EXECUTIVE SUMMARY

This is a Final Environmental Impact Statement (FEIS) for the shock trial of WINSTON S. CHURCHILL (DDG 81). The FEIS was prepared by the Department of the Navy with the cooperation of the National Marine Fisheries Service (NMFS).

WINSTON S. CHURCHILL is the third ship in a new "flight" of 23 guided missile destroyers known as the Flight IIA ships of the ARLEIGH BURKE (DDG 51) class destroyers. A flight is a subset of a class of ships to which significant changes have been made. Flight IIA ships represent the largest single upgrade to the original ARLEIGH BURKE class destroyers. Features include the SPY-ID phased array, wide-area, anti-jam radar; vertical launch missile system; extensive command, communications, and data link systems; and sophisticated SQS-53C sonar system. By the year 2010, ARLEIGH BURKE class destroyers will represent the major force in the surface Navy.

Each new class of ships (or major upgrade) constructed for the Navy must undergo a shock trial. A shock trial is a series of underwater detonations that send a shock wave through the ship's hull to simulate near misses during combat. A shock trial allows the Navy to assess the survivability of the hull, the ship's systems, and the capability of the ship to protect the crew. WINSTON S. CHURCHILL was selected as the Flight IIA shock trial ship because it has additional design changes that will not be included in the first two Flight IIA ships, and therefore it is more representative of the flight.

PROPOSED ACTION

The proposed action is to conduct a shock trial of WINSTON S. CHURCHILL at an offshore location between 1 May and 30 September 2001. The test was scheduled for this period based on the likelihood of favorable weather and the availability of the ship. The FEIS analyzes in detail alternative areas offshore of Naval Station Mayport, Florida; Naval Station Norfolk, Virginia; and Naval Station Pascagoula, Mississippi (**Figure ES.1**).

In the shock trial, WINSTON S. CHURCHILL would be exposed to a series of underwater detonations of a 4,536 kg (10,000 lb) charge. The ship and the explosive charge would be brought closer together with each successive detonation to increase the severity of the shock. The gradation in severity would allow the Navy to fully assess the survivability of the ship and its systems. The plan is to subject WINSTON S. CHURCHILL to three detonations, which is the number of detonations needed to collect adequate data on survivability. A fourth detonation would be conducted only if one of the planned three detonations fails to provide technically acceptable data (e.g., due to equipment failure or some other technical problem). The shock trial would be conducted at a rate of one detonation per week to allow time to perform detailed inspections of the ship's systems prior to the next detonation.

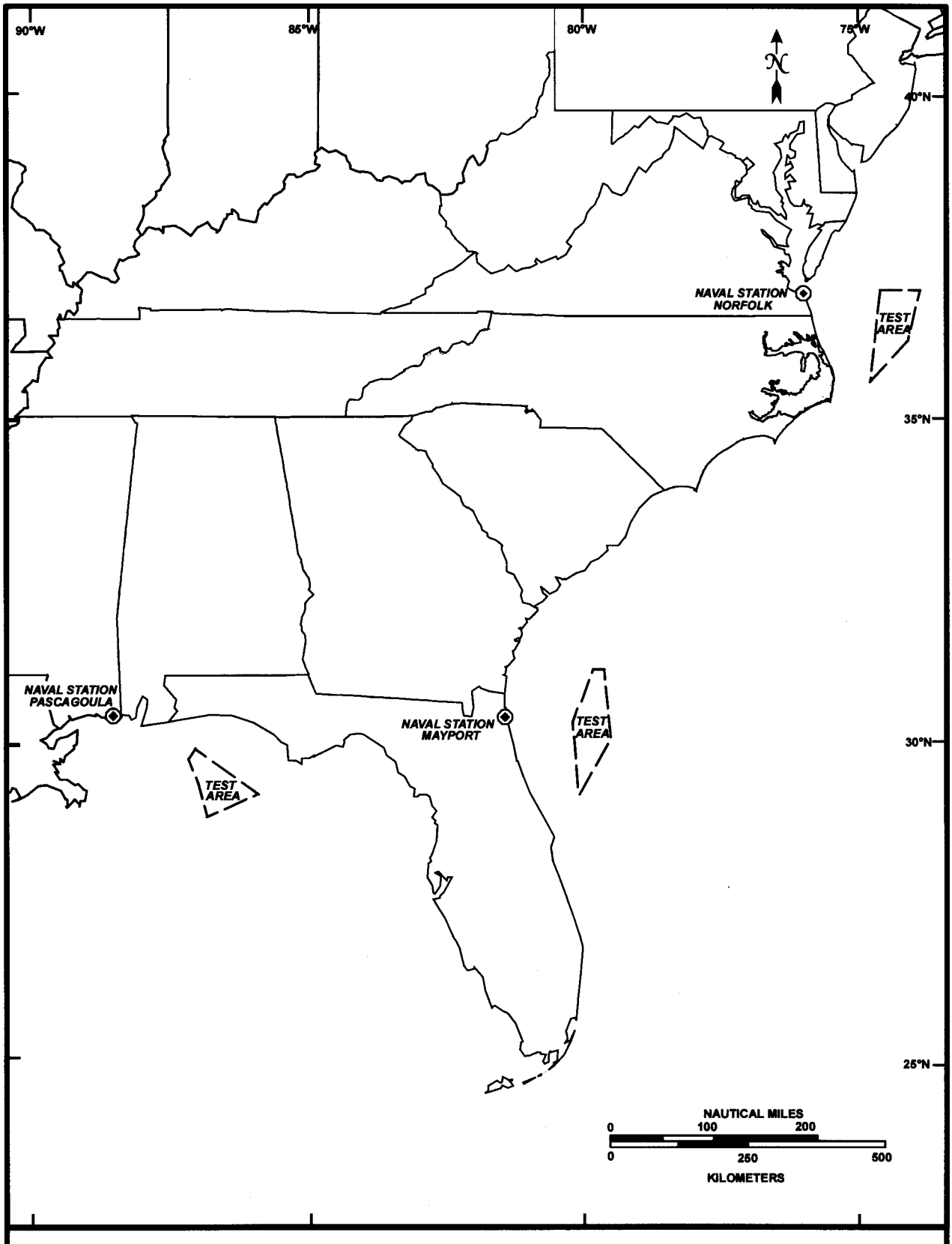

Figure ES.1. Potential test areas for the DDG 81 shock trial.

PROJECT PURPOSE AND NEED

The purpose of the project is to generate data that can be used to assess the survivability of Flight IIA ships. An entire manned ship must be shock tested at sea to obtain information to assess the survivability of the ship that is not obtainable through computer modeling and component testing on machines or in surrogates. Shock trials have proven their value as recently as the Persian Gulf War when ships were able to survive battle damage and continue their mission because of ship design, crew training, and survivability lessons learned during previous shock trials.

Section 2366, Title 10, United States Code (10 USC 2366) requires realistic survivability testing of a covered weapon system to ensure the vulnerability of that system under combat conditions is known. This statute requires that the Navy determine both what constitutes realistic survivability testing and whether a system is covered. In this case, the Navy has determined that the Flight IIA destroyer is a covered system. Realistic survivability testing means testing for the vulnerability of the ship in combat by firing munitions likely to be encountered in combat with the ship configured for combat. This testing is commonly referred to as "Live Fire Test & Evaluation" (LFT&E). Realistic testing by firing live ammunition at the ship or detonating a real mine against the ship's hull, however, could result in the loss of a multi-million dollar Navy asset. Therefore, the Navy has established an approved LFT&E program to complete the vulnerability assessment of Flight IIA ships as required by 10 USC 2366. The LFT&E program includes three major areas that together provide for a complete and comprehensive evaluation of the survivability of Flight IIA ships in a near miss, underwater explosion environment. These areas are computer modeling and analysis, component testing, and an at-sea ship shock trial. As discussed in Section 1.0 of the FEIS, computer modeling and component tests provide valuable information regarding the survivability of the ship. However, only the at-sea shock trial would provide the real-time data necessary to fully assess ship survivability.

USS JOHN PAUL JONES (DDG 53) was shock tested off the coast of California in June 1994 to assess the survivability of the original DDG 51 class destroyer. However, Flight IIA ships are significantly different from the original DDG 51 class destroyers in their design. Due to the number of major structural and equipment changes between Flight IIA ships and DDG 51 class destroyers, a new shock trial is necessary to assess the shock response of Flight IIA ships and the interaction of ship systems and components.

ALTERNATIVES

The FEIS evaluates two alternatives: (1) no action and (2) conducting a shock trial at an offshore location. Three alternative test areas for the shock trial are identified that meet all operational requirements. The three test areas are compared from operational and environmental perspectives.

No Action Alternative

Under this alternative, no new activities affecting the physical environment would be conducted to assess the response of Flight IIA ships to underwater detonations. This alternative would avoid all environmental impacts of the shock trial.

The "no action" alternative would prevent the Navy from being able to assess the survivability of Flight IIA ships. A shock trial at sea provides the only means to assess the shock response of the entire ship and the interaction of the ship's systems and components. The LFT&E program for Flight IIA ships already includes the maximum reasonable amount of computer modeling and component testing.

The "no action" alternative involves no activity affecting the physical environment. However, the "no action" alternative is implicit in the environmental analysis throughout the document. The Existing Environment section provides a "no action" benchmark against which the proposed action can be evaluated. The Environmental Consequences section compares impacts of an action (conducting a shock trial) with the alternative of "no action."

Shock Trial at an Offshore Location (Preferred Alternative)

Conducting a shock trial at an offshore location is the proposed action and the Navy's preferred alternative. Within this alternative, a multi-step process was used to identify, eliminate, and finalize alternative offshore locations for assessment in the EIS. Alternative areas for the shock trial were identified based on operational requirements. Portions of the candidate test areas were excluded to avoid environmental impacts. Mitigation measures were developed that would minimize potential impacts at each test area. Environmental impacts of conducting a shock trial at each of the alternative test areas were analyzed.

Operational Requirements. Alternative areas for the proposed shock trial were evaluated by the Navy according to operational criteria. A location along the East Coast or Gulf of Mexico would best meet operational needs because WINSTON S. CHURCHILL will be homeported on the East Coast. Only three Naval Stations along the East Coast and Gulf of Mexico have sufficient homeported ships to support the shock trial: Naval Station Mayport, Naval Station Norfolk, and Naval Station Pascagoula. Test areas offshore of these three Naval Stations can meet all other operational requirements including water depth of at least 183 m (600 ft), suitable weather/sea state conditions, a manageable volume of commercial ship traffic, and proximity to aircraft, a ship repair facility, and an ordnance loading facility. A detailed analysis concluded that all three test areas could support the shock trial. From an operational perspective, Norfolk and Mayport rank higher and are about equal, with Pascagoula ranking lower and well behind the other two.

Operational Characteristics: Mayport

Advantages:	Disadvantages:
• The area has favorable weather and sea state conditions. • The area has the lowest amount of commercial shipping traffic of the three areas. • Helicopters are homebased at Naval Station Mayport.	• A Military Sealift Command (MSC) tug would have to be deployed out of Naval Amphibious Base Little Creek (VA) for the duration of the shock trial. • Repair facilities are limited (one floating drydock in Mayport and one contract shipyard in Savannah). • There is no explosives storage (dayload only). • Aircraft would have to be deployed to Naval Air Station (NAS) Jacksonville to support the trial. • It is not the homeport of WINSTON S. CHURCHILL.

Operational Characteristics: Norfolk

Advantages:	Disadvantages:
• Naval Station Norfolk is the homeport of WINSTON S. CHURCHILL. • Largest number of homeported ships to support shock trial. • Home-based F-14 or F/A-18 aircraft are available at nearby NAS Oceana. • An MSC tug is available at nearby Naval Amphibious Base Little Creek. • The nearby Naval Weapons Station Yorktown is available to store and load the explosives.	• Weather conditions overall are less favorable than at either Mayport or Pascagoula, though adequate to conduct the shock trial. • Helicopters would need to be transferred from Mayport to NAS Norfolk for the duration of the trial. • Ship repair facilities, though more extensive than at Mayport, do not include a DDG 51 class shipbuilder.

Operational Characteristics: Pascagoula

Advantages:	Disadvantages:
• The area has the most favorable weather and sea state conditions. • A DDG 51 class shipbuilder is present at Pascagoula.	• There is heavier ship traffic than at the other test areas. • An MSC tug would have to be deployed out of Naval Amphibious Base Little Creek (VA) for the duration of the trial. • Helicopters would need to be transferred from Mayport to NAS Pensacola for the duration of the trial. • Aircraft would have to be deployed to NAS Pensacola or Tyndall Air Force Base to support the trial. • There is no explosives storage (dayload only). • The number of homeported ships to support the trial is minimal. • Fleet support activities at this Naval Station are minimal. • It is farthest from the homeport of WINSTON S. CHURCHILL.

Exclusionary Mapping. Some environmental features such as explosives dumpsites and shipping lanes were deliberately avoided in defining the test areas. After the test areas were defined, exclusionary mapping was conducted to determine whether portions of the test areas should be excluded. Environmental features that were included in the exclusionary mapping were as follows:

- Active petroleum lease blocks;
- Artificial reef sites and areas;
- Communications cables;
- Critical habitats;
- Data buoys;
- Explosives dumpsites;
- Hard bottom and coral areas;
- Marine sanctuaries;
- Navigation aids;
- Ocean dredged material, acid waste, and sewage sludge disposal sites;
- Pipelines (oil and gas);
- Platforms (oil and gas);
- Shipping lanes;
- Towers (communications or navigation);
- Unexploded ordnance; and
- Wrecks and obstructions.

Buffer zones were added to appropriate environmental features with the goal of protecting resources or avoiding conflicts at the time of the shock trial. Various buffer distances were used, depending on the type of environmental feature. The exclusionary mapping indicates that each test area has a large area remaining in which the shock trial could be conducted.

Comparison of Alternatives

Table ES.1 summarizes the analysis of alternatives with respect to project purpose and need, operational criteria, and environmental impacts.

Purpose and Need. The "no action" alternative (including computer modeling and component testing) is not a reasonable alternative because it would not provide the information and data necessary to assess the survivability of the ship as required by 10 USC 2366. The alternative of conducting a shock trial at an offshore location would meet the project purpose and need.

Operational Analysis. As explained previously, a detailed analysis concluded that all three potential test areas (Mayport, Norfolk, and Pascagoula) could support the shock trial. From an operational perspective, the Norfolk and Mayport test areas rank higher and are about equal, whereas the Pascagoula test area is significantly less suitable for supporting the shock trial.

Environmental Analysis. Potential environmental impacts of conducting a shock trial at the Mayport, Norfolk, and Pascagoula test areas are analyzed in the Environmental Consequences section of the FEIS and summarized in **Table ES.2**. Most environmental impacts of the shock trial would be similar at Mayport, Norfolk, or Pascagoula. These include minor and/or temporary impacts to the physical and biological environments and existing human uses of the test site. However, there are significant differences with respect to potential impacts on marine mammals and sea turtles, as discussed below.

Table ES.1. Summary of alternatives analysis.

Basis for Comparison	Alternative			
	No Action (Includes Maximum Reasonable Amount of Computer Modeling and Component Testing)	**Shock Testing at an Offshore Location**		
		Mayport Area	Norfolk Area	Pascagoula Area
Meets project purpose and need	No	Yes	Yes	Yes
Meets operational requirements	No further analysis (alternative does not meet project purpose and need)	Yes (Ranked higher, similar to Norfolk)	Yes (Ranked higher, similar to Mayport)	Yes (Ranked lower)
Environmental impacts				
- Marine mammals	No further analysis (alternative does not meet project purpose and need)	Lower risk of impacts (similar to Pascagoula)	Higher risk of impacts than Mayport or Pascagoula	Lower risk of impacts (similar to Mayport)
- Sea turtles	No further analysis (alternative does not meet project purpose and need)	Lower risk of impacts (similar to Pascagoula)	Higher risk of impacts than Mayport or Pascagoula	Lower risk of impacts (similar to Mayport)
- Other	No further analysis (alternative does not meet project purpose and need)	Most other environmental impacts similar at the three areas (**see Table ES.2**)		

Table ES.2. Comparison of potential environmental impacts of a shock trial at the Mayport, Norfolk, and Pascagoula test areas.

Environmental Component	Section of FEIS Analyzing Impacts	Description of Potential Impact	Comparison of Alternative Areas
		IMPACTS EVALUATED UNDER EXECUTIVE ORDER 12114 (impacts outside U.S. territorial seas)	
Biological Environment			
Marine mammals	4.1.1	Mitigation will minimize risk, but marine mammals could be killed or injured if not detected within Safety Range. At greater distances, animals may experience disruption of hearing-based behaviors.	Risk of a marine mammal being killed, injured, or experiencing hearing disruption would be higher at Norfolk and lower and about equal at Mayport or Pascagoula.
Sea turtles	4.1.2	Mitigation will minimize risk, but turtles could be killed or injured if not detected within Safety Range. At greater distances, turtles may experience disruption of hearing-based behaviors.	Risk of a sea turtle being killed, injured, or experiencing hearing disruption would be higher at Norfolk and lower and about equal at Mayport or Pascagoula.
Seabirds	4.1.3(a)	Seabirds above the detonation point could be killed or stunned by the plume of water ejected into the air. Other seabirds resting or feeding at the surface could be killed or injured by the shock wave. It is unlikely that more than a few birds would be affected.	Mayport, Norfolk, and Pascagoula similar.
Fish	4.1.3(b)	Pelagic (water column) fish near the detonation point may be killed or injured. Many of the same species occur at all three areas. Demersal (bottom) fish will not be affected.	Mayport, Norfolk, and Pascagoula similar.
Ichthyoplankton and *Sargassum* communities	4.1.3(c)	Floating organisms near the detonation point would be killed, but populations would be rapidly replenished through reproduction and mixing with adjacent waters.	Mayport, Norfolk, and Pascagoula similar.

Table ES.2. (Continued).

Environmental Component	Section of FEIS Analyzing Impacts	Description of Potential Impact	Comparison of Alternative Areas
IMPACTS EVALUATED UNDER EXECUTIVE ORDER 12114 (continued) (impacts outside U.S. territorial seas)			
Benthic communities	4.1.3(d)	No direct effect on benthic organisms is expected. No habitat disturbance is expected. Metal fragments deposited on the seafloor will be colonized by invertebrates and attract fish.	Mayport, Norfolk, and Pascagoula similar.
Socioeconomic Environment			
Commercial and recreational fisheries	4.1.4(a)	Individuals of commercial or recreational fishery species may be killed or injured, but no significant impact on fishery stocks is expected. Commercial and recreational fishing activities within 18.5 km (10 nmi) of the detonation point will be temporarily interrupted.	Mayport, Norfolk, and Pascagoula similar.
Ship traffic	4.1.4(b)	Ship traffic passing within 18.5 km (10 nmi) of the detonation point would need to alter course or be escorted from the area.	Mayport, Norfolk, and Pascagoula similar.
Physical Environment			
Geology and sediments	4.1.5(a)	Metal fragments will be deposited on the seafloor. No cratering or sediment disturbance expected.	Mayport, Norfolk, and Pascagoula similar.
Air quality	4.1.5(b)	Temporary, localized increase in concentrations of explosion products in the atmosphere. No hazard to marine or human life.	Mayport, Norfolk, and Pascagoula similar.
Water quality	4.1.5(c)	Temporary, localized increase in concentrations of explosion products in the ocean. No hazard to marine life.	Mayport, Norfolk, and Pascagoula similar.

Table ES.2. (Continued).

Environmental Component	Section of FEIS Analyzing Impacts	Description of Potential Impact	Comparison of Alternative Areas
IMPACTS EVALUATED UNDER NEPA [a] (impacts onshore and within U.S. territorial seas)			
Biological Environment	4.2.1	No significant direct or indirect impacts on marine biota, including plankton, pelagic fish, marine mammals, sea turtles, benthic organisms, and seabirds.	Mayport, Norfolk, and Pascagoula similar.
Socioeconomic Environment	4.2.2	No significant direct or indirect impacts on the local economy, including ship traffic and the fishing and tourism industries.	Mayport, Norfolk, and Pascagoula similar.
Physical Environment	4.2.3	No significant direct or indirect impacts on geology and sediments, air quality and noise, or water quality.	Mayport, Norfolk, and Pascagoula similar.

[a] Shore support operations and movement of vessels and aircraft within territorial seas are not unusual or extraordinary and are part of the routine operations associated with the existing shore bases.

Marine Mammal Impacts. Potential impacts on marine mammals are analyzed in detail in Section 4.1.1 of the FEIS and summarized in **Table ES.2**. Potentially significant direct impacts include mortality, injury, and temporary disruption of hearing-based behaviors. At either Mayport, Norfolk, or Pascagoula, mitigation methods described in Section 5.0 would result in selection of a test site with low densities of marine mammals. In addition, most marine mammals would be detectable during pre-detonation aerial surveys, surface observations, and passive acoustic monitoring, minimizing the risk of death or injury. The Norfolk test area has a higher density of marine mammals, including several endangered species (particularly sperm whales and fin whales). Due to these higher densities, the likelihood of finding a suitable test site is lower at Norfolk than at either Mayport or Pascagoula. The number of marine mammals potentially killed, injured, or experiencing disruption of hearing-based behaviors during the shock trial would be higher at Norfolk than at either Mayport or Pascagoula. The risk would be lower and about equal at Mayport and Pascagoula.

Sea Turtle Impacts. Potential impacts on sea turtles are analyzed in detail in Section 4.1.2 of the FEIS and summarized in **Table ES.2**. Potentially significant direct impacts include mortality, injury, and disruption of hearing-based behaviors. At either Mayport, Norfolk, or Pascagoula, mitigation methods described in Section 5.0 would result in selection of a test site with low densities of sea turtles. Because the Norfolk test area has a higher density of sea turtles, the likelihood of finding a test site with no detectable turtles is lower there than at either Mayport or Pascagoula. The number of sea turtles potentially killed or injured during the shock trial is higher at Norfolk than at either Mayport or Pascagoula. The risk would be lower and about equal at Mayport and Pascagoula.

Preferred Alternative

The preferred alternative is to conduct a shock trial at Mayport between 1 May and 30 September 2001 with mitigation to minimize risk to marine mammals and turtles. Although all three test areas meet minimum operational requirements, the Norfolk and Mayport test areas rank higher operationally, whereas the Pascagoula test area is significantly less suitable for supporting the shock trial. Environmentally, the risk of impacts to marine mammals and turtles is higher in the Norfolk test area, and is lower at, and about equal between, Mayport and Pascagoula. Therefore, considering all other aspects of the three candidate test areas to be about the same, conducting the shock trial at Mayport would meet the project purpose and need, satisfy operational requirements, and minimize environmental impacts.

ENVIRONMENTAL CONSEQUENCES

Impact discussions in the Environmental Consequences chapter are divided into separate subsections to distinguish between those aspects of the proposed action evaluated under the National Environmental Policy Act (NEPA) and those evaluated under Executive Order 12114. NEPA applies to activities and impacts within U.S. territory, whereas Executive Order 12114 applies to activities and impacts outside territorial seas. The proposed action includes operations that would occur both within and outside U.S. territory. The shock trial and

associated mitigation operations would occur at least 79 km (43 nmi) offshore at the Mayport area, 60 km (32 nmi) offshore at the Norfolk area, or 50 km (27 nmi) offshore at the Pascagoula area, outside U.S. territorial seas. No impacts from the actual shock trial (detonation of explosives) would occur in U.S. territory. The only operations that would occur within territorial limits are shore support activities and vessel and aircraft movements in territorial waters (i.e., transits between the shore base and the offshore shock trial site). These shore support activities and vessel and aircraft movements are not unusual or extraordinary and are part of the routine operations associated with the existing shore bases.

The proposed action involves underwater detonations that would produce a shock wave and noise, release chemical products into the ocean and atmosphere, and deposit metal fragments on the seafloor. During each test, there would be increased vessel traffic, including ships and aircraft monitoring for marine mammals and turtles. Routine ship traffic (including commercial and recreational fishing vessels) would be temporarily excluded from the test area.

Marine Mammals. Potentially significant impacts on marine mammals include mortality, injury, and temporary disruption of hearing-based behaviors. Numbers of marine mammals that may be killed by the detonations was estimated by using a model to predict the range for onset of extensive lung hemorrhage. Numbers of marine mammals potentially injured was similarly calculated using a model to predict the range for onset of slight lung hemorrhage. Disruption of hearing-based behaviors was estimated using a model to predict the range for onset of temporary threshold shift (TTS). TTS is a change in the threshold of hearing (the quietest sound that the animal can hear), which could temporarily affect an animal's ability to hear calls, echolocation sounds, and other ambient sounds.

Marine mammals could be killed or injured if they are present near the detonation point and not detected during pre-detonation monitoring. Marine mammals at greater distances may experience disruption of hearing-based behaviors. At any of the three test areas, site selection surveys would be conducted to choose a specific test site with low densities of marine mammals and turtles (see Mitigation). Potential deaths and injuries of marine mammals would be minimized by using marine mammal and turtle observers aboard aircraft and the shock trial ship, as well as passive acoustic monitoring. However, because of differences in marine mammal populations among test areas, the numbers potentially killed or injured would be higher at Norfolk than at Mayport or Pascagoula. Potential impacts from four detonations are estimated as follows:

Potential Marine Mammal Impacts

	Mayport	Norfolk	Pascagoula
Mortalities	4	7	3
Injuries	6	12	4
Disruption of hearing-based behaviors	2,885	14,640	3,132
Species most likely to be affected	• Bottlenose dolphin • Risso's dolphin	• Pilot whale • Atlantic spotted dolphin • Bottlenose dolphin	• Dwarf/pygmy sperm whale • Bottlenose dolphin

The higher numbers for disruption of hearing-based behaviors at Norfolk reflect the test area's water depth (onset TTS ranges are greater in deep water) as well as the marine mammal density differences.

At Mayport or Pascagoula, it is unlikely that any endangered marine mammals would be killed or injured. Sperm whales could be present, but in low densities, and these animals are very likely to be detected by visual and/or passive acoustic monitoring (see Section 5.0 and Appendix B). The probability of a sperm whale being present undetected in the Safety Range at either Mayport or Pascagoula is less than 1%. No other endangered whales are expected to occur at Mayport or Pascagoula during the test period.

Sperm whales and fin whales are the most abundant endangered cetaceans likely to be present at Norfolk. There is a small, but non-negligible (>1%) chance that an individual sperm whale, fin whale, or sei whale would be killed or injured if the shock trial were conducted at Norfolk. The probability of a humpback whale being killed or injured is less than 1%. No other endangered whales are expected to occur at Norfolk during the test period.

Sea Turtles. Potentially significant impacts on sea turtles could include mortality and injury. In the FEIS, the same criteria developed for marine mammals were used to estimate potential impacts on sea turtles. At any of the test areas, site selection surveys would result in selection of a test site with low densities of sea turtles. Because of the difference in turtle densities between areas, the risk of a turtle being killed or injured would be higher at Norfolk than at Mayport or Pascagoula. Potential impacts from four detonations are estimated as follows:

Potential Turtle Impacts

	Mayport	Norfolk	Pascagoula
Mortalities	1	2	1
Injuries	2	3	1
Disruption of hearing-based behaviors	232	855	199

Leatherback turtles (an endangered species) make up most of the population at the Mayport and Pascagoula test areas, whereas loggerhead turtles (a threatened species) are more abundant at Norfolk. Juvenile and hatchling sea turtles are unlikely to be affected because detonation would be postponed if large *Sargassum* rafts or debris lines (the preferred habitat of these turtles) were present within the Safety Range.

Seabirds. A few seabirds (if present on the water surface or in the air immediately above the detonation point) could be killed or stunned by the plume of water ejected into the air. As part of the mitigation plan, the Navy would postpone detonation if flocks of seabirds were sighted within 1.85 km (1 nmi) of the detonation point. This would avoid any large mortality of seabirds.

Fish and Other Small Marine Life. Fish and other small marine life near the detonation point would be killed or injured by the shock wave. A large fish kill would not be expected because detonation would be postponed if large schools of fish were observed within 1.85 km (1 nmi) of the detonation point (see Mitigation). Small fish with swimbladders (e.g., dwarf herring, round scad, Atlantic menhaden, and chub mackerel) are the ones most likely to be affected if present within about 1,645 m (5,400 ft) of the detonation point. Larger pelagic fish such as billfish, dolphinfish, tunas, and wahoo may be affected within a radius of about 915 m (3,000 ft). Fish without a swimbladder (e.g., sharks) are unlikely to be affected unless they are within about 22 m (73 ft) of the detonation point. Although individual fish would be killed and injured, no impact on fish populations is expected because the species found at the Mayport, Norfolk, and Pascagoula test areas are abundant and widely distributed. Other small marine life such as plankton would also be affected but would be rapidly replenished through population growth and mixing of test site waters with adjacent waters. Due to the water depth of at least 183 m (600 ft), bottom dwelling fish and invertebrates are unlikely to be affected at any of the test areas.

Fishing and Shipping Activities. Fishing vessels and other ships and aircraft would be excluded from an area of 9.3 km (5 nmi) radius before, during, and after each detonation, for a period of up to 12 hours. This exclusion zone is an electronic emissions control zone that virtually eliminates the possibility of an inadvertent detonation caused by radio/radar induced electrical current in the explosive firing circuit. The exclusion zone also provides an area of safe maneuvering for the charge-handling vessel and the towed charge. Ships within a 18.5 km (10 nmi) radius would be warned to alter course or would be escorted from the area. The most common fishing activities at both areas are surface and bottom longlining and trolling. Due to the short duration of the tests and advance warning through *Notices to Airmen and Mariners*, the interruption is not expected to significantly affect commercial or recreational fisheries or other ship traffic at Mayport, Norfolk, or Pascagoula.

Water and Air Quality. Underwater explosions would release chemical products into the ocean and atmosphere and deposit metal fragments on the seafloor. Due to the low initial concentrations and rapid dispersion of the chemical products, they would pose no hazard to marine or human life. Predicted atmospheric concentrations are well below human safety standards within 305 m (1,000 ft) downwind. Predicted concentrations in the surface pool above the detonation point are below water quality criteria. The small metal fragments would gradually corrode but are not expected to produce significant adverse impacts on the seafloor; they would provide a substrate for growth of epibiota and attract fish.

MITIGATION AND MONITORING

Mitigation, as defined by the Council on Environmental Quality, includes measures to minimize impacts by limiting the degree or magnitude of a proposed action and its implementation. The proposed action includes mitigation designed to minimize risk to marine mammals and turtles. A detailed marine mammal and sea turtle mitigation plan has been developed that includes test area selection and pre- and post-detonation monitoring. The plan is summarized below and described in detail in Section 5.0 of the FEIS. Other mitigation measures described in the FEIS

include environmental buffer zones to avoid impacts to certain environmental features; an exclusion zone to avoid impacts to routine vessel and air traffic; and measures to deal with unexploded ordnance in the unlikely event of a misfire.

Marine Mammal and Sea Turtle Mitigation Plan

A detailed Marine Mammal and Sea Turtle Protection/Mitigation Plan is presented in Section 5.0. The plan includes the same type of mitigation and monitoring efforts that were used successfully during the shock trial of the USS JOHN PAUL JONES in 1994. Those shock trial operations included two 4,536 kg (10,000 lb) detonations and no deaths or injuries of marine mammals were detected.

The mitigation plan represents the final step in a sequence of actions to avoid or reduce environmental impacts. The Mayport, Norfolk, and Pascagoula test areas were initially selected based on the Navy's operational requirements. Then, portions of each test area were excluded based on environmental considerations. Finally, the results of impact analysis in the Environmental Consequences section were used to compare the risk of impacts to marine mammals and turtles among test areas.

The mitigation plan would build upon these efforts to avoid and further reduce potential environmental impacts. Within a test area, one primary and two secondary test sites would be selected where marine mammal and turtle populations are the lowest, based on the results of aerial surveys to be conducted one to two days prior to the first detonation. This would ensure that the final test site selected for the shock trial poses the least possible risk to the marine environment. Pre-detonation monitoring would be conducted on the day of the shock trial to evaluate the test site and verify that the Safety Range and Buffer Zone are free of visually and acoustically detectable marine mammals; sea turtles; large *Sargassum* rafts, debris lines, and/or concentrations of jellyfish (all are possible indicators of turtle presence); large schools of fish; and flocks of seabirds. Finally, post-detonation monitoring would be conducted to determine the effectiveness of the mitigation efforts. A ship-based Marine Animal Recovery Team (MART) and aerial observers would monitor the test site and surrounding waters for injured or dead animals after each detonation. Communications with stranding network personnel would be maintained throughout the shock trial period.

The concept of a Safety Range is an integral part of the mitigation plan. The area within the Safety Range would be monitored by all components of the mitigation team and detonation would not occur until it is clear of detectable marine mammals and sea turtles, as well as indicators of sea turtle presence such as large *Sargassum* rafts, debris lines, and jellyfish aggregations. The purpose of the Safety Range is to prevent deaths and injuries to marine mammals and sea turtles. The Safety Range radius of 3.7 km (2 nmi) around the detonation point exceeds the estimated ranges for mortality and injury to a marine mammal or sea turtle associated with detonation of a 4,536 kg (10,000 lb) explosive. Based on the analysis presented in Appendix D, the maximum range for mortality (onset of extensive lung injury) is 1.35 km (0.73 nmi) and the maximum range for injury (onset of slight lung injury) is 2.25 km (1.22 nmi). These are conservative ranges, and take into account the worst-case depth effects.

The Safety Range extends well beyond these ranges to encompass the maximum area that can be effectively monitored both visually and acoustically. Its radius is approximately 2.7 times the onset mortality range and 1.6 times the range for onset of slight lung injury.

The mitigation plan includes three components: (1) aerial surveys/monitoring; (2) shipboard monitoring from WINSTON S. CHURCHILL; and (3) passive acoustic monitoring. Aerial and shipboard monitoring teams would identify and locate animals on the surface, whereas the acoustic monitoring team would detect and locate calls from submerged marine mammals. This combination of monitoring components would be used to detect marine mammals and turtles within the Safety Range and to minimize the risk of impacts to these animals.

COORDINATION AND CONSULTATION WITH THE NMFS

The NMFS has two regulatory roles in the project. First, it is responsible for administering the Endangered Species Act of 1973 as it applies to sea turtles and most marine mammals. The DEIS served as a Biological Assessment that the Navy submitted to the NMFS, requesting formal consultation under Section 7 of the Endangered Species Act. The NMFS subsequently issued a Biological Opinion which is included in Appendix G of the FEIS.

The NMFS also has a regulatory role under the Marine Mammal Protection Act of 1972. In January 2000, following the release of the DEIS, the Navy submitted a separate application to the NMFS for an "incidental take authorization" under section 101(a)(5)(A) of the Marine Mammal Protection Act. In December 2000, the NMFS published a Proposed Rule in the Federal Register (65 FR 77546). The Proposed Rule specifies mitigation, monitoring, and reporting requirements for the shock trial. A Final Rule must be issued before the shock trial can proceed.

The NMFS is also a cooperating agency with the Navy in preparing the EIS. Because of its regulatory responsibilities under the Endangered Species Act and the Marine Mammal Protection Act, the NMFS limited its role in preparation of the EIS mainly to providing review and comment. The only formal comments received from the agency concern essential fish habitat, and they are addressed in Appendix I of the FEIS.