

**Environmental Impact Statement/
Overseas Environmental Impact Statement
Point Mugu Sea Range
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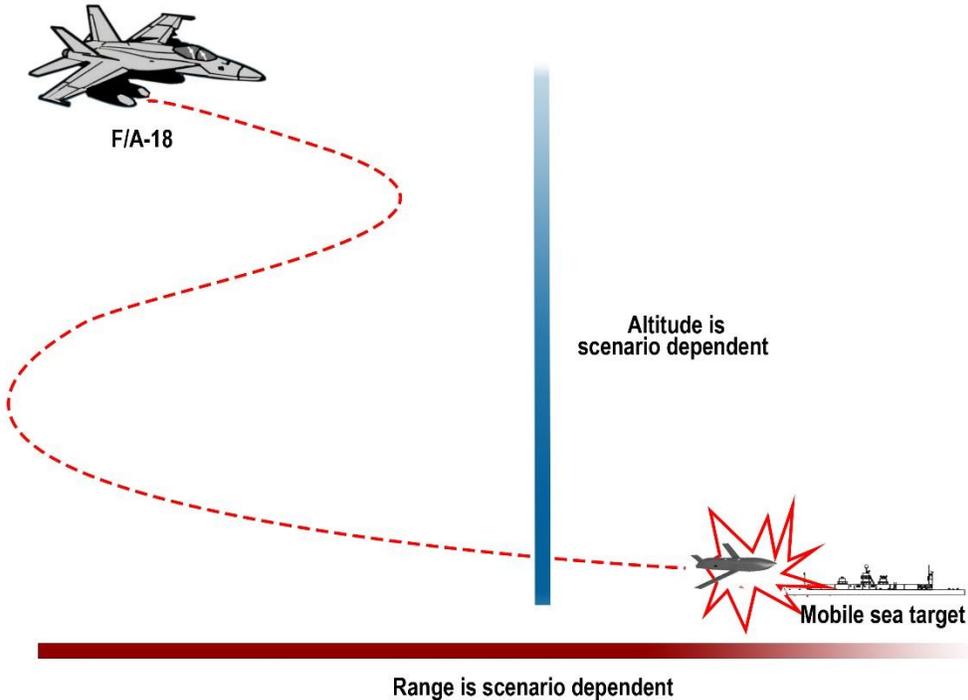
Appendix A PMSR Scenario Descriptions

A.1 Air-to-Air Scenario

Point Mugu Sea Range	
Air-to-Air Scenario	
Short Description	<p>The air-to-air scenario involves testing or training with weapons that support the Navy’s mission of air warfare. A typical air-to-air scenario involves the evaluation of an airborne weapon system (e.g., a missile fired from a fighter aircraft against an airborne target). Test missiles are highly instrumented to record the intercept parameters and usually do not carry live warheads. Training missiles usually have live warheads.</p>
Long Description	<p>Most testing under this scenario involves captive flight testing using an inert missile that is not fired. A “captive-carry” sortie involves an aircraft carrying inert missiles equipped with telemetry devices to simulate carrying and firing live ordnance. However, some scenarios involve configuring a missile with telemetry and a booster for launch and data gathering. Other test and training events require the actual firing of a live air-to-air missile at an airborne target. The missiles do not always physically strike the target. However, when missile impacts do occur, they are at altitudes of about 20,000–30,000 feet (6,100–9,100 m). Most participants take off and land from NBVC Point Mugu.</p>
Example Scenario	<p>The diagram illustrates an air-to-air scenario. On the left, an F/A-18 fighter jet is shown launching a missile. The missile's trajectory is a high, parabolic arc that peaks and then descends towards an aerial target on the right. A red starburst symbol marks the point of impact between the missile and the target. A blue vertical bar on the right side of the diagram represents the altitude of the target, with the text 'Altitude is scenario dependent' next to it. A red horizontal bar below the missile's path represents the distance from the launch point to the target, with the text 'Distance is scenario/missile dependent' above it. The target is labeled 'Aerial Target'.</p>
Targets	<p>Targets for captive-carry tests usually are manned aircraft since the missiles are not launched. For air-to-air events that require missile launching at an actual target, these targets can be unmanned, full-scale aircraft, subscale, subsonic, surface- or air-launched targets. The airborne targets are not normally destroyed (unless there is a direct hit) and are recovered. Target retrieval following the test or operation is conducted by a range or contractor helicopter, and a range boat is used for backup target recovery for subsequent reuse. Missiles are destroyed prior to impact with the water and are not normally recovered.</p>
Typical Components	<p>Platforms: Fixed-wing aircraft Targets: QF-16; subsonic BQM-34, BQM-177, and BQM-74; Ballistic Aerial Target System [BATS]); an air-launched supersonic target (AQM-37); the supersonic land-launched GQM-163. Systems Being Trained/Tested: Air-to-Air Weapons Systems</p>

Point Mugu Sea Range			
Air-to-Air Scenario			
Ancillary Operations Systems	<p>Ancillary Operations Systems are those systems that support routine Sea Range operations and include radar and communication systems.</p> <p>Radar Systems. NAWCWD uses a variety of surveillance radars and display systems to detect and track aircraft and surface vessels on or near the Sea Range. Surveillance radars can provide a complete picture of all of the activity within line-of-sight on the range, including both participants and non-participants. Continuous monitoring of range traffic allows NAWCWD to conduct hazardous operational testing and training events involving aircraft flights, missile firings, other weapons employment, and target drone launches without undue danger to the public or non-participating boats or aircraft present on the range.</p> <p>Communication Systems. Sea Range communication systems include voice communication systems (telephone), radio communication systems (including satellite interfaces), a Sea Range connectivity structure, video systems, and range timing systems. These communications systems provide the means for effective conduct of testing and training activities on the Sea Range. The communication services also provide for sea, land, and area clearance; range instrumentation connectivity; missile flight safety; target control; and target recovery operations.</p>		
Standard Operating Procedures	<table border="1"> <tr> <td data-bbox="375 783 886 1035">Range clearance is performed by a NAWCWD surveillance aircraft. Command and control of all range participants, data gathering, and range safety are performed for each air-to-air scenario.</td> <td data-bbox="886 783 1435 1035"> <p>Typical PMSR Locations</p> <p>Warning Areas 289E, 289W, and 289S north and east of San Nicolas Island are the most used areas of the Sea Range, however, activities may occur in other areas on the PMSR. Hazardous operations are conducted in those areas and occur throughout the year.</p> </td> </tr> </table>	Range clearance is performed by a NAWCWD surveillance aircraft. Command and control of all range participants, data gathering, and range safety are performed for each air-to-air scenario.	<p>Typical PMSR Locations</p> <p>Warning Areas 289E, 289W, and 289S north and east of San Nicolas Island are the most used areas of the Sea Range, however, activities may occur in other areas on the PMSR. Hazardous operations are conducted in those areas and occur throughout the year.</p>
Range clearance is performed by a NAWCWD surveillance aircraft. Command and control of all range participants, data gathering, and range safety are performed for each air-to-air scenario.	<p>Typical PMSR Locations</p> <p>Warning Areas 289E, 289W, and 289S north and east of San Nicolas Island are the most used areas of the Sea Range, however, activities may occur in other areas on the PMSR. Hazardous operations are conducted in those areas and occur throughout the year.</p>		
Safety	<p>Safety of personnel, aircraft, and ships is the primary priority for all Sea Range activities. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships. Every practical effort is made to keep non-participating boats and aircraft out of the safety hazard pattern. This is done by establishing Restricted and Warning Areas, publishing Notices to Mariners and Notices to Airmen, and maintaining close coordination with agencies controlling aircraft and surface traffic. Prior to any hazardous activity, the projected impact areas are surveyed by Range Safety aircraft. Each missile has a safety hazard pattern, which is the surface area that could be endangered by the missile if it does not follow its prescribed flight path. The debris pattern for a given test is a smaller subset of the safety hazard pattern and is located within these boundaries. If non-participating ships or aircraft are in the impact area, these individuals are warned of the impending hazard and asked to leave. If the area cannot be cleared, the tests or training events are delayed or cancelled until the area is clear or the event is moved to a clear area. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships.</p>		
Recovery	<p>Many of the airborne targets used in the air-to-air scenarios are recoverable. Helicopters and boats are used for recovery operations. Typically, the primary recovery area 10 miles (16 km) south of Anacapa Island would be used to recover airborne targets used in the air-to-air scenarios.</p>		

A.2 Air-to-Surface Scenario

Point Mugu Sea Range		
Air-to-Surface Scenario		
Short Description	<p>The air-to-surface scenario involves testing and training with weapons that support the Navy’s strike/surface warfare mission. These tests often include an aircraft weapon system using a missile, bomb, or any other object released from an aircraft for attack of an enemy surface target. Free-fall bombs are usually inert, with small required fusing but without explosives, and are used to test the accuracy of a weapon system. Free-fall bombs can be fully explosive when required for specific test or training events.</p>	<p>Typical Duration</p> <p>1–4 hours, with preceding range clearance, and scheduled back-up range times.</p>
Long Description	<p>Targets for the air-to-surface scenario are floating surface targets or the Land Impact Area on the western tip of San Nicolas Island. The target is located on the northwest portion of San Nicolas Island and may consist of several stacks of empty shipping containers, derelict aircraft bodies, or other similar targets. The Land Impact Area only allows for the use of inert weapons. Floating surface targets are usually not sunk and, if struck, are repaired for later use. The missiles being tested may carry live warheads, but those are destroyed on impact with the water.</p> <p>Targets are typically towed to a desired location on the range and augmentation systems energized (i.e., turned on) by range personnel. These targets can be towed by other boats or operated by remote control by range personnel. The NAWCWD Pacific Targets and Marine Operations (PTMO) Division at Naval Base Ventura County Port Hueneme provides range support for most of the boat targets and transportation of targets personnel.</p> <p>Additional range support involves the chase aircraft, range support boat, and tug required to position an unpowered target. Recovery of the range targets is similar to that performed for air-to-air tests.</p>	
Example Scenario	 <p>The diagram illustrates an F/A-18 aircraft in a loop, releasing a missile that strikes a mobile sea target. A vertical blue line indicates the altitude is scenario dependent, and a horizontal red line indicates the range is scenario dependent.</p>	

Point Mugu Sea Range	
Air-to-Surface Scenario	
Typical Components	<p>Platforms: Surface vessels, fixed-wing aircraft</p> <p>Targets: Targets for this scenario can be seaborne such as remotely controlled powered boats like the 56-foot (17 m) QST-35 or the 18-foot (6 m) QST-33, the Mobile Ship Target (MST), the Self Defense Test Ship (SDTS), barges, or fixed land targets on San Nicolas Island.</p> <p>Systems Being Trained/Tested: Shipboard Surface Warfare Systems</p>
Ancillary Operations Systems	<p>Ancillary Operations Systems are those systems that support routine Sea Range operations and include radar and communication systems.</p> <p>Radar Systems. NAWCWD uses a variety of surveillance radars and display systems to detect and track aircraft and surface vessels on or near the Sea Range. Surveillance radars can provide a complete picture of all of the activity within line-of-sight on the range, including both participants and non-participants. Continuous monitoring of range traffic allows NAWCWD to conduct hazardous operational testing and training events involving aircraft flights, missile firings, other weapons employment, and target drone launches without undue danger to the public or non-participating boats or aircraft present on the range.</p> <p>Communication Systems. Sea Range communication systems include voice communication systems (telephone), radio communication systems (including satellite interfaces), a Sea Range connectivity structure, video systems, and range timing systems. These communications systems provide the means for effective conduct of testing and training activities on the Sea Range. The communication services also provide for sea, land, and area clearance; range instrumentation connectivity; missile flight safety; target control; and target recovery operations.</p>
Standard Operating Procedures	Range clearance is performed by a NAWCWD surveillance aircraft, and target retrieval is performed by PMSR range support boats. All air participants take off from and land at NBVC Point Mugu.
	<p>Typical PMSR Locations</p> <p>Warning Areas 289E, 289W, and 289S are the most used areas of the Sea Range. Hazardous operations are conducted in those areas and occur throughout the year.</p>
Safety	<p>Safety of personnel, aircraft, and ships is the primary priority for all Sea Range activities. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships. Every practical effort is made to keep non-participating boats and aircraft out of the safety hazard pattern. This is done by establishing Restricted and Warning Areas, publishing Notices to Mariners and Notices to Airmen, and maintaining close coordination with agencies controlling aircraft and surface traffic.</p> <p>Prior to any hazardous activity, the projected impact areas are surveyed by Range Safety aircraft. Each missile has a safety hazard pattern, which is the surface area that could be endangered by the missile if it does not follow its prescribed flight path. The debris pattern for a given test is a smaller subset of the safety hazard pattern and is located within these boundaries. If non-participating ships or aircraft are in the impact area, these individuals are warned of the impending hazard and asked to leave. If the area cannot be cleared, the tests or training events are delayed until the area is clear or the event is moved to a clear area. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships.</p> <p>In addition, extensive safety precautions are taken when air-to-surface missiles are fired against land targets on San Nicolas Island, including a safety chase aircraft and a termination system that turns off the engine and provides parachute recovery of the missile.</p>
Recovery	<p>Sea Range target recovery procedures and range support assets are similar to the air-to-air scenarios. Many of the seaborne targets used in the air-to-surface scenarios are recoverable. PMSR Range support boats are used for recovery operations. In addition, standard clearance procedures are implemented for the west end of San Nicolas Island when missile testing occurs there.</p>

A.3 Surface-to-Air Scenario

Point Mugu Sea Range		
Surface-to-Air Scenario		
Short Description	The surface-to-air scenario involves testing and training with weapons that support the air warfare mission. This includes operating a ship's defensive weapons systems for defense against an enemy airborne target or threat. Other surface-to-air scenarios include surface-launched weapons systems and airborne targets.	Typical Duration 1–4 hours, with preceding range clearance, and scheduled back-up range times.
Long Description	Testing and training with surface-to-air missiles involves Navy ships firing their self-defense missiles against airborne targets. Targets used by the Navy in this scenario can be launched from aircraft such as the KC-130, F/A-18, or QF-16 and are recovered when possible. The air-launched AQM-37 and ground-launched GQM-163 supersonic targets are not recovered and are destroyed either on impact by the test missile or upon water entry. Missile impact altitudes for surface-to-air tests are dependent on the type of missile or target being tested. Altitudes can range from less than 100 feet (30 m) for GQM-163 targets to 80,000 feet (24,238 m) for AQM-37s.	
Example Scenario		
Another Standard Scenario	The Navy has equipped most ships with close-in defense systems, including destroyers, cruisers, littoral combat ships, amphibious ships, and aircraft carriers. Testing close-in ship defense systems on the Sea Range involves Navy ships firing the gun against an airborne target. In addition, calibration tests are conducted, which do not require the use of targets. A frequent surface-to-air scenario involves testing or training with a ship's close-in defense systems against high-speed anti-ship missiles. Close-in weapons systems (CIWS) are considered the last line of defense designed to protect ships from missile attacks. CIWS include a search and track radar, gun, magazine, weapon control unit, and associated electronics, all integrated into a single unit. The gun is hydraulically powered and fires a projectile with a tungsten penetrator. Each firing burst consists of about 200 rounds. The typical missile intercept range is between 2 miles (3 km) and 4 miles (6 km) from the ship. Missile intercept altitudes typically range from about 20 feet (6 m) to 50 feet (15 m) above the water.	

Point Mugu Sea Range	
Surface-to-Air Scenario	
Typical Components	<p>Platforms: Surface vessels, fixed-wing aircraft</p> <p>Targets: The targets are similar to the air-to-air scenario and are air-launched or surface-launched. QF-16; subsonic BQM-34, BQM-177, and BQM-74; Ballistic Aerial Target System [BATS]); an air-launched supersonic target (AQM-37); the supersonic land-launched GQM-163. Systems Being Trained/Tested: Shipboard Air Warfare Systems</p>
Ancillary Operations Systems	<p>Ancillary Operations Systems are those systems that support routine Sea Range operations and include radar and communication systems.</p> <p>Radar Systems. NAWCWD uses a variety of surveillance radars and display systems to detect and track aircraft and surface vessels on or near the Sea Range. Surveillance radars can provide a complete picture of all of the activity within line-of-sight on the range, including both participants and non-participants. Continuous monitoring of range traffic allows NAWCWD to conduct hazardous operational test and training events involving aircraft flights, missile firings, other weapons employment, and target drone launches without undue danger to the public or non-participating boats or aircraft present on the range.</p> <p>Communication Systems. Sea Range communication systems include voice communication systems (telephone), radio communication systems (including satellite interfaces), a Sea Range connectivity structure, video systems, and range timing systems. These communications systems provide the means for effective conduct of testing and training activities on the Sea Range. The communication services also provide for sea, land, and area clearance; range instrumentation connectivity; missile flight safety; target control; and target recovery operations.</p>
Standard Operating Procedures	Range clearance is performed by a NAWCWD surveillance aircraft, and target retrieval is performed by a contract helicopter. All participants (except the unmanned target) take off from and land at NBVC Point Mugu.
	<p>Typical PMSR Locations</p> <p>Warning Areas 289E, 289W, and 289S north and east of San Nicolas Island are the most used areas of the Sea Range. Hazardous operations are conducted in those areas and occur throughout the year.</p>
Safety	<p>Safety of personnel, aircraft, and ships is the primary priority for all Sea Range activities. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships. Every practical effort is made to keep non-participating boats and aircraft out of the safety hazard pattern. This is done by establishing Restricted and Warning Areas, publishing Notices to Mariners and Notices to Airmen, and maintaining close coordination with agencies controlling aircraft and surface traffic. Prior to any hazardous activity, the projected impact areas are surveyed by Range Safety aircraft. Each missile has a safety hazard pattern, which is the surface area that could be endangered by the missile if it does not follow its prescribed flight path. The debris pattern for a given test is a smaller subset of the safety hazard pattern and is located within these boundaries. If non-participating ships or aircraft are in the impact area, these individuals are warned of the impending hazard and asked to leave. If the area cannot be cleared, the tests or training events are delayed until the area is clear or the event is moved to a clear area. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships.</p>
Recovery	<p>Many of the airborne targets used in the surface-to-air scenarios are recoverable. Helicopters and boats are used for recovery operations. Typically, the primary recovery area 10 miles (16 km) south of Anacapa Island would be used to recover airborne targets used in the surface-to-air scenarios.</p>

A.4 Surface-to-Surface Scenario

Point Mugu Sea Range		
Surface-to-Surface Scenario		
Short Description	The surface-to-surface scenario involves testing and training with weapons that support the surface warfare mission. In this scenario, a surface vessel fires a missile against a surface target, which is either another ship or a land target.	Typical Duration 1–4 hours, with preceding range clearance, and scheduled back-up range times.
Long Description	<p>This includes testing and training with a ship’s weapon system using a missile weapon to attack a surface target. The weapon used can be captive-carry simulated using an inert missile, a missile with telemetry and a live rocket, or the actual firing of a live missile. Air support is required from the range to provide chase aircraft, and safety procedures are implemented to clear the target operational area.</p> <p>Targets for the surface-to-surface scenario are floating surface targets or the Land Target area on the western tip of San Nicolas Island. The target is located on the northwest portion of San Nicolas Island and consists of several stacks of empty shipping containers. Floating surface targets are usually not sunk and, if struck, are repaired for later use. The missiles being tested are instrumented for the test, do not normally carry live warheads, and are destroyed on impact with the water.</p> <p>Targets are typically towed to a desired location on the range and augmentation systems energized (i.e., turned on) by range personnel. These targets can be towed by other boats or operated by remote control by range personnel. The NAWCWD PTMO at Naval Base Ventura County Port Hueneme provide range support for most of the boat targets and transportation of targets personnel.</p> <p>Additional range support involves the chase aircraft, range support boat, and tug required to position an unpowered target. Recovery of the range targets is similar to that performed for air-to-surface tests.</p>	
Example Scenario		
Typical Components	<p>Platforms: Surface vessels, fixed-wing aircraft</p> <p>Targets: Targets for this scenario can be seaborne, such as remotely controlled powered boats like the 56-foot (17 m) QST-35 or the 18-foot (6 m) QST-33, the Mobile Ship Target (MST), the Self Defense Test Ship (SDTS), barges, or fixed land targets on San Nicolas Island.</p> <p>Systems Being Trained/Tested: Shipboard Surface Warfare Systems</p>	
Ancillary Operations Systems	<p>Ancillary Operations Systems are those systems that support routine Sea Range operations and include radar and communication systems.</p> <p>Radar Systems. NAWCWD uses a variety of surveillance radars and display systems to detect and track aircraft and surface vessels on or near the Sea Range. Surveillance radars can provide a complete picture of all of the activity within line-of-sight on the range, including both participants and non-participants. Continuous monitoring of range traffic allows NAWCWD to conduct hazardous operational testing and training events involving aircraft flights, missile firings, other weapons employment, and target drone launches without undue danger to the public or non-participating boats or aircraft present on the range.</p> <p>Communication Systems. Sea Range communication systems include voice communication systems (telephone), radio communication systems (including satellite interfaces), a Sea Range</p>	

Point Mugu Sea Range	
Surface-to-Surface Scenario	
	connectivity structure, video systems, and range timing systems. These communications systems provide the means for effective conduct of testing and training activities on the Sea Range. The communication services also provide for sea, land, and area clearance; range instrumentation connectivity; missile flight safety; target control; and target recovery operations.
Standard Operating Procedures	Range clearance is performed by a NAWCWD surveillance aircraft, and target retrieval is performed by a PMSR range support boats. All air participants take off from and land at NBVC Point Mugu.
	<p>Typical PMSR Locations</p> <p>Warning Areas 289E, 289W, and 289S are the most used areas of the Sea Range. Hazardous operations are conducted in those areas and occur throughout the year.</p>
Safety	<p>Safety of personnel, aircraft, and ships is the primary priority for all Sea Range activities. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships. Every practical effort is made to keep non-participating boats and aircraft out of the safety hazard pattern. This is done by establishing Restricted and Warning Areas, publishing Notices to Mariners and Notices to Airmen, and maintaining close coordination with agencies controlling aircraft and surface traffic.</p> <p>Prior to any hazardous activity, the projected impact areas are surveyed by Range Safety aircraft. Each missile has a safety hazard pattern, which is the surface area that could be endangered by the missile if it does not follow its prescribed flight path. The debris pattern for a given test is a smaller subset of the safety hazard pattern and is located within these boundaries. If non-participating ships or aircraft are in the impact area, these individuals are warned of the impending hazard and asked to leave. If the area cannot be cleared, the tests or training events are delayed until the area is clear or the event is moved to a clear area. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships.</p> <p>In addition, extensive safety precautions are taken when surface-to-surface missiles are fired against land targets on San Nicolas Island, including a safety chase aircraft and a termination system which turns off the engine and provides parachute recovery of the missile.</p>
Recovery	Sea Range target recovery procedures and range support assets are similar to the air-to-surface scenarios. Many of the seaborne targets used in the surface-to-surface scenarios are recoverable. PMSR Range support boats are used for recovery operations.

A.5 Subsurface-to-Surface Scenario

Point Mugu Sea Range			
Subsurface-to-Surface Scenario			
Short Description	<p>The subsurface-to-surface scenario involves testing or training with weapons that support the strike/surface warfare mission. This includes a submarine’s weapon system to attack a surface or land target.</p>		
	<table border="1"> <tr> <th>Typical Duration</th> </tr> <tr> <td>1–4 hours on the PMSR, with preceding range clearance, and scheduled back-up range times.</td> </tr> </table>	Typical Duration	1–4 hours on the PMSR, with preceding range clearance, and scheduled back-up range times.
Typical Duration			
1–4 hours on the PMSR, with preceding range clearance, and scheduled back-up range times.			
Long Description	<p>This includes testing or training with a submarine’s weapon system using a cruise missile weapon to attack a surface target. The weapon can be an inert missile, a missile with telemetry and a live rocket, or the actual firing of a live missile.</p> <p>The PMSR also supports subsurface-to-surface testing for submarine-launched (for example: Trident) ballistic missiles. These test firings originate on the PMSR and terminate at target areas thousands of miles downrange in the Pacific Ocean.</p> <p>Air support is required from the range to provide chase aircraft, and safety procedures are implemented to clear the target operational area. Additional range support involves the chase aircraft, range support boat, and tug required to position an unpowered target. Recovery of the range targets is similar to that performed for air-to-surface tests.</p>		
Example Scenario	<p>The diagram shows a blue parabolic arc representing a sub-orbital trajectory. At the bottom right, a submarine is labeled "Submerged launch on PMSR". A red horizontal line extends from the launch point to the left, labeled "Range is scenario dependent". At the end of this line, a missile is shown in the process of launching, with a plume of smoke. The text "Exo-atmospheric and on a sub-orbital trajectory" is centered above the arc. A dashed blue line indicates the sea level.</p>		
Typical Components	<p>Platforms: Submarines, support surface vessels, fixed-wing aircraft</p> <p>Targets: Targets for this scenario can be seaborne, such as remotely controlled powered boats like the 56-foot (17 m) QST-35 or the 18-foot (6 m) QST-33, the Mobile Ship Target (MST), the Self Defense Test Ship (SDTS), barges, or fixed land targets on San Nicolas Island. Fixed target areas downrange in the Pacific Ocean support ballistic missile testing.</p> <p>Systems Being Trained/Tested: Submarine Surface Warfare, and Ballistic Missile Systems</p>		
Ancillary Operations Systems	<p>Ancillary Operations Systems are those systems that support routine Sea Range operations and include radar and communication systems.</p> <p>Radar Systems. NAWCWD uses a variety of surveillance radars and display systems to detect and track aircraft and surface vessels on or near the Sea Range. Surveillance radars can provide a complete picture of all of the activity within line-of-sight on the range, including both</p>		

Point Mugu Sea Range	
Subsurface-to-Surface Scenario	
	<p>participants and non-participants. Continuous monitoring of range traffic allows NAWCWD to conduct hazardous operational testing and training events involving aircraft flights, missile firings, other weapons employment, and target drone launches without undue danger to the public or non-participating boats or aircraft present on the range.</p> <p>Communication Systems. Sea Range communication systems include voice communication systems (telephone), radio communication systems (including satellite interfaces), a Sea Range connectivity structure, video systems, and range timing systems. These communications systems provide the means for effective conduct of testing and training activities on the Sea Range. The communication services also provide for sea, land, and area clearance; range instrumentation connectivity; missile flight safety; target control; and target recovery operations.</p>
Standard Operating Procedures	Range clearance is performed by a NAWCWD surveillance aircraft, and target retrieval is performed by a PMSR range support boats. All air participants take off from and land at NBVC Point Mugu.
	<p>Typical PMSR Locations</p> <p>Warning Areas 289E, 289W, and 289S are the most used areas of the Sea Range. Hazardous operations are conducted in those areas and occur throughout the year.</p>
Safety	<p>Safety of personnel, aircraft, and ships is the primary priority for all Sea Range activities. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships. Every practical effort is made to keep non-participating boats and aircraft out of the safety hazard pattern. This is done by establishing Restricted and Warning Areas, publishing Notices to Mariners and Notices to Airmen, and maintaining close coordination with agencies controlling aircraft and surface traffic.</p> <p>Prior to any hazardous activity, the projected impact areas are surveyed by Range Safety aircraft. Each missile has a safety hazard pattern, which is the surface area that could be endangered by the missile if it does not follow its prescribed flight path. The debris pattern for a given test is a smaller subset of the safety hazard pattern and is located within these boundaries. If non-participating ships or aircraft are in the impact area, these individuals are warned of the impending hazard and asked to leave. If the area cannot be cleared, the tests or training events are delayed until the area is clear or the event is moved to a clear area. Prior to any live firing of missiles or ordnance, range safety officials ensure that the range areas are clear of non-participating aircraft or ships.</p> <p>In addition, extensive safety precautions are taken when subsurface-to-surface missiles are fired against long-range targets in the Pacific Ocean, including national Department of Defense assets that monitor the flight and performance of the missile until target area impact.</p>
Recovery	Sea Range target recovery procedures and range support assets are similar to the air-to-surface scenarios. Many of the seaborne targets used in the subsurface-to-surface scenarios are recoverable. PMSR Range support boats are used for recovery operations.