonar use with intervals of non-activity in between.	
Long Description	Littoral combat ships conduct detect-to-engage operations against modern diesel-electric and nuclear submarines using airborne and surface assets (both manned and unmanned). Active and passive acoustic systems are used to detect and track submarine targets, culminating in the deployment of lightweight torpedoes to engage the threat.		
Typical Components	Platforms: Rotary-wing aircraft, surface combatant Targets: Sub-surface targets Systems being Trained/Tested: Sonar systems, countermeasure systems, torpedo systems, sonobuoys		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Towed in-water device safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Ingestion: Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: Decelerators/parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Chemicals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Acoustic countermeasures, expended bathythermograph, expended bathythermograph wire, lightweight torpedo accessories, sonobuoy (non-explosive), sonobuoy wires	Military Recoverable Material	Sub-surface target (mobile) – recovered, lightweight torpedo (non-explosive)
Sonar and Other Transducer Bins	Anti-Submarine Warfare: ASW1 ASW2 ASW3 ASW5	Mid-Frequency: MF4 MF5 MF12	Torpedoes: TORP1

Anti-Submarine Warfare			
Anti-Submarine Warfare Mission Package Testing			
Explosive Bins	None		
Procedural Mitigation Measures	<table border="0"> <tr> <td style="vertical-align: top;"> Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar </td> <td style="vertical-align: top;"> Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices </td> </tr> </table>	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices
Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement Towed in-water devices		
Assumptions Used for Analysis	All sonobuoys have parachutes unless otherwise noted. Sub-surface targets are submarines.		

A.2.2.1.2 At-Sea Sonar Testing

Anti-Submarine Warfare			
At-Sea Sonar Testing			
Short Description	At-sea testing to ensure systems are fully functional in an open ocean environment.	Typical Duration From 4 hours to 11 days	
Long Description	At-sea sonar testing is required to calibrate or document the functionality of sonar and torpedo systems while the ship or submarine is in an open ocean environment. At-sea sonar testing is conducted to verify the ship meets design acoustic specifications, define the underwater characteristics of the ship, determine effects of systems and equipment on ship's acoustic characteristics, and provide technical background necessary to initiate development of design improvements to reduce noise. Tests also consist of electronic support measurement, photonics, and sonar sensor accuracy testing. In some instances, a submarine's passive detection capability is tested when a second submarine utilizes its active sonar or is equipped with a noise augmentation system in order to replicate acoustic or electromagnetic signatures of other vessel types or classes.		
Typical Components	Platforms: Fixed platform, submarines Targets: None Systems being Trained/Tested: High and mid-frequency sonar, acoustic modems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Explosive: None	Physical Disturbance and Strike: Military expended materials Ingestion: None	Energy: In-water electromagnetic devices In-air electromagnetic devices Entanglement: Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Other materials	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire	Military Recoverable Material	None
Sonar and Other Transducer Bins	High-Frequency: HF1 HF6	Acoustic Modems: M3	Mid-Frequency: MF3 MF9
Explosive Bins	None		

Anti-Submarine Warfare		
At-Sea Sonar Testing		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	Active sonar is intermittent throughout the duration of this event.	

A.2.2.1.3 Torpedo (Explosive) Testing

Anti-Submarine Warfare			
Torpedo (Explosive) Testing			
Short Description	Air, surface, or submarine crews employ explosive and non-explosive torpedoes against artificial targets.	Typical Duration	
		1–2 days during daylight hours	
Long Description	Non-explosive and explosive torpedoes (carrying a warhead) will be launched at a suspended target by a submarine and fixed- or rotary-wing aircraft or surface combatants. Event duration is one to two days during daylight hours.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, moored platform, submarines, support craft, surface combatant Targets: Sub-surface targets; surface targets Systems being Trained/Tested: Sonar systems, acoustic countermeasures, sonobuoys, torpedo systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Explosive: In-water explosions	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: Decelerators/parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals	Chemicals Other materials
Stressors to Human Resources	Cultural Resources: Explosives Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: In-air energy Underwater energy Physical interactions
Military Expended Material	Ingestible Material: Lightweight torpedo (explosive) fragments, heavyweight torpedo (explosive) fragments, decelerators/parachutes - small, target fragments Non-Ingestible Material: Buoy (non-explosive), expended bathythermograph, expended bathythermograph wire, guidance wire, heavyweight torpedo accessories, lightweight torpedo accessories, sonobuoy (non-explosive), sonobuoy wires	Military Recoverable Material	Heavyweight (non-explosive) torpedo, lightweight torpedo (non-explosive), sub-surface target (stationary), surface target (stationary)

Anti-Submarine Warfare							
Torpedo (Explosive) Testing							
Sonar and Other Transducer Bins	<table border="0"> <tr> <td>Anti-Submarine Warfare: ASW3</td> <td>High-Frequency: HF1 HF6</td> <td>Mid-Frequency: MF1 MF3 MF4 MF5 MF6</td> </tr> <tr> <td colspan="3">Torpedoes: TORP1 TORP2</td> </tr> </table>	Anti-Submarine Warfare: ASW3	High-Frequency: HF1 HF6	Mid-Frequency: MF1 MF3 MF4 MF5 MF6	Torpedoes: TORP1 TORP2		
Anti-Submarine Warfare: ASW3	High-Frequency: HF1 HF6	Mid-Frequency: MF1 MF3 MF4 MF5 MF6					
Torpedoes: TORP1 TORP2							
Explosive Bins	E8 E11						
Procedural Mitigation Measures	<table border="0"> <tr> <td>Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar</td> <td>Explosive Stressors: <i>(Section 5.3.3)</i> Explosive torpedoes</td> </tr> <tr> <td colspan="2">Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement</td> </tr> </table>	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive torpedoes	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement			
Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar	Explosive Stressors: <i>(Section 5.3.3)</i> Explosive torpedoes						
Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement							
Assumptions Used for Analysis	Only one heavyweight torpedo test could occur on a single day; two heavyweight torpedo tests could occur on consecutive days. Two lightweight torpedo tests could occur in a single day. All non-explosive torpedoes are recovered.						

A.2.2.1.4 Torpedo (Non-Explosive) Testing

Anti-Submarine Warfare			
Torpedo (Non- Explosive) Testing			
Short Description	Air, surface, or submarine crews employ non-explosive torpedoes against submarines or surface vessels.	Typical Duration	
		Up to 2 weeks	
Long Description	Aerial, surface, and subsurface assets fire exercise torpedoes against surface or subsurface targets or at no target and programmed with a particular run geometry. Torpedo testing evaluates the performance and the effectiveness of hardware and software upgrades of heavyweight or lightweight torpedoes. It also includes testing of experimental torpedoes. Not all torpedo tests involve acoustics. Exercise torpedoes are recovered, typically from surface ships and helicopters that are specifically crewed and outfitted for torpedo recovery. Event duration is dependent on number of torpedoes fired.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, moored platform, submarines, support craft, surface combatant Targets: Sub-surface targets; surface targets Systems being Trained/Tested: Sonar systems, acoustic countermeasures, sonobuoys, torpedo systems		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Weapons firing safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials	Energy: In-air electromagnetic devices
	Explosive: None	Ingestion: Military expended materials – other than munitions	Entanglement: Decelerators/parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality:	
		Chemicals Metals	Other materials
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: Decelerators/parachutes - small	Military Recoverable Material	Heavyweight (non-explosive) torpedo, lightweight torpedo (non-explosive), sub-surface target (mobile), sub-surface target (stationary)
	Non-Ingestible Material: Acoustic countermeasures, buoy (non-explosive), expended bathythermograph, expended bathythermograph wire, guidance wire, heavyweight torpedo accessories, lightweight torpedo accessories, anti-torpedo torpedo, anti-torpedo torpedo accessories, sonobuoy (non-explosive), sonobuoy wires		

Anti-Submarine Warfare			
Torpedo (Non- Explosive) Testing			
Sonar and Other Transducer Bins	Anti-Submarine Warfare:		High-Frequency:
	ASW3	ASW4	HF1 HF6
	Mid-Frequency:		Torpedoes:
	MF1	MF3	TORP1 TORP2
	MF4	MF5	TORP3
	MF6		
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i>		Physical Disturbance and Strike Stressors:
	Active sonar		<i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	All torpedoes are recovered.		
	Events can last up to two weeks and use up to 40 torpedoes. Typically, no more than eight torpedoes are fired per day during daylight hours.		

A.2.2.2 Electronic Warfare

A.2.2.2.1 Radar and Other System Testing

Electronic Warfare			
Radar and Other System Testing			
Short Description	Test may include radiation of military or commercial radar, communication systems (or simulators), or high-energy lasers. Testing may occur aboard a ship against drones, small boats, rockets, missiles, or other targets.	Typical Duration	
		12 hours per day over a 7-day period	
Long Description	At-sea and docked testing may use radiation of military or commercial radar, communication systems (or simulators), or high-energy lasers. No subsurface transmission will occur during this testing. Testing of various air and surface targets may include unmanned aerial systems, or small craft (floating cardboard triwalls, towed, anchored, or self-propelled vessels). High-energy laser testing may include tracking, scoring, and neutralization runs with single or multiple targets.		
Typical Components	Platforms: Surface combatant Targets: Air targets; surface targets Systems being Trained/Tested: Radar, high-energy lasers		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Laser Procedures Unmanned aerial and underwater vehicle procedures High-energy laser safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Aircraft noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Ingestion: None	Energy: In-air electromagnetic devices In-water electromagnetic devices Lasers Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: In-air energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: Decelerators/parachutes – large, air target (drone)	Military Recoverable Material	Surface target (mobile and stationary), air targets

Electronic Warfare	
Radar and Other System Testing	
Sonar and Other Transducer Bins	None
Explosive Bins	None
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	High-energy lasers will not be tested pierside. Any sources used during this activity would be <i>de minimis</i> and not quantitatively analyzed and therefore are not included under munitions.

A.2.2.3 Mine Warfare

A.2.2.3.1 Mine Countermeasure and Neutralization Testing

Mine Warfare			
Mine Countermeasure and Neutralization Testing			
Short Description	Air, surface, and subsurface vessels neutralize threat mines and mine-like objects.	Typical Duration	
		1–10 days, with intermittent use of countermeasure/neutralization systems during this period	
Long Description	Mine countermeasure-neutralization and mine system testing is required to ensure systems can effectively neutralize threat (live or inert) mines that will otherwise restrict passage through an area and to ensure U.S. Navy mines remain effective against enemy ships. These systems may be deployed with a variety of ships, aircraft, submarines, or unmanned autonomous vehicles and operate in water depths up to 6,000 feet. Mines are neutralized by cutting mooring cables of buoyant mines, producing acoustic energy that fires acoustic-influence mines, employing radar or laser fields, producing electrical energy to replicate the magnetic signatures of surface ships in order to detonate threat mines, detonation of mines using remotely-operated vehicles, and using explosive charges to destroy threat mines.		
Typical Components	Platforms: Amphibious warfare ship, mine warfare ship, unmanned aerial system – rotary-wing, rotary-wing aircraft, surface combatant, unmanned underwater vehicle Targets: Mine shapes Systems being Trained/Tested: Electromagnetic devices, high-frequency sonar, radar, low energy lasers		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Unmanned aerial and underwater vehicle procedures Towed in-water device safety Laser Procedures Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex, nearshore, and littorals	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Seafloor devices	Energy: In-water electromagnetic devices In-air electromagnetic devices
	Explosive: In-water explosions	Ingestion: Military expended materials – munitions	Entanglement: Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Explosives Metals	Chemicals Other materials
	Cultural Resources: Explosives	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions

Mine Warfare			
Mine Countermeasure and Neutralization Testing			
Military Expended Material	Ingestible Material: Neutralizer (explosive) fragments Non-Ingestible Material: Fiber optic cable, fiber optic can, mine shape (non-explosive)	Military Recoverable Material	Anchor - mine
Sonar and Other Transducer Bins	High-Frequency: HF4		
Explosive Bins	E4		
Procedural Mitigation Measures	Acoustic Stressors: (Section 5.3.2) Active sonar Physical Disturbance and Strike Stressors: (Section 5.3.4) Vessel movement Towed in-water devices	Explosive Stressors: (Section 5.3.3) Explosive mine countermeasure and neutralization activities	
Assumptions Used for Analysis	Agat Bay underwater detonation site, 20 lb. net explosive weight (NEW) maximum charge. Piti and Outer Apra Harbor underwater detonation sites, 10 lb. NEW maximum.		

A.2.2.4 Surface Warfare Testing

A.2.2.4.1 Kinetic Energy Weapon Testing

Surface Warfare			
Kinetic Energy Weapon Testing			
Short Description	A kinetic energy weapon uses stored energy released in a burst to accelerate a projectile.	Typical Duration	
		1 day	
Long Description	A kinetic energy weapon uses stored energy released in a burst to accelerate a projectile to more than seven times the speed of sound to a range of up to 200 miles.		
Typical Components	Platforms: Surface combatant Targets: Air targets, surface targets Systems being Trained/Tested: Kinetic energy weapon		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Weapons firing safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area, Primary areas: Special Use Airspace	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Weapons noise Explosive: In-air explosions	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Ingestion: Military expended materials – munitions Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: None
	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: In-air energy Physical interactions
Military Expended Material	Ingestible Material: Large caliber (explosive) fragments, target fragments Non-Ingestible Material: Air target (drone), decelerator/parachute – large, kinetic energy round, large caliber projectile (non-explosive), large caliber casings, sabot - kinetic energy round, surface target (stationary)	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		

Surface Warfare	
Kinetic Energy Weapon Testing	
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	Assume one target per event. Explosive rounds are designed to detonate above the surface target.

A.2.2.5 Vessel Evaluation

A.2.2.5.1 Undersea Warfare Testing

Vessel Evaluation			
Undersea Warfare Testing			
Short Description	Ships demonstrate capability of countermeasure systems and underwater surveillance, weapons engagement and communications systems. This tests ships ability to detect, track, and engage undersea targets.	Typical Duration	
		Up to 10 days	
Long Description	Undersea warfare events may be comprised of tracking and firing events or tests of hull-mounted sonar system capabilities to detect and avoid torpedo type targets. Tracking and firing events ensure the operability of the undersea warfare suite and its interface with the rotary-wing helicopter. Tests include demonstrating the ability of the ship to search, detect, and track a target; and conduct attacks with exercise torpedoes. Detection and avoidance events may use surface craft and underwater platforms to test the capability of mid- and high-frequency acoustic sources. Subsurface moving targets, rocket and air-dropped weapons, sonobuoys, towed arrays and sub-surface torpedo-like devices may be used. Approximately one week of in-port training may precede the event.		
Typical Components	Platforms: Rotary-wing aircraft, surface combatant Targets: Sub-surface targets Systems being Trained/Tested: Acoustic countermeasures, sonar systems, sonobuoys, torpedo sonar		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety Target deployment and retrieval safety	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Range Complex	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Sonar and other transducers Aircraft noise Vessel noise Explosive: None	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices Military expended materials Ingestion: Military expended materials – other than munitions	Energy: In-air electromagnetic devices Entanglement: Decelerators/parachutes Wires and cables
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Metals Other materials	
Stressors to Human Resources	Cultural Resources: Physical disturbance and strike	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: Decelerators/parachutes - small Non-Ingestible Material: Expended bathythermograph, expended bathythermograph wire, lightweight torpedo accessories, sonobuoy (non-explosive), sonobuoy wires	Military Recoverable Material	Lightweight torpedo (non-explosive), sub-surface target (mobile)

Vessel Evaluation			
Undersea Warfare Testing			
Sonar and Other Transducer Bins	High-Frequency: HF4	Mid-Frequency: MF1 MF4 MF5	Torpedoes: TORP1
Explosive Bins	None		
Procedural Mitigation Measures	Acoustic Stressors: <i>(Section 5.3.2)</i> Active sonar		Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement
Assumptions Used for Analysis	Five targets per event. Sonobuoys from surface ships do not have an associated parachute. Ships will not be conducting test constantly during the entire duration.		

A.2.2.6 Other Testing

A.2.2.6.1 Simulant Testing

Other Testing Activities			
Simulant Testing			
Short Description	The capability of surface ship defense systems to detect and protect against chemical and biological attacks are tested.	Typical Duration	
		3 days	
Long Description	The capabilities of surface ship defense systems to detect and protect in the event of chemical and biological attacks are tested. Testing involves the deployment of harmless compounds (i.e., simulants) as substitutes for chemical and biological warfare agents. Methods of simulant delivery include aerial dispersal and hand-held spray.		
Typical Components	Platforms: Fixed-wing aircraft, rotary-wing aircraft, surface combatant Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Aircraft safety	Typical Locations	
		Range Complexes/Testing Ranges: Marianas Islands Training and Testing Study Area	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Aircraft noise Vessel noise	Physical Disturbance and Strike: Aircraft and aerial targets Vessels and in-water devices	Energy: In-air electromagnetic devices
	Explosive: None	Ingestion: None	Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: Chemicals Other materials	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Physical interactions
Military Expended Material	Ingestible Material: None	Military Recoverable Material	None
	Non-Ingestible Material: None		
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		
Assumptions Used for Analysis	All chemical simulants have low toxicity to humans and the environment. Examples of chemical simulants include glacial acetic acid and triethyl phosphate. All biological simulants are considered to be Biosafety Level 1 organisms. Examples of biological simulants are spore-		

Other Testing Activities	
Simulant Testing	
	forming bacteria, non-spore-forming bacteria, the protein ovalbumin, MS2 bacteriophages, and the fungus <i>Aspergillus niger</i> .

A.2.3 OFFICE OF NAVAL RESEARCH TESTING ACTIVITIES

A.2.3.1 Acoustic and Oceanographic Research

Acoustic and Oceanographic Science and Technology			
Acoustic and Oceanographic Research			
Short Description	Research of oceanographic processes using active transmissions, typically high-frequency (38 kHz and above) oceanographic measurement devices, deployed from ships, unmanned underwater vehicles and on moored platform	Typical Duration	
		1–2 weeks	
Long Description	ONR performs research on oceanographic processes in U.S. territorial waters and international waters using passive measurement devices and active acoustic systems such as acoustic Doppler current profilers and echosounders. Measurement systems may be deployed by ship, unmanned underwater vehicle, or on standard oceanographic moorings. Moorings may be left in place for more than 1 year.		
Typical Components	Platforms: Research vessels, unmanned vehicles, oceanographic moorings Targets: None Systems being Trained/Tested: None		
Standard Operating Procedures <i>(Section 2.3.3)</i>	Vessel safety Unmanned aerial and underwater vehicle procedures	Typical Locations	
		Range Complexes/Testing Ranges: Mariana Islands Training and Testing Study Area	Inland Waters/Pierside: None
Stressors to Biological Resources	Acoustic: Vessel noise Explosive: None	Physical Disturbance and Strike: Vessel and in-water devices Seafloor devices Ingestion: None	Energy: None Entanglement: None
Stressors to Physical Resources	Air Quality: Criteria air pollutants	Sediments and Water Quality: None	
Stressors to Human Resources	Cultural Resources: None	Socioeconomic Resources: Accessibility Airborne acoustics Physical disturbance and strike	Public Health and Safety: Underwater energy In-air energy Physical interactions
Military Expended Material	Ingestible Material: None Non-Ingestible Material: None	Military Recoverable Material	None
Sonar and Other Transducer Bins	None		
Explosive Bins	None		
Procedural Mitigation Measures	Physical Disturbance and Strike Stressors: <i>(Section 5.3.4)</i> Vessel movement		

Acoustic and Oceanographic Science and Technology	
Acoustic and Oceanographic Research	
Assumptions Used for Analysis	Approximately 12 non-recoverable bottom moorings may be used. Any sonar transducers used would be <i>de minimis</i> .