Appendix A Navy Activities Descriptions

Gulf of Alaska Navy Training Activities

Draft Supplemental Environmental Impact Statement/ Overseas Environmental Impact Statement

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Appendix A Navy Activities Descriptions

A.1 Training Activities

The U.S. Department of the Navy's (Navy's) training activities are organized generally into five primary mission areas and a miscellaneous category (Support Operations) in this Supplemental Environmental Impact Statement (SEIS)/Overseas Environmental Impact Statement (OEIS) that includes those activities that do not fall within a primary mission area but are an essential part of Navy training. Since the 1990s, the Navy has participated in Exercise Northern Edge, a major joint training exercise in Alaska and off the Alaskan coast that involves the Departments of the Navy, Army, Air Force, and Coast Guard participants reporting to a unified or joint commander. The commander then coordinates the activities planned to demonstrate and evaluate the ability of the services to engage in a regional conflict and carry out plans in response to a threat to national security. The tempo and types of training activities have fluctuated within the Gulf of Alaska (GOA) Temporary Maritime Activities Area (TMAA) Study Area (referred to as the "TMAA") due to evolving requirements, the introduction of new technologies, the dynamic nature of international events, advances in warfighting doctrine and procedures, and force structure changes. Training conducted in the TMAA is considered a major training exercise but is broken out into the individual warfare areas that could be part of the Northern Edge Exercise, or future Commander, United States Indo-Pacific Command high-end, multi-domain exercises. The exercise itself may vary by year and has flexibility based on assigned forces involved in the exercise for a particular year. The Proposed Action would occur over a maximum time period of up to 21 consecutive days during the months of April–October.

Descriptions of sonar, ordnance/munitions, targets, and other systems were provided in the 2011 GOA Final Environmental Impact Statement (EIS)/OEIS (Chapter 2, Description of Proposed Action and Alternatives, and Appendix H, Acoustic Systems Descriptions). Though the types of activities and level of events in the Proposed Action are the same as in the previous documents (Alternative 1 in both the 2011 GOA Final EIS/OEIS and 2016 GOA Final SEIS/OEIS), there have been changes in the platforms and systems used as part of those activities. Consistent with the previous analysis for Alternative 1, the sinking exercise activity will not be part of the Proposed Action for this SEIS/OEIS. The Navy has reduced the number or type of explosives used in the TMAA because unlike the analysis in the 2011 GOA Final EIS/OEIS and 2016 GOA Final SEIS/OEIS, this SEIS/OEIS does not include an "Alternative 2" that covers sinking exercise activities.

A.1.1 Air Warfare Training

Air warfare is the primary mission area that addresses combat operations by air and surface forces against hostile aircraft and missile threats. Navy ships contain an array of modern anti-aircraft weapon systems, including surface-to-air missile systems and naval guns linked to radar-directed fire-control systems. 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 the employment of these weapons systems against simulated threat aircraft or targets. Air warfare training includes air combat maneuver, air defense exercise, gunnery exercise surface-to-air, missile exercise air-to-air, and missile exercise surface-to-air.

A.1.1.1 Air Combat Maneuver

<table>
<tr><th colspan="6">Air Warfare</th></tr>
<tr><th colspan="6">Air Combat Maneuver</th></tr>
<tr><td>Short Description</td><td colspan="3">Fixed-wing aircrews aggressively maneuver against threat aircraft to gain a tactical advantage.</td><td>Typical Duration
1–2 hours</td><td></td></tr>
<tr><td>Long Description</td><td colspan="5">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. These maneuvers typically involve two aircraft; however, based upon the training requirement, air combat maneuver exercises may involve over a dozen aircraft.</td></tr>
<tr><td>Typical Components</td><td colspan="5">Platforms: Fixed-wing aircraft
Targets: None</td></tr>
<tr><td>Standard Operating Procedures (Section 2.13)</td><td colspan="2">Aircraft safety</td><td colspan="3">Typical Locations
At high altitude above the TMAA</td></tr>
<tr><td>Stressors to Biological Resources</td><td colspan="2">Acoustic:
Aircraft noise

Explosive:
None</td><td colspan="2">Physical Disturbance and Strike:
Aircraft

Ingestion:
None</td><td>Energy:
In-air electromagnetic devices

Entanglement:
None</td></tr>
<tr><td>Stressors to Physical Resources</td><td colspan="3">Air Quality:
Criteria air pollutants
Habitats:
None</td><td colspan="2">Sediments and Water Quality:
Metals</td></tr>
<tr><td>Stressors to Human Resources</td><td>Cultural Resources:
None</td><td colspan="2">Socioeconomic Resources:
Accessibility
Airborne acoustics
Physical disturbance and strike</td><td colspan="2">Public Health and Safety:
None</td></tr>
<tr><td>Military Expended Material</td><td colspan="2">Ingestible Material:
None

Non-Ingestible Material:
None</td><td>Military Recoverable Material</td><td colspan="2">None</td></tr>
<tr><td>Sonar and Other Transducer Bins</td><td colspan="5">None</td></tr>
<tr><td>In-Water Explosive Bins</td><td colspan="5">None</td></tr>
<tr><td>Procedural Mitigation Measures</td><td colspan="5">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="5">No munitions fired. Flare and chaff may be used. All flare and chaff accounted for in Counter Targeting Chaff Exercise—Aircraft events and Electronic Warfare Exercise.</td></tr>
</table>

A.1.1.2 Air Defense Exercise

Air Warfare			
Air Defense Exercise			
Short Description	Aircrew and ship crews conduct defensive measures against threat aircraft or simulated missiles.	**Typical Duration**	1–4 hours
Long Description	Fixed-wing 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. During this exercise, no ordnance is fired, however, countermeasures such as chaff and flares may be used. This exercise may include air intercept control exercises where aircraft controllers on ships, in fixed-wing aircraft, or at land-based locations use search radars to track and direct friendly aircraft to intercept the threat aircraft, and to engage exercises where personnel on ships use search radars to detect, classify, and track enemy aircraft or missiles up to the point of engagement.		
Typical Components	**Platforms:** Fixed-wing aircraft, surface combatant **Targets:** Aircraft, Air targets		
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety	**Typical Locations**	TMAA
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 **Habitats:** 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:** None
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		

Air Warfare	
Air Defense Exercise	
Procedural Mitigation Measures	**Physical Disturbance and Strike:** *(Section 5.3.4)* Vessel movement
Assumptions Used for Analysis	All flare and chaff accounted for in flare exercise and chaff exercise events. No munitions are fired.

A.1.1.3 Surface-to-Air Gunnery Exercise

Air Warfare				
Surface-to-Air Gunnery Exercise				
Short Description	Surface ship crews fire large-caliber or medium-caliber guns at air targets.	**Typical Duration**	1–2 hours	
Long Description	An event involves one ship and a simulated threat aircraft or missile that is detected by the ship's radar. Large-caliber or 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.			
Typical Components	**Platforms:** Aircraft carrier, amphibious warfare ship, fixed-wing aircraft, surface combatant **Targets:** Towed Air targets			
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety Weapons firing procedures	**Typical Locations**	TMAA	
Stressors to Biological Resources	**Acoustic:** Aircraft noise Vessel noise Weapons noise **Explosive:** None	**Physical Disturbance and Strike:** Aircraft and aerial targets Vessels and in-water devices Military expended materials **Ingestion:** Military expended materials – munitions	**Energy:** In-air electromagnetic devices **Entanglement:** None	
Stressors to Physical Resources	**Air Quality:** Criteria air pollutants **Habitats:** Physical disturbance and strike – military expended material	**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	
Military Expended Material	**Ingestible Material:** Large-caliber projectile fragments **Non-Ingestible Material:** None	**Military Recoverable Material**	None	
Sonar and Other Transducer Bins	None			
In-Water Explosive Bins	None			
Procedural Mitigation Measures	**Acoustic Stressors:** *(Section 5.3.2)* Weapon firing noise	**Physical Disturbance and Strike Stressors:** *(Section 5.3.4)* 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 non-explosive.			

A.1.1.4 Air-to-Air Missile Exercise

Air Warfare			
Air-to-Air Missile Exercise			
Short Description	Fixed-wing aircrews fire air-to-air missiles at air targets or simulate firing a missile.	**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, non-explosive practice munitions, or captive air training missiles with nothing released from the aircraft; most of these events involve captive air training missiles. 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; tactical air-launched decoys and illumination flares are expended and not recovered. These events typically occur at high altitudes.		
Typical Components	**Platforms:** Fixed-wing aircraft; rotary-wing aircraft; small boat **Targets:** Air targets, flares		
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety Weapons firing procedures Unmanned Aerial Vehicle Procedures	**Typical Locations**	TMAA
Stressors to Biological Resources	**Acoustic:** Aircraft noise Vessel noise Weapons noise **Explosive:** In-air explosives	**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 **Habitats:** Physical disturbance and strike – military expended material	**Sediments and Water Quality:** Chemicals 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:** Target and missile (explosive) fragments **Non-Ingestible Material:** Medium parachutes (from illumination flares)	**Military Recoverable Material**	Undamaged targets, large or extra-large parachutes (recovered with drones)
Sonar and Other Transducer Bins	None		

Air Warfare	
Air-to-Air Missile Exercise	
In-Water Explosive Bins	None
Procedural Mitigation Measures	**Physical Disturbance and Strike:** *(Section 5.3.4)* Vessel movement
Assumptions Used for Analysis	Assumes that all missiles are explosive, although non-explosive practice munitions may be used. All missiles explode at high altitudes. All propellants and explosives are consumed. Assume 1.5 flares per Missile Exercise event.

A.1.1.5 Surface-to-Air Missile Exercise

<table>
<tr><td colspan="5">Air Warfare</td></tr>
<tr><td colspan="5">Surface-to-Air Missile Exercise</td></tr>
<tr><td>Short Description</td><td colspan="2">Surface ship crews fire surface-to-air missiles at air targets.</td><td>Typical Duration</td><td>1–2 hours</td></tr>
<tr><td>Long Description</td><td colspan="4">Surface ship crews defend against threat missiles and aircraft with ship-launched surface-to-air missiles.

The event involves a simulated threat aircraft, anti-ship missile, or land-attack missile, which is detected by the ship's radar. Ship-launched surface-to-air missiles are fired (explosive) to disable or destroy the threat. The target typically is a remote-controlled drone, launched from a ship. Target drones deploy parachutes and are recovered by small boat or rotary-wing aircraft; when used, tactical air-launched decoys are not recovered.</td></tr>
<tr><td>Typical Components</td><td colspan="4">Platforms: Aircraft carrier, amphibious warfare ship, surface combatant
Targets: Air targets, unmanned aerial vehicles</td></tr>
<tr><td>Standard Operating Procedures (Section 2.13)</td><td colspan="2">Vessel safety
Aircraft safety
Weapons firing procedures
Unmanned aerial vehicle procedures</td><td colspan="2">Typical Locations
TMAA</td></tr>
<tr><td>Stressors to Biological Resources</td><td>Acoustic:
Aircraft noise
Vessel noise
Weapons noise

Explosive:
In-air explosives</td><td colspan="2">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</td><td>Energy:
In-air electromagnetic devices

Entanglement:
None</td></tr>
<tr><td>Stressors to Physical Resources</td><td colspan="4">Air Quality:
Criteria air pollutants
Habitats:
Physical disturbance and strike – military expended material
Sediments and Water Quality:
Chemicals
Metals Other materials</td></tr>
<tr><td>Stressors to Human Resources</td><td>Cultural Resources:
None</td><td colspan="2">Socioeconomic Resources:
Accessibility
Airborne acoustics
Physical disturbance and strike</td><td>Public Health and Safety:
Physical interactions</td></tr>
<tr><td>Military Expended Material</td><td colspan="2">Ingestible Material:
Target and missile (explosive) fragments

Non-Ingestible Material:
Target launch rockets</td><td>Military Recoverable Material</td><td>Undamaged targets, large or extra-large parachutes (recovered with drones)</td></tr>
<tr><td>Sonar and Other Transducer Bins</td><td colspan="4">None</td></tr>
</table>

Air Warfare	
Surface-to-Air Missile Exercise	
In-Water Explosive Bins	None
Procedural Mitigation Measures	**Physical Disturbance and Strike:** *(Section 5.3.4)* Vessel movement
Assumptions Used for Analysis	Assumes that all surface-to-air missiles are high-explosive. The missile explodes at least 33 feet above the surface. All explosives and propellants are consumed.

A.1.2 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. The aircraft-to-surface component of surface warfare is conducted by long-range attacks using air-launched cruise missiles, precision-guided munitions, or aircraft guns and rockets. Surface warfare also is conducted by warships employing naval guns, and surface-to-surface missiles. Submarines attack surface ships using 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 launch events. Gunnery and missile training generally involves the expenditure of ordnance against a towed surface target. Explosive missiles are not used on surface targets.

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.1.2.1 Visit, Board, Search, and Seizure

Surface Warfare			
Visit, Board, Search, and Seizure			
Short Description	Military personnel from ships and aircraft board suspect vessels, potentially under hostile conditions.	**Typical Duration**	Up to 3 hours
Long Description	Military personnel from ships and aircraft board suspect vessels, potentially under hostile conditions. 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 and surveillance or reconnaissance unmanned surface and aerial vehicles. The entire exercise may last 2–3 hours.		
Typical Components	**Platforms:** Rotary-wing aircraft, surface combatant, small boat **Targets:** Surface targets		
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety Laser safety Unmanned Aerial Vehicle Procedures Unmanned Surface Vehicle and Unmanned Underwater Vehicle Procedures	**Typical Locations**	TMAA
Stressors to Biological Resources	**Acoustic:** Aircraft noise Vessel noise Weapons noise **Explosive:** None	**Physical Disturbance and Strike:** Aircraft 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	**Habitats:** Military expended materials	**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:** Small-caliber projectile (casing only), compression pad or plastic piston, endcap, flare O-ring **Non-Ingestible Material:** Marine marker	**Military Recoverable Material**	None

Surface Warfare	
Visit, Board, Search, and Seizure	
Sonar and Other Transducer Bins	None
In-Water Explosive Bins	None
Procedural Mitigation Measures	**Physical Disturbance and Strike Stressors:** *(Section 5.3.4)* Vessel movement
Assumptions Used for Analysis	None

A.1.2.2 Air-to-Surface Bombing Exercise

Surface Warfare			
Air-to-Surface Bombing Exercise			
Short Description	Fixed-wing aircrews deliver bombs against surface targets.	**Typical Duration**	1 hour
Long Description	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 bombs on the target. An exercise support boat may be used to deploy towed or maneuvering targets for an aircraft to attack. 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). Precision-guided munitions include laser-guided bombs (explosive, non-explosive), laser-guided training rounds (non-explosive), Joint Direct Attack Munition (explosive, non-explosive).		
Typical Components	**Platforms:** Fixed-wing aircraft, support craft **Targets:** Surface targets		
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety Weapons firing procedures	**Typical Locations**	TMAA (Use of explosives will not occur in the Portlock Bank Mitigation Area.)
Stressors to Biological Resources	**Acoustic:** Aircraft noise Vessel noise Weapons noise **Explosive:** Detonations at or near the surface	**Physical Disturbance and Strike:** Aircraft 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 **Habitats:** Physical disturbance and strike – military expended material	**Sediments and Water Quality:** Explosives Metals	
Stressors to Human Resources	**Cultural Resources:** None	**Socioeconomic Resources:** Accessibility Airborne acoustics Physical disturbance and strike	**Public Health and Safety:** In-water energy In-air energy Physical interactions
Military Expended Material	**Ingestible Material:** Small decelerators/parachutes, target fragments, bomb fragments **Non-Ingestible Material:** Mark 58 marine marker	**Military Recoverable Material**	Surface targets (mobile)

Surface Warfare		
Air-to-Surface Bombing Exercise		
Sonar and Other Transducer Bins	None	
In-Water Explosive Bins	E9 E10 E12	
Procedural Mitigation Measures	**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	Approximately 90 percent of non-explosive bombs are the sub-scale bombs such as the MK-76 and BDU-48. Use of explosives will not occur in the North Pacific Right Whale Mitigation Area from June 1 to September 30 or in the Portlock Bank area.	

A.1.2.3 Air-to-Surface Gunnery Exercise

<table>
<tr><td colspan="4">Surface Warfare</td></tr>
<tr><td colspan="4">Air-to-Surface Gunnery Exercise</td></tr>
<tr><td>Short Description</td><td colspan="2">Fixed-wing, helicopter, and tilt-rotor aircrews fire small-caliber or medium-caliber inert rounds at surface targets.</td><td>Typical Duration
1 hour</td></tr>
<tr><td>Long Description</td><td colspan="3">Helicopters and tilt-rotor aircraft conduct attacks against an at-sea target. Targets simulate enemy ships, boats, and floating/near-surface mines. Each platform will engage the target with small-caliber weapons. Targets range from a smoke float or an empty steel drum to high-speed remote-controlled boats and jet-skis.

Fixed-wing and helicopter aircrew, engage surface targets with medium-caliber guns. Targets simulate enemy ships, boats, swimmers, and floating/near- surface mines. Fixed-wing aircraft descend on a target firing medium-caliber non-explosive practice munitions. Helicopters will conduct attacks against an at-sea target. Aircrew will engage the target with small-caliber and medium-caliber non-explosive practice munitions. Targets range from a smoke float or an empty steel drum to high-speed remote-controlled boats and jet-skis.</td></tr>
<tr><td>Typical Components</td><td colspan="3">Platforms: Fixed-wing aircraft, 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</td></tr>
<tr><td>Standard Operating Procedures (Section 2.13)</td><td>Vessel safety
Aircraft safety
Weapons firing procedures</td><td colspan="2">Typical Locations
TMAA</td></tr>
<tr><td>Stressors to Biological Resources</td><td colspan="3">Acoustic:
Aircraft noise
Vessel noise
Weapons noise

Explosive:
None

Physical Disturbance and Strike:
Aircraft
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</td></tr>
<tr><td>Stressors to Physical Resources</td><td colspan="3">Air Quality:
Criteria air pollutants

Habitats:
Physical disturbance and strike – military expended material

Sediments and Water Quality:
Metals</td></tr>
<tr><td>Stressors to Human Resources</td><td colspan="3">Cultural Resources:
None

Socioeconomic Resources:
Accessibility
Airborne acoustics
Physical disturbance and strike

Public Health and Safety:
Physical interactions</td></tr>
</table>

<table>
<tr><th colspan="4">Surface Warfare</th></tr>
<tr><th colspan="4">Air-to-Surface Gunnery Exercise</th></tr>
<tr><td>Military Expended Material</td><td>Ingestible Material:
Small decelerators/parachutes, Projectiles, projectile casings, target fragments

Non-Ingestible Material:
MK 58 marine marker, surface target (stationary)</td><td>Military Recoverable Material</td><td>Surface targets (mobile)</td></tr>
<tr><td>Sonar and Other Transducer Bins</td><td colspan="3">None</td></tr>
<tr><td>In-Water Explosive Bins</td><td colspan="3">None</td></tr>
<tr><td>Procedural Mitigation Measures</td><td colspan="3">Physical Disturbance and Strike Stressors:
(Section 5.3.4, Section 5.3.4.1)
Vessel movement
Small- and medium-caliber non-explosive practice munitions</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="3">Fixed-wing casings remain with aircraft, and helicopter shell casings are expended into the water.
Two fixed-wing aircraft (300 rounds each) or one helicopter (400 rounds) per activity.
One target used per event: expendable smoke float (50 percent), stationary target (45 percent), or remote-controlled target (5 percent).</td></tr>
</table>

A.1.2.4 Surface-to-Surface Gunnery Exercise

Surface Warfare		
Surface-to-Surface Gunnery Exercise		
Short Description	Surface ship crews fire small-caliber, medium-caliber, or large-caliber guns at surface targets. Or small boat crews fire small-caliber or medium-caliber guns at surface targets.	**Typical Duration** 1 hour Up to 3 hours
Long Description	Small boat crews fire small-caliber or medium-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 near shore land targets with small-caliber (up to and including .50-caliber) or medium-caliber (up to and including 40 millimeter [mm]) weapons. A number of different types of boats are used depending on the unit using the boat and the training objective. Boats are most used to protect 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 riverine craft, combat rubber raiding craft, rigid-hull inflatable boats, patrol craft, as well as other versions of these types of boats. These boats can be inboard or outboard, with diesel, or gasoline engines driving either propeller or water jet propulsion. Surface ship crews fire small-caliber or medium-caliber weapons to practice defensive marksmanship, typically against high-speed mobile targets or a stationary floating target (a 10-foot-diameter inflatable red balloon ["Killer Tomato"]), a 50-gallon steel drum, or another available target, such as a biodegradable cardboard box. Some targets are expended during the exercise and are not recovered. Ship crew qualifications conducted at sea employ stationary targets on deck. Small-caliber projectiles fired during these events will be expended in the water. Shipboard protection systems (Close-In Weapon System) utilizing small-caliber or medium-caliber projectiles would train against high-speed mobile targets. Surface ship exercises also involve ships' gun crews engaging surface targets at sea with their main battery large-caliber (typically 57 millimeter [mm], and 5-inch) guns. Targets include a high-speed maneuverable surface target or a specially configured remote-controlled watercraft. Some targets are expended during the exercise and are not recovered. 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. 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. Large-caliber guns will also be fired during weapon certification events and in conjunction with weapon maintenance. With the exception of some high-explosive large-caliber rounds, all other rounds would be non-explosive. High-explosive large-caliber rounds can either be fused for detonation on impact (with water surface or target), or for proximity to the target (in air detonation).	
Typical Components	**Platforms:** Small boat, patrol combatant, surface combatant, aircraft carrier, amphibious warship **Targets:** Surface targets (e.g., stationary floating target, seaborne powered target, Killer Tomato, 50-gallon steel drum, cardboard box, high speed maneuverable/mobile surface target, or a specially configured remote-controlled watercraft)	

<table>
<tr><th colspan="4">Surface Warfare</th></tr>
<tr><th colspan="4">Surface-to-Surface Gunnery Exercise</th></tr>
<tr><td>Standard Operating Procedures (Section 2.13)</td><td colspan="3">Vessel safety
Weapons firing procedures</td></tr>
<tr><td>Typical Locations</td><td colspan="3">TMAA</td></tr>
<tr><td>Stressors to Biological Resources</td><td colspan="3">Acoustic:
Vessel noise
Weapons noise

Explosive:
Detonation of large-caliber rounds at or near the surface

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</td></tr>
<tr><td>Stressors to Physical Resources</td><td colspan="3">Habitats:
Physical disturbance and strike – military expended materials
In-water explosives

Air Quality:
Criteria air pollutants

Sediments and Water Quality:
Explosives
Chemicals
Metals
Other materials</td></tr>
<tr><td>Stressors to Human Resources</td><td colspan="3">Cultural Resources:
None

Socioeconomic Resources:
Accessibility
Airborne acoustics
Physical disturbance and strike

Public Health and Safety:
In-water energy
Physical interactions</td></tr>
<tr><td>Military Expended Material</td><td>Ingestible Material:
Projectile casings, non-explosive small-caliber and medium-caliber projectiles
Target fragments Large-caliber projectile fragments

Non-Ingestible Material:
Surface targets (stationary)</td><td>Military Recoverable Material</td><td>Surface target (mobile)</td></tr>
<tr><td>Sonar and Other Transducer Bins</td><td colspan="3">None</td></tr>
<tr><td>In-Water Explosive Bins</td><td colspan="3">E5</td></tr>
<tr><td>Procedural Mitigation Measures</td><td colspan="3">Acoustic Stressors: (Section 5.3.2)
Weapons firing noise

Explosive Stressors: (Section 5.3.3)
Explosive medium-caliber and large-caliber projectiles

Physical Disturbance and Strike Stressors: (Section 5.3.4)
Vessel movement
Small-, medium-, and large-caliber non-explosive practice munitions</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="3">Most medium-caliber events will involve boat crews training with MK 203 40-millimeter grenade launcher. One target used per event, typically a stationary target such as a 50-gallon steel drum.</td></tr>
</table>

Surface Warfare	
Surface-to-Surface Gunnery Exercise	
	For small-caliber ship events, small-caliber gun rounds per event: 1,000 to 3,000 non-explosive practice munitions. For medium-caliber ship events, 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 intended to be recovered. Approximately 15 percent of targets are other stationary targets such as a steel drum. All explosive rounds detonating at or near the surface are modeled in the acoustic effects analysis as if the detonation occurs fully underwater, and assuming all.

A.1.2.5 Maritime Interdiction

Surface Warfare		
Maritime Interdiction		
Short Description	Helicopters, surface ships, and small boat crews conduct a suite of maritime security operations at sea, including maritime interdiction operations, force protection, and anti-piracy operations.	**Typical Duration** Up to 3 hours
Long Description	Helicopter and surface ship crews conduct a suite of maritime security operations (e.g., 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 and surveillance or reconnaissance unmanned surface and aerial vehicles. The entire exercise may last 2–3 hours. 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. 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 events involve helicopters and boarding parties. Maritime security operations training events are conducted proximate to naval homeports (TMAA) including during times of transit in and out of port, as well as during major training exercises. Maritime Interdiction Operations: Ships and aircraft train in pursuing, intercepting, and ultimately detaining suspect vessels. Maritime Infrastructure Protection and Harbor Defense: Naval personnel train to defend oil platforms, similar at sea structures, harbors, piers, and other infrastructure. 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. 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. Anti-Piracy Training: Naval personnel train in deterring and interrupting piracy activity. Training includes large vessels (pirate “mother ships”), and multiple small, maneuverable, and fast craft.	
Typical Components	**Platforms:** Rotary-wing aircraft, surface combatant, small boat **Targets:** Surface targets	

<table>
<tr><th colspan="5">Surface Warfare</th></tr>
<tr><th colspan="5">Maritime Interdiction</th></tr>
<tr><td>Standard Operating Procedures
(Section 2.13)</td><td colspan="2">Vessel safety
Aircraft safety
Laser safety
Unmanned Aerial Vehicle Procedures
Unmanned Surface Vehicle and Unmanned Underwater Vehicle Procedures</td><td colspan="2">Typical Locations
TMAA</td></tr>
<tr><td>Stressors to Biological Resources</td><td>Acoustic:
Aircraft noise
Vessel noise
Weapons noise

Explosive:
None</td><td colspan="2">Physical Disturbance and Strike:
Aircraft
Vessels and in-water devices
Military expended materials

Ingestion:
Military expended materials – munitions
Military expended materials – other than munitions</td><td>Energy:
In-air electromagnetic devices

Entanglement:
None</td></tr>
<tr><td>Stressors to Physical Resources</td><td colspan="2">Habitats:
Military expended materials</td><td colspan="2">Air Quality:
Criteria air pollutants
Sediments and Water Quality:
Metals Other materials</td></tr>
<tr><td>Stressors to Human Resources</td><td>Cultural Resources:
None</td><td colspan="2">Socioeconomic Resources:
Accessibility
Airborne acoustics
Physical disturbance and strike</td><td>Public Health and Safety:
Physical interactions</td></tr>
<tr><td>Military Expended Material</td><td colspan="2">Ingestible Material:
Small-caliber projectile (casing only), compression pad or plastic piston, endcap, flare O-ring
Non-Ingestible Material:
Marine marker</td><td>Military Recoverable Material</td><td>None</td></tr>
<tr><td>Sonar and Other Transducer Bins</td><td colspan="4">None</td></tr>
<tr><td>In-Water Explosive Bins</td><td colspan="4">None</td></tr>
<tr><td>Procedural Mitigation Measures</td><td colspan="4">Physical Disturbance and Strike Stressors:
(Section 5.3.4)
Vessel movement</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="4">None</td></tr>
</table>

A.1.2.6 Air-to-Surface Missile Exercise

Surface Warfare			
Air-to-Surface Missile Exercise			
Short Description	Fixed-wing aircrews simulate firing precision-guided missiles, using captive air training missiles against surface targets.	**Typical Duration**	1 hour
Long Description	Fighter, Electronic Attack, maritime patrol aircraft aircrews fire precision-guided missiles against surface targets. Aircraft involved may be unmanned. Fixed-wing aircraft (fighters, Electronic Attack, or maritime patrol aircraft) approach an at-sea surface target from high altitude and launch precision guided missiles. Occurs year round, daytime only.		
Typical Components	**Platforms:** Fixed-wing aircraft, surface combatants **Targets:** Recoverable floating target (stationary or towed), remotely operated target		
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety Laser procedures Weapons firing procedures	**Typical Locations**	TMAA
Stressors to Biological Resources	**Acoustic:** Aircraft noise Vessel noise Weapons noise **Explosive:** None	**Physical Disturbance and Strike:** Aircraft 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 **Habitats:** Physical disturbance and strike – military expended material	**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
Military Expended Material	**Ingestible Material:** Small decelerators/parachutes **Non-Ingestible Material:** Missiles (non-explosive), surface target (stationary)	**Military Recoverable Material**	Surface targets (mobile)
Sonar and Other Transducer Bins	None		
In-Water Explosive Bins	None		

Surface Warfare	
Air-to-Surface Missile Exercise	
Procedural Mitigation Measures	**Physical Disturbance and Strike Stressors:** *(Section 5.3.4, Section 5.3.4.1)* Vessel movement Non-Explosive Missiles
Assumptions Used for Analysis	Assume one target per event.

A.1.2.7 Sea Surface Control

Surface Warfare			
Sea Surface Control			
Short Description	Aircraft, unmanned aerial systems, ships, and submarines use all available sensors to collect data on threat vessels.	**Typical Duration**	2–8 hours
Long Description	Aircraft, unmanned aerial systems operators, ships, and submarines use all available sensors to collect data on threat vessels. Passive sonobuoys are used to collect and analyze acoustic data, and photographic equipment is used to document the vessel with visual information. Occurs year round, daytime only.		
Typical Components	**Platforms:** Aircraft, unmanned aerial system, ships, submarines **Targets:** None		
Standard Operating Procedures *(Section 2.13)*	Aircraft safety Unmanned aircraft system procedures Vessel safety	**Typical Locations**	TMAA
Stressors to Biological Resources	**Acoustic:** Aircraft noise Vessel noise **Explosive:** None	**Physical Disturbance and Strike:** Aircraft and aerial target Military expended materials Vessel and in-water devices **Ingestion:** Military expended materials – other than munitions	**Energy:** In-air electromagnetic devices **Entanglement:** 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:** None	**Public Health and Safety:** None
Military Expended Material	**Ingestible Material:** Small decelerators/parachutes **Non-Ingestible Material:** Sonobuoys, sonobuoy wires	**Military Recoverable Material**	None
Sonar and Other Transducer Bins	None		
In-Water Explosive Bins	None		
Procedural Mitigation Measures	None		
Assumptions Used for Analysis	Sea Surface Control training is conducted by fixed-wing and rotary-wing aircraft and unmanned aerial systems. Aircrews use a variety of intelligence gathering and surveillance methods, including visual, infrared, electronic, radar, and acoustic.		

A.1.3 Anti-Submarine Warfare Training

Anti-submarine warfare (ASW) involves helicopters and maritime patrol aircraft, ships, and submarines. These units operate alone or in coordination 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 ASW. Every deploying strike group and most individual surface combatants 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 detect the presence, character, and indicate the movement of submarines. Passive sonar provides only a bearing (direction) to a sound-emitting source; it does not provide an immediately accurate range (distance) to the source. Active sonar is needed to immediately locate objects because active sonar provides both bearing and range to the detected contact (such as an enemy submarine).

The Navy's ASW training plan, including the use of active sonar in at-sea training scenarios, includes multiple levels of training. Individual-level ASW training addresses basic skills such as search plans, 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 ASW 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 passive detection and tracking a submarine to active sonar transition for attacking a target using simulated weapons. Training events include detection and tracking exercises against "enemy" submarine contacts and exercising command and control tasks in a multi-dimensional battlespace.

A.1.3.1 Tracking Exercise—Helicopter

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise - Helicopter			
Short Description	Helicopter crews search for, track, and detect submarines.	**Typical Duration**	2–4 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; no torpedoes would be launched. Sonobuoys (both passive and active) are typically employed by a helicopter operating at altitudes below 3,000 feet. Dipping sonar (both passive and active) is employed from an altitude of about 50 feet both before and after the search area has been narrowed based on the sonobuoy search. The anti-submarine warfare target used for this exercise may be an expendable ASW target, a recoverable ASW 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. The preferred range for this exercise is an instrumented range, but it may be conducted without instrumentation depending on training requirements and available assets.		
Typical Components	**Platforms:** Rotary-wing aircraft, submarines **Targets:** Sub-surface targets		
Standard Operating Procedures *(Section 2.13)*	Aircraft safety Unmanned Surface Vehicle and Unmanned Underwater Vehicle Procedures	**Typical Locations**	TMAA
Stressors to Biological Resources	**Acoustic:** Sonar and other transducers Aircraft noise Vessel noise **Explosive:** None	**Physical Disturbance and Strike:** Aircraft 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 **Habitats:** Physical disturbance and strike – military expended material	**Sediments and Water Quality:** Chemicals Metals Other materials	
Stressors to Human Resources	**Cultural Resources:** None	**Socioeconomic Resources:** Accessibility Airborne acoustics Physical disturbance and strike	**Public Health and Safety:** In-water energy Physical interactions

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise - Helicopter			
Military Expended Material	**Ingestible Material:** Small decelerators/parachutes **Non-Ingestible Material:** Sonobuoys (non-explosive), sonobuoy wires, expendable sub-surface targets, marine marker	**Military Recoverable Material**	None
Sonar and Other Transducer Bins	**Mid-Frequency:** MF4 MF5 MF6		
In-Water 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	Submarines may provide service as the target.		

A.1.3.2 Tracking Exercise—Maritime Patrol Aircraft

<table>
<tr><th colspan="4">Anti-Submarine Warfare</th></tr>
<tr><th colspan="4">Anti-Submarine Warfare Tracking Exercise—Maritime Patrol Aircraft</th></tr>
<tr><td>Short Description</td><td colspan="2">Maritime patrol aircraft crews search for, track, and detect submarines.</td><td>Typical Duration
2–8 hours</td></tr>
<tr><td>Long Description</td><td colspan="3">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.

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 an expendable ASW training target, a recoverable ASW training target, or a live submarine. This exercise may involve a single aircraft, or be undertaken in the context of a larger coordinated scenario involving multiple aircraft and vessels.</td></tr>
<tr><td>Typical Components</td><td colspan="3">Platforms: Fixed-wing aircraft, submarines
Targets: Sub-surface targets</td></tr>
<tr><td>Standard Operating Procedures (Section 2.13)</td><td>Vessel safety
Aircraft safety</td><td colspan="2">Typical Locations
TMAA</td></tr>
<tr><td>Stressors to Biological Resources</td><td colspan="3">Acoustic:
Sonar and other transducers
Aircraft noise
Vessel noise

Explosive:
None

Physical Disturbance and Strike:
Aircraft
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</td></tr>
<tr><td>Stressors to Physical Resources</td><td colspan="3">Air Quality:
Criteria air pollutants
Habitats:
Physical disturbance and strike – military expended material

Sediments and Water Quality:
Chemicals
Metals Other materials</td></tr>
<tr><td>Stressors to Human Resources</td><td colspan="3">Cultural Resources:
None

Socioeconomic Resources:
Accessibility
Airborne acoustics
Physical disturbance and strike

Public Health and Safety:
In-water energy
Physical interactions</td></tr>
<tr><td>Military Expended Material</td><td colspan="2">Ingestible Material:
Small decelerators/parachutes
Non-Ingestible Material:
Sonobuoys, Expendable ASW Training Targets, expendable bathythermographs</td><td>Military Recoverable Material</td><td>None</td></tr>
</table>

Anti-Submarine Warfare		
Anti-Submarine Warfare Tracking Exercise—Maritime Patrol Aircraft		
Sonar and Other Transducer Bins	**Mid-Frequency:** MF5 MF6	**Anti-Submarine Warfare:** ASW2
In-Water 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	A submarine may provide service as the target. If a target is air-dropped, one parachute per target.	

A.1.3.3 Tracking Exercise—Submarine

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise—Submarine			
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 a firing position to launch a torpedo. A single submerged submarine operates at slow speeds and various depths while using its hull-mounted sonar to track a threat submarine. Passive sonar is used almost exclusively. The target for this exercise is either an expendable ASW training target, recoverable ASW training target, or live submarine. This exercise could occur anywhere throughout the TMAA. This exercise may involve a single submarine, or be undertaken in the context of a larger coordinated scenario involving multiple aircraft, ships, and submarines.		
Typical Components	**Platforms:** Submarines **Targets:** Sub-surface targets		
Standard Operating Procedures *(Section 2.13)*	Vessel safety	**Typical Locations**	TMAA
Stressors to Biological Resources	**Acoustic:** Sonar and other transducers Vessel noise **Explosive:** None	**Physical Disturbance and Strike:** Aircraft, Vessels and in-water devices Military expended materials **Ingestion:** None	**Energy:** None **Entanglement:** None
Stressors to Physical Resources	**Air Quality:** None **Habitats:** Physical disturbance and strike – military expended material	**Sediments and Water Quality:** Metals	
Stressors to Human Resources	**Cultural Resources:** None	**Socioeconomic Resources:** Physical disturbance and strike Airborne acoustics	**Public Health and Safety:** In-water energy Physical interactions
Military Expended Material	**Ingestible Material:** None **Non-Ingestible Material:** Acoustic countermeasures	**Military Recoverable Material**	None
Sonar and Other Transducer Bins	**Mid-Frequency:** MF3 **High-Frequency:** HF1	**Anti-Submarine Warfare:** ASW4	
In-Water Explosive Bins	None		

Anti-Submarine Warfare		
Anti-Submarine Warfare Tracking Exercise—Submarine		
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	ASW training targets can either be expendable, recoverable, or live submarine.	

A.1.3.4 Tracking Exercise—Ship

Anti-Submarine Warfare			
Anti-Submarine Warfare Tracking Exercise—Ship			
Short Description	Surface ship crews search for, track, and detect submarines.	**Typical Duration**	2–4 hours
Long Description	Surface ships search for, detect, and track threat submarines to determine a firing position to launch a torpedo. 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 an expendable ASW training target, a recoverable ASW training target, or a live submarine. ASW Tracking exercise—Ship could occur anywhere throughout the TMAA. This exercise may involve a single ship, or be undertaken in the context of a larger coordinated scenario involving multiple aircraft, ships, and submarines.		
Typical Components	**Platforms:** Surface combatant; submarine **Targets:** ASW training targets		
Standard Operating Procedures *(Section 2.13)*	Vessel Towed in-water device safety	**Typical Locations**	TMAA
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 **Ingestion:** None	**Energy:** In-water electromagnetic devices **Entanglement:** Wires and cables
Stressors to Physical Resources	**Air Quality:** Criteria air pollutants **Habitats:** Physical disturbance and strike – military expended material	**Sediments and Water Quality:** Metals Chemicals Other materials	
Stressors to Human Resources	**Cultural Resources:** None	**Socioeconomic Resources:** Accessibility Airborne acoustics Physical disturbance and strike	**Public Health and Safety:** In-water energy Physical interactions
Military Expended Material	**Ingestible Material:** None **Non-Ingestible Material:** Sonobuoy (non-explosive), sonobuoy wires	**Military Recoverable Material**	None
Sonar and Other Transducer Bins	**Mid-Frequency:** MF1 MF11 MF12	**Anti-Submarine Warfare:** ASW1 ASW3	

Anti-Submarine Warfare		
Anti-Submarine Warfare Tracking Exercise—Ship		
In-Water 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 Towed in-water devices
Assumptions Used for Analysis	A Submarine may provide service as the target.	

A.1.4 Electronic Warfare

Electronic warfare is the mission area of naval warfare that aims to control the 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.1.4.1 Counter Targeting Exercise

Electronic Warfare			
Counter Targeting Exercise			
Short Description	Ships and aircraft conduct jamming and deploy chaff to disrupt threat targeting and missile guidance radars.	**Typical Duration**	1–2 hours
Long Description	A Counter Targeting exercise is a coordinated, defensive activity utilizing surface and air assets, that attempts to use jamming and chaff to show a false force presentation to inbound surface-to-surface platforms. During these exercises, electronic warfare jamming aircraft will position itself between the carrier strike group assets and the threat and jam the radar systems of potential hostile surface units. Carrier strike group ships will launch chaff to create false targets that saturate the threat radars return, thus masking their true position. These activities occur within the TMAA.		
Typical Components	**Platforms:** Fixed-wing aircraft, rotary-wing aircraft, surface combatants **Targets:** None		
Standard Operating Procedures *(Section 2.13)*	Aircraft safety Vessel safety	**Typical Locations**	TMAA
Stressors to Biological Resources	**Acoustic:** Aircraft noise Vessel noise **Explosive:** None	**Physical Disturbance and Strike:** Vessels and in-water devices Aircraft **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 pollutants **Habitats:** Physical disturbance and strike – military expended material	**Sediments and Water Quality:** Metals Chemicals Other materials	
Stressors to Human Resources	**Cultural Resources:** None	**Socioeconomic Resources:** Accessibility Airborne acoustics	**Public Health and Safety:** Physical interactions

<table>
<tr><th colspan="4">Electronic Warfare</th></tr>
<tr><th colspan="4">Counter Targeting Exercise</th></tr>
<tr><td>Military Expended Material</td><td colspan="2">Ingestible Material:
Expended components of chaff-ship (chaff-ship fibers)
Per aircraft flare cartridge: one silicone rubber compression pad OR one plastic piston
Per aircraft chaff: chaff-air fibers, one chaff plastic endcap, one compression pad; OR one plastic piston, one plastic endcap
Non-Ingestible Material:
MK 53 decoy, chaff-ship cartridges
Per flare cartridge: flare (typically consumed), one plastic endcap, O-ring (rubber, nitrile)</td><td>Military Recoverable Material
None</td></tr>
<tr><td>Sonar and Other Transducer Bins</td><td colspan="3">None</td></tr>
<tr><td>In-Water Explosive Bins</td><td colspan="3">None</td></tr>
<tr><td>Procedural Mitigation Measures</td><td colspan="3">Physical Disturbance and Strike Stressors:
(Section 5.3.4)
Vessel movement</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="3">None</td></tr>
</table>

A.1.4.2 Chaff Exercise

Electronic Warfare				
Chaff Exercise				
Short Description	Surface ship crews deploy chaff to disrupt threat targeting and missile guidance radars.	**Typical Duration** 1–2 hours		
Long Description	Surface ship crews deploy chaff to disrupt threat targeting and missile guidance radars to defend against an attack. 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. 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 systems away from the actual friendly platform. Ships may also train with advanced countermeasure systems, such as the MK 53 Decoy Launching System (Nulka).			
Typical Components	**Platforms:** Surface combatants, amphibious warfare ships, fixed-wing aircraft, rotary-wing aircraft **Targets:** None			
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety	**Typical Locations** TMAA		
Stressors to Biological Resources	**Acoustic:** Vessel noise Aircraft noise **Explosive:** None	**Physical Disturbance and Strike:** Vessels and in-water devices Aircraft **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 pollutants **Habitats:** Physical disturbance and strike – military expended material	**Sediments and Water Quality:** Metals Chemicals Other materials		
Stressors to Human Resources	**Cultural Resources:** None	**Socioeconomic Resources:** Accessibility Airborne acoustics	**Public Health and Safety:** Physical interactions	
Military Expended Material	**Ingestible Material:** Expended components of chaff-ship (chaff-ship fibers) **Non-Ingestible Material:** MK 53 decoy, chaff-ship cartridges	**Military Recoverable Material**	None	
Sonar and Other Transducer Bins	None			

Electronic Warfare	
Chaff Exercise	
In-Water Explosive Bins	None
Procedural Mitigation Measures	**Physical Disturbance and Strike Stressors:** *(Section 5.3.4)* Vessel movement
Assumptions Used for Analysis	None

A.1.4.3 Electronic Warfare Exercise

<table>
<tr><th colspan="6">Electronic Warfare</th></tr>
<tr><th colspan="6">Electronic Warfare Exercise</th></tr>
<tr><td>Short Description</td><td colspan="3">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.</td><td>Typical Duration
1–2 hours</td><td></td></tr>
<tr><td>Long Description</td><td colspan="5">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.</td></tr>
<tr><td>Typical Components</td><td colspan="5">Platforms: Fixed-wing aircraft, surface combatant
Targets: Air targets, electronic warfare targets</td></tr>
<tr><td>Standard Operating Procedures (Section 2.13)</td><td colspan="2">Vessel safety
Aircraft safety</td><td colspan="3">Typical Locations
TMAA</td></tr>
<tr><td>Stressors to Biological Resources</td><td colspan="2">Acoustic:
Aircraft noise
Vessel noise

Explosive:
None</td><td colspan="2">Physical Disturbance and Strike:
Aircraft and aerial target
Vessels and in-water devices

Ingestion:
Military expended materials – other than munitions</td><td>Energy:
In-air electromagnetic devices

Entanglement:
None</td></tr>
<tr><td>Stressors to Physical Resources</td><td colspan="3">Air Quality:
Criteria air pollutants

Habitats:
None</td><td colspan="2">Sediments and Water Quality:
None</td></tr>
<tr><td>Stressors to Human Resources</td><td>Cultural Resources:
None</td><td colspan="2">Socioeconomic Resources:
Accessibility
Airborne acoustics
Physical disturbance and strike</td><td>Public Health and Safety:
None</td><td></td></tr>
<tr><td>Military Expended Material</td><td colspan="2">Ingestible Material:
Expended components of chaff-ship (chaff-ship fibers)
Per flare cartridge: one silicone rubber compression pad or one plastic piston

Non-Ingestible Material:
Chaff-ship cartridges
Per flare cartridge: flare (typically consumed), one plastic endcap, O-ring (rubber, nitrile)</td><td>Military Recoverable Material</td><td colspan="2">None</td></tr>
</table>

Electronic Warfare	
Electronic Warfare Exercise	
Sonar and Other Transducer Bins	None
In-Water Explosive Bins	None
Procedural Mitigation Measures	**Physical Disturbance and Strike Stressors:** *(Section 5.3.4)* Vessel movement
Assumptions Used for Analysis	None

A.1.5 Naval Special Warfare

Naval special warfare conducts military activities in five Special Operations mission areas: unconventional warfare, direct action, special reconnaissance, foreign internal defense, and counterterrorism.

Naval special warfare training involves specialized tactics, techniques, and procedures, employed in training events that could include insertion/extraction activities using parachutes, rubber boats, or helicopters and other equipment.

A.1.5.1 Special Warfare Operations

Naval Special Warfare				
Special Warfare Operations				
Short Description	Personnel are inserted into and extracted from an objective area by aircraft, small boats, or subsurface platforms.		**Typical Duration** 2–8 hours	
Long Description	Utilizing aircraft, small surface platforms, and subsurface platforms, personnel are inserted in the water. The insertion/extraction activities are confined to in-water training.			
Typical Components	**Platforms:** Small boat, helicopters, and submersibles **Targets:** None			
Standard Operating Procedures *(Section 2.13)*	Vessel safety Aircraft safety	**Typical Locations** TMAA		
Stressors to Biological Resources	**Acoustic:** Vessel noise Aircraft noise **Explosive:** None	**Physical Disturbance and Strike:** Vessels and in-water devices Aircraft and aerial targets **Ingestion:** None	**Energy:** None **Entanglement:** None	
Stressors to Physical Resources	**Habitats:** Physical disturbance and strike – military expended material	**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 **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:** *(Section 5.3.4)* Vessel movement			
Assumptions Used for Analysis	None			

A.1.6 Strike Warfare

Strike Warfare addresses combat (or interdiction) activities by air and surface forces against hostile land-based forces and assets. Strike warfare activities include training of fixed-wing fighter/attack aircraft in delivery of precision-guided munitions, nonguided munitions, rockets, and other ordnance against land targets in all weather and light conditions.

Training events typically involve a strike mission with a flight of four or more aircraft. The strike mission practices attacks on long-range targets (i.e., those geographically distant from friendly ground forces), or close air support of targets within close range of friendly ground forces. Some strike missions involve no-drop events in which prosecution of targets is practiced, but video footage is often obtained by onboard sensors. Strike exercises occur on the land and air training ranges outside the TMAA, and their impacts are covered under other environmental analysis. The Strike Warfare activity in the TMAA is limited to the launch and recovery of aircraft conducting the training in the land and air training ranges; therefore, no specific activity descriptions are provided.

A.1.7 Support Operations

Other training is conducted in the TMAA that falls outside of the primary mission areas, but supports overall readiness. Specifically, this includes Deck Landing Qualifications, which provides for helicopter crews to land on ships underway at sea.

A.1.7.1 Deck Landing Qualification

Support Operations				
Deck Landing Qualification				
Short Description	Ship's personnel launch and recover helicopters to achieve qualifications and certifications.		**Typical Duration**	Up to 12 hours
Long Description	Ship's personnel launch and recover helicopters to achieve qualifications and certifications.			
Typical Components	**Platforms:** Small boats, Navy vessels **Targets:** None			
Standard Operating Procedures *(Section 2.13)*	Vessel safety Unmanned aerial, surface, and sub-surface vehicle safety	**Typical Locations**	TMAA	
Stressors to Biological Resources	**Acoustic:** Vessel noise Aircraft noise **Explosive:** None	**Physical Disturbance and Strike:** Vessels and in-water devices Aircraft and aerial targets **Ingestion:** None		**Energy:** None **Entanglement:** None
Stressors to Physical Resources	**Air Quality:** Criteria air pollutants **Habitats:** None	**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 **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:** *(Section 5.3.4)* Vessel movement			
Assumptions Used for Analysis	None			