Final Environmental Assessment

Operations at the Bloodsworth Island Range, Maryland

February 2006

Department of the Navy
Naval Air Systems Command
Naval Air Warfare Center Aircraft Division

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Final Environmental Assessment

Operations at the Bloodsworth Island Range

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Abstract

This environmental assessment (EA) identifies and evaluates the potential environmental effects of a proposed action that considered increasing the use of the land and surface water resources of the Bloodsworth Island Range (BIR) to conduct research, development, test, and evaluation (RDT&E) and training events. Three alternatives are analyzed in this EA. Based on mission requirements, the Navy will continue to voluntarily cease land impact operations, including the dropping of live or inert ordnance, at the BIR. Therefore, in order to finalize the draft EA, the Navy has selected the No-Action Alternative as the preferred alternative, which maintains the current operational environment at the BIR. Implementation of the preferred alternative, as described and assessed in this EA, would have no significant impact on the quality of human health and the environment.

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Executive Summary

In the following environmental assessment (EA), the Department of the Navy (the Navy) analyzes the potential environmental impacts of accommodating research, development, test, and evaluation (RDT&E) operations and incorporating selected training events at the Bloodsworth Island Range, Maryland (BIR). This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and Navy procedures for implementing NEPA (32 CFR 775) and evaluates three alternatives addressing viable RDT&E and training events (range operations) that the BIR could potentially support. These alternatives are reflective of the Navy's current knowledge of RDT&E and training priorities for national security needs in the context of the availability of the BIR, a potentially significant range asset.

Due to past public interest in Navy activities at the BIR, the Navy decided to circulate a draft version of the EA for a 30-day public review period. Additionally, three public information exchanges took place in mid-March 2005 at Deal Island, Cambridge, and Wingate, Maryland. The public information exchanges allowed the Navy and citizens to discuss the proposed action and address questions and concerns in an open-house-type setting. In addition, copies of the document were made available for review at four Eastern Shore libraries and were mailed to interested citizens.

A total of 337 individuals attended the three public information exchanges; written comments were received from 73 individuals and groups. Five federal and state government agencies also submitted comments on the draft EA. The comments can be categorized into eight major issue areas: noise, type and tempo of operations, health and safety, environment, commercial fishing, recreational fishing/hunting, economics, and the NEPA process. The comments have been considered and information incorporated into the EA where appropriate.

Since initiating this EA, the Navy has continued to evaluate its mission needs with respect to aircraft RDT&E. Accordingly, at this time, the Navy has determined that it is in its best interest to concentrate on range operations that use the restricted airspace overlying the BIR and not expand the use of the BIR for surface activities. **The Navy will continue the policy implemented in 1996 to voluntarily cease land impact operations at the BIR, including the dropping of live or inert ordnance.** In that context, the description of the No-Action Alternative in the draft EA was clarified in this final EA, but no extensive changes were made to the description and analysis of the impacts of the other alternatives.

The Proposed Action

Although the Navy has selected the No-Action Alternative as the preferred alternative, the proposed action considered expanding the use of land and surface water resources of the BIR to 12 months per year (day or night). The proposed action considered allowing the Navy to perform the following RDT&E and select training operations (hereinafter referred to as range operations):

- Continuation of natural resources management on the BIR and maintenance of the established heron rookery and platforms
- Continuation of non-impact operations, including aviation-related tests that use the Special Use Airspace overlying the BIR ***but not*** the surface impact areas on Bloodsworth or Pone Islands
- Resumption of previous range operations that involved nonexplosive ordnance for air-to-ground impact operations on Bloodsworth and Pone Islands
- Range operations, compatible with natural resources management procedures at the BIR which involve small boat platforms, amphibious craft, rotary- and fixed-wing aircraft, small arms (training and operational rounds), and ground forces
- Range operations, compatible with natural resources management procedures at the BIR, proposed by other Navy commands, other military services, and Federal agencies as authorized by the NAVAIR Range Department

In addition, the proposed action includes replacement and/or relocation of targets on BIR and may require the construction and installation of infrastructure improvements on BIR to support proposed range operations.

Alternatives Considered

Three alternatives are evaluated in this EA:

- **Alternative 1 (No-Action Alternative)** - The No-Action Alternative would allow the Navy to continue to conduct aviation-related RDT&E activities that use the Special Use Airspace that overlies the BIR. In addition, the Navy's voluntary suspension of all ordnance expenditures on the BIR (Bloodsworth Island and Pone Island) would be maintained. **Thus, NO impact operations are proposed for the BIR's surface impact area**. This alternative would also provide for existing target maintenance, which includes replacement and/or relocation of targets on the BIR and continued management of the BIR's natural resources. In

The No-Action Alternative means ***no change*** in the operational status of the BIR.

summary, the No-Action Alternative means ***NO*** change in the current operational status of the BIR.

- **Alternative 2 (BIR Surface Danger Zone Clearance for up to 800 Hours per Year)** - The BIR would be available for 12 months per year. However, BIR operations requiring the clearance of the BIR's Surface Danger Zone would be allowed for up to 800 hours per year. This level of usage is projected on the basis of historic use and likely future use. Although the Surface Danger Zone could be closed to non-test participants for up to 800 hours annually, this does not mean that the maximum level of usage would occur each year. Historically, the use of the BIR has been highly variable, which is a direct result of the number and status of the Navy's aircraft RDT&E programs coupled with the need for operating in an estuarine/littoral environment. In general, operational workloads are heaviest when RDT&E requirements for aircraft platforms are needed and during times of international conflict.

- **Alternative 3 (BIR Surface Danger Zone Clearance for up to 1,200 Hours per Year)** - The BIR would be available for 12 months per year. However, those BIR operations requiring the clearance of the BIR's Surface Danger Zone would be allowed for up to 1,200 hours per year. As with Alternative 2, the need to close the Surface Danger Zone for up to 1,200 hours per year would depend on the number and status of the Navy's aircraft RDT&E programs during any one year.

Environmental Consequences

As described in Table ES-1, the implementation of any of the alternatives would result in no significant environmental impacts.

Table ES-1 Maximum Environmental Consequences to Resource Areas

Resource	Maximum Environmental Consequences
Land Use and Coastal Zone Management	Proposed action would be compatible with the past use of the BIR as an impact range and would not impact residential or commercial land uses in proximity to the BIR. Additionally, the proposed action would be undertaken in a manner fully consistent with the applicable enforceable coastal zone management policies of the State of Maryland.
Range Operations and Safety	The proposed action would be conducted in accordance with existing safety procedures to ensure public health and safety when range operations are conducted at the BIR. Targets on the BIR would be replaced and relocated as needed.
Recreation and Open Space	Waterfowl hunting would continue at the BIR on a permitted basis during Maryland's waterfowl hunting seasons. There would be no impacts to other federal or state open space or recreational resources.

Resource	Maximum Environmental Consequences
Socioeconomics	***Environmental Justice*** - An evaluation of ethnicity, poverty status, and demographic data demonstrates that there would be no disproportionately high or adverse health or environmental effects on minority or low-income populations pursuant to Executive Order 12898, nor would these effects pose disproportionate environmental health or safety risks to children pursuant to Executive Order 13045. ***Impacts to Commercial and Recreational Fishing, Crabbing, and Boating*** - The BIR Surface Danger Zone would be closed to commercial fishing for up to 22 percent or 33 percent of summer daylight hours for Alternatives 2 and 3, respectively. Closure of the Surface Danger Zone would not be a significant impact because commercial fishing would be restricted from only 3 percent of the Middle Chesapeake Bay and access would continue to be allowed through Hooper Strait to fishing grounds in Tangier Sound north and east of the BIR or around Holland and South Marsh islands and through the Holland Straits. Furthermore, given the average duration of Surface Danger Zone closure, watermen would be able to fish in other areas of the bay while range operations were being conducted at the BIR and return to the Surface Danger Zone after those operations have been completed. Impacts to recreational fishers and boaters would be similar and not significant.
Topography, Geology, and Soils;	Impacts to these resources would be short-term and would, with application of best management practices, not be significant.
Water and Sediment Quality	The results of water quality sampling by the Navy at the BIR support the conclusion that release of nonexplosive ordnance under the proposed action would not adversely affect water or sediment quality in the bay. Other water quality impacts would be within the natural, short-term variability of the background concentrations in this portion of the bay.
Vegetation and Wetlands	Range operations would disturb tidal wetlands, but no individual area would be affected on a continual basis; thus, wetland vegetation disturbed by range operations would quickly recover after cessation of the activities. Construction of the amphibious assault craft landing pads, helicopter pad, and storage shed could result in the permanent loss of up to 0.6 acre of estuarine emergent wetland. Because complete wetland avoidance is not feasible, a Clean Water Act Section 404 permit would be obtained from U.S. Army Corps of Engineers.
Wildlife and Fisheries	***Terrestrial Wildlife and Fisheries*** - The implementation of seasonal restrictions on certain range operations conducted at the BIR and the minimal potential for release of ordnance constituents into the environment would avoid significant impacts on wildlife and fisheries. ***Essential Fish Habitat*** *(EFH)* - The Navy has determined that the proposed action would only cause temporary or minimal impacts on EFH that would be immeasurable. Such impacts would not adversely affect EFH. Therefore, consultation with National Oceanographic and Atmospheric Administration (NOAA) Fisheries is not required. ***Natural Resources Management*** - The Navy will continue to manage the natural resources on the BIR and maintain the established heron rookery and platforms.
Threatened and Endangered Species/Marine Mammals	***Threatened and Endangered Species*** - Based on the proposed implementation of seasonal restrictions, the Navy has determined that the proposed BIR operations would have no effect on all state and federally listed species. ***Marine Mammal Protection Act*** *(MMPA)*- Based on the minimal potential for impacts to marine mammals related to direct strikes, vehicle collisions, and underwater acoustics, implementation of the proposed action would not result in the reasonably foreseeable "takes" of a marine mammal species by harassment or injury or mortality as defined under the MMPA. Therefore, neither consultation with National Marine Fisheries (NMFS) under Endangered Species Act (ESA) nor application for takings under MMPA is required.
Cultural Resources	Cultural resources are within the boundaries of the existing No Fire Area. Therefore, the Navy has determined that implementation of the proposed action would have no adverse effect on the proposed historic district or the eligibility of any historic site for listing in the National Register of Historic Places.
Noise	Noise exposure levels at the nearest sensitive receptors at Bishops Head and Elliott Island would be below 65 decibels (dBA) day-night average sound level (DNL) for aircraft operations and below 45 dBA for operations by small boats and watercraft. Peak sound levels associated with small-arms fire would be below the 115 dBP noise complaint threshold for the nearest sensitive receptors.
Air Quality	Total emissions under the proposed action would be below de minimis thresholds.

Resource	Maximum Environmental Consequences
Ordnance, Hazardous Materials Management, Radio-Frequency Sources, and Directed Energy Systems	***Hazardous Materials Management*** **-** Only nonexplosive ordnance would be employed at the BIR. The results of water quality sampling by the Navy at the BIR support the conclusion that release of nonexplosive ordnance under the proposed action would not result in releases of hazardous substances to the environment ***Radio-Frequency Impacts*** **-** Adherence to requirements of the Hazards of Electromagnetic Radiation to Personnel (HERP) program would avoid significant radio-frequency impacts from operation of electronic warfare emitters at the BIR. ***Directed Energy System Impacts*** **-** The use of directed energy systems would continue to be used during range operations conducted on the BIR. Use of such systems would be limited to those targets that have been surveyed and specifically approved for such use. If new or additional targets were needed, the target and target area would be surveyed and assessed before approval to ensure that no potential hazards exist that could create safety risks.
Transportation	The commercial shipping lane through Chesapeake Bay is 3 miles west of BIR Surface Danger Zone and would not be affected by BIR operations under the proposed action.
Cumulative Impacts	The EA analyzed five actions that would cumulatively increase use of surface waters in Chesapeake Bay, but the actions are located at a sufficient distance from each other to result in no significant cumulative impacts.

Identification of the Preferred Alternative

When the Navy began preparation of this EA, the alternatives analyzed herein were reflective of the Navy's RDT&E and training priorities for national security needs at that time. While the proposed action and purpose/need are still viable in the context of providing more diversified RDT&E and training opportunities, current Navy strategic planning, restructuring, and fiscal considerations make the need less urgent. Given the decreased urgency, NAVAIR has decided to concentrate on range operations that use the airspace overlying the BIR and not expand use of the BIR for surface activities. **The Navy will continue to voluntarily cease land impact operations at the BIR, including the dropping of live or inert ordnance.** Selection of the No-Action Alternative means ***NO*** change in the operational status of the BIR.

THE NAVY IS SELECTING THE NO-ACTION ALTERNATIVE AS THE PREFERRED ALTERNATIVE.

Acronyms and Abbreviations

AAAV	Advanced amphibious assault vehicle
AESO	Aircraft Environmental Support Office
AGL	above ground level
BASH	bird/aircraft strike hazard
BIR	Bloodsworth Island Range
CAA	Clean Air Act
cal	caliber
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSAR	combat search and rescue
CTR	Chesapeake Test Range
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
dBA	decibels
dBP	peak decibel
DNL	day-night average sound level
DoD	Department of Defense
EA	environmental assessment
EFH	essential fish habitat
EFV	expeditionary fighting vehicle
EIS	environmental impact statement
EMAP	Environmental Monitoring and Assessment Program

Acronyms and Abbreviations

EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
EW	electronic warfare
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FEIS	Final Environmental Impact Statement
FLIR	forward-looking infrared
HAPC	habitat areas of particular concern
HERP	hazards of electromagnetic radiation to personnel
HPA	Habitat Protection Area
INRMP	Integrated Natural Resources Management Plan
JDAM	joint direct attack munition
L_{dnmr}	onset-rate adjusted day-night sound level
LNG	liquefied natural gas
MDE	Maryland Department of Environment
MDNR	Maryland Department of Natural Resources
$\mu g/m^3$	microgram per cubic meter
mm	millimeter
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act

Acronyms and Abbreviations

NAAQS	National Ambient Air Quality Standards
NAB	Naval Amphibious Base
NAS	Naval Air Station
NATOPS	Naval Aviation Training and Operating Procedures Standardization
NASPAXRIVRINST	Naval Air Station Patuxent River Instruction
NAVAIR	Naval Air Systems Command
NAWCAD	Naval Air Warfare Center Aircraft Division
NEPA	National Environmental Policy Act
NGFS	naval gunfire support
Ni-Cd	nickel-cadmium
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPS	National Parks Service
NRHP	National Register of Historic Places
NSWC	Naval Surface Warfare Center
NSW	Naval Special Warfare
NWR	national wildlife refuge
OCE	officer conducting the exercise
OPNAVINST	Chief of Naval Operations Instruction
PA	Preliminary Assessment
PBL	patrol boat light
ppm	parts per million
ppt	parts per thousand

Acronyms and Abbreviations

R	restricted area
RCRA	Resource Conservation Recovery Act
RDT&E	research, development, test, and evaluation
RDX	cyclo-1,3,5-trimethylene-2,4,6-trinitramine
RF	radio frequency
RONA	Record of Non-Applicability
SAR	search and rescue
SAV	submerged aquatic vegetation
SEL	sound exposure level
SIP	State Implementation Plan
SOC-R	special operations craft riverine
SRTA	short-range training ammunition
SUA	special use airspace
TNT	2,4,6-trinitrotoluene
UAV	unmanned aerial vehicle
UCAV	unmanned combat aerial vehicle
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps

Acronyms and Abbreviations

UXO	unexploded ordnance
VDGIF	Virginia Department of Game and Inland Fisheries
VIMS	Virginia Institute of Marine Science
WISS	Weapons Impact Scoring System
WMA	wildlife management area

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1 Purpose and Need

The United States Navy proposes to increase the use of the land and surface water resources of the Bloodsworth Island Range, Maryland (BIR) for research, development, test, and evaluation (RDT&E) and selected training operations. This Environmental Assessment (EA) evaluates three alternatives addressing viable RDT&E and training events (range operations) that could be conducted at the BIR. These alternatives are reflective of the Navy's current knowledge of RDT&E and training priorities for national security needs in the context of the availability of the BIR, a potentially significant range asset.

Range Operations - RDT&E tests, training events, or other activities that are accomplished for an intended military mission or task over a scheduled period of time. For the purposes of this EA, range operations include training events conducted by other federal agencies, such as the Department of Homeland Security or the Federal Bureau of Investigation.

Because of past public interest in Navy activities at the BIR, the Navy decided to circulate a draft version of the EA for a 30-day public review period. Additionally, three public information exchanges took place in mid-March 2005 at Deal Island, Cambridge, and Wingate, Maryland. The public information exchanges allowed the Navy and citizens to discuss the proposed action and address questions and concerns in an open-house-type setting. In addition, copies of the document were made available for review at four Eastern Shore libraries and were mailed to interested citizens.

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Since initiating this EA, the Navy has continued to evaluate its mission needs with respect to aircraft RDT&E. Accordingly, at this point in time, the Navy has determined that it is in its best interest to concentrate on range operations that use the restricted airspace overlying the BIR and not expand the use of the BIR for surface activities. **This means the Navy is selecting the No-Action Alternative as the preferred alternative.** In that context, the description of the No-Action Alternative in the draft EA was clarified in this final EA. No extensive changes were made to the description and analysis of the impacts of the other alternatives.

1.1 NEPA Requirements

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508),

and Navy procedures for implementing NEPA (32 CFR 775). The NEPA process ensures that the potential environmental impacts of proposed major federal actions are considered in decision-making. To that end, the EA describes the existing environmental conditions in the vicinity of the proposed activities and evaluates the direct, indirect, and cumulative impacts that may result from implementation of the proposed activities.

1.2 Background

1.2.1 Location of Bloodsworth Island

The BIR is located within Dorchester County, Maryland, in the middle section of Chesapeake Bay (see Figure 1-1), approximately 24 miles south of Cambridge, Maryland and 27 miles southwest of Salisbury, Maryland. Naval Air Station (NAS) Patuxent River is approximately 20 miles northwest of the BIR.

The BIR is comprised of four islands with a combined land area of 6,013 acres: Adam, Bloodsworth, Northeast, and Pone. Bloodsworth Island is the largest at 5,361 acres. A fifth island, Great Cove, was formerly part of the BIR but is now completely submerged. A Surface Danger Zone, which is activated during BIR operations, surrounds the islands and covers a total area of about 16,430 acres (26 square miles) of surface water.

Special Use Airspace - Airspace designated by the Federal Aviation Administration for military use.

The land, water, and instrumentation assets of the Patuxent River Complex also surround the BIR. The Patuxent River Complex includes the Chesapeake Test Range (CTR) and its 1,800 square miles of special use airspace (SUA) overlying the middle Chesapeake Bay and portions of southern Maryland, Maryland's Eastern Shore, western Delaware, and Virginia's Northern Neck. To the south, west, and northwest of BIR are three established surface target areas: Hooper, Hannibal, and Tangier. These targets, all with a water background, provide safe, controlled locations where weapons/stores separation testing or air-to-ground and surface-to-surface firing can be conducted. The Naval Air Systems Command (NAVAIR) Range Department at NAS Patuxent River, Maryland schedules and controls the use of the Patuxent River Complex.

1.2.2 History of BIR

Impact Operations - Range operations that involve the use of the land resources for maneuvers, the firing of weapons, or the delivery (drop) of ordnance on a range impact area.

The BIR was acquired by the Navy during World War II (July 1942) and was in continuous use for BIR operations until 1996. During that period both live and nonexplosive ordnance was fired or dropped on impact areas on Bloodsworth and Pone islands. A range-spotting tower was constructed on Adam Island to provide scoring capability. Adam, Northeast, and Grand Cove islands did not receive ordnance.

In 1996, the Navy voluntarily ceased range impact operations on the BIR. This decision was made by Naval Amphibious Base (NAB) Little Creek in Norfolk, Virginia (the then-current owner) based on the lack of an adequate Range Safety Plan, standard operating procedures, and other safety guidelines. However, the NAVAIR Range Department continued to use BIR as a visual target for non-impact operations in support of its RDT&E activities and for operations conducted by the U.S. Navy Test Pilot School. On March 27, 2001, ownership of the BIR was transferred from NAB Little Creek to NAVAIR. Management of the BIR was then assigned to the Naval Air Warfare Center, Aircraft Division (NAWCAD) and NAS Patuxent River.

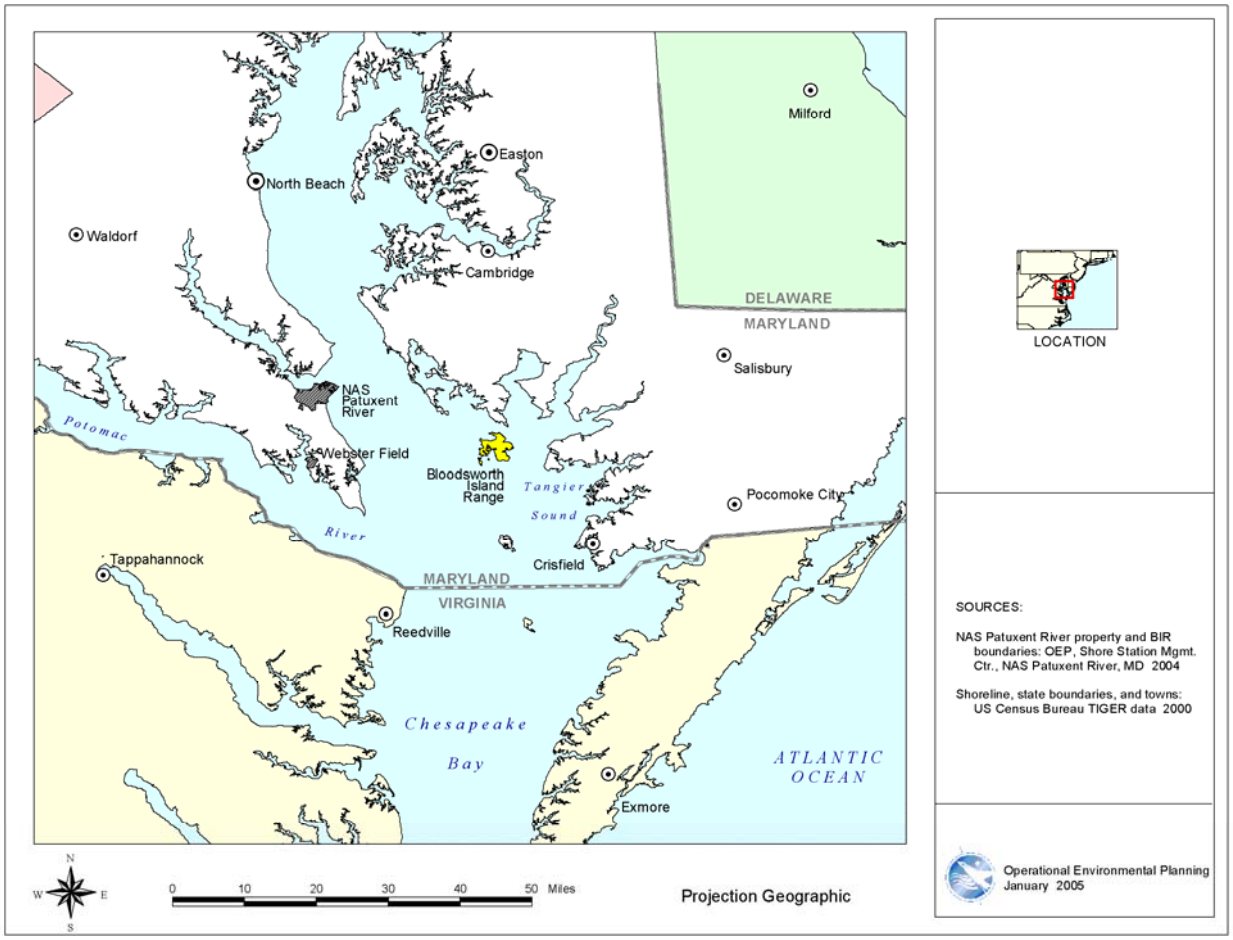

Figure 1-1 Location of Bloodsworth Island

Weapons Separation Tests - Testing to ensure that a weapon releases from an aircraft in a positive and stable manner.

Past impact operations at BIR included naval gunfire support (NGFS) training, air-to-ground weapons delivery, and weapons separation testing. NGFS involving shore bombardment and field gunnery exercises was conducted at the BIR until 1989, when the Naval Amphibious School's NGFS Spotter Course was terminated. Training exercises involved the day and night delivery of inert and explosive 3-inch/.38 caliber (cal) and 5-inch/.54cal projectiles and illumination rounds from ships (including destroyers, guided missile destroyers, frigates, and guided missile frigates, and Coast Guard vessels) to targets located on the western shore of Bloodsworth Island. Ships were stationed at three separate Fire Support Areas between 2 to 8 miles west of the BIR. Scoring was conducted from the tower on Adam Island.

Test and training in air-to-ground weapons delivery by military aircraft (bombing and strafing) and weapons separation tests were performed on the BIR from 1942 through 1996. Ordnance delivered by aircraft included nonexplosive training rounds, nonexplosive practice bombs, and explosive ordnance up to 500 pounds. In addition, illumination flares, 2.75-inch and 5-inch rockets, and machine guns were employed. Ground targets, including vehicles, metal structures, and a simulated portable surface-to-air missile site, provided realistic scenarios for aircraft targeting.

Non-Impact Operations - Range operations that do not affect land resources, for example, flyovers.

Current, non-impact operations at the BIR involve the test and evaluation of aircraft, including their flying qualities and performance, propulsion, aircrew, and missions systems; electronic warfare; search and rescue; flight crew proficiency; and evaluation of radar systems, unmanned aerial vehicle (UAV) and Unmanned Combat Aerial Vehicle (UCAV) sensors, night vision systems, directed energy systems, and other electronic systems. These range operations are conducted in the SUA located directly above BIR, which contains three restricted areas (R) (R-4002, R-4006, and R-4008) that cover a continuous altitude band from the surface to 85,000 feet. R-4002 extends from the surface to 20,000 feet, R-4006 extends from 3,500 feet to 25,000 feet, and R-4008 extends from 25,000 feet to 85,000 feet. The restricted areas are set up this way, including the overlap in altitudes for R-4002/R-4006, to contain the unique activities of NAWCAD aircraft.

Restricted Area - A type of Special Use Airspace designated by the Federal Aviation Administration that may not be entered by nonparticipating aircraft unless authorized by the military air traffic control authority.

Historically, the use of the BIR has been highly variable, which is a direct result of the number and status of the Navy's aircraft RDT&E programs coupled with the need for operating in an estuarine/littoral environment. In general, operational workloads are heaviest when RDT&E requirements for aircraft platforms are needed and during times of international conflict.

The impact area at the BIR (with clearance of the Surface Danger Zone) has historically been available for scheduling about 3,700 hours annually. The highest tempo of surface operations reached a maximum of approximately 800 hours each year, a level of activity that is reflective of the Navy's current policy of closing the BIR during the migratory waterfowl season, which runs from about October/November to February/March each year.

1.3 Purpose and Need

The NAVAIR mission directly supports the efforts of U.S. Navy forces to succeed in combat through the research, test, acquisition, and maintenance of aircraft and aircraft weapons systems. NAVAIR is supported in this mission by the NAWCAD, which conducts RDT&E of aircraft platforms and all associated subsystems, including weapons delivery hardware/software, propulsion systems, avionics, flight controls, and radar. In carrying out its aviation-related RDT&E responsibilities, NAWCAD uses the flight and ground test facilities that comprise the Patuxent River Complex. The NAVAIR Range Department schedules the Patuxent River Complex and maintains and operates the required range instrumentation and associated processes that are used to quantify and effectively provide decision-quality data to BIR users.

Platform - any military vessel, aircraft, vehicle, or structure bearing weapons.

Recent international events have shown a need for increased training in the area of national security that requires U.S. security forces to be ready for, and have the demonstrated capabilities to overcome, threats and challenges. To succeed in their mission, security forces need weapons systems and realistic training developed for and tested against potential threat targets representative of the variable conditions faced during actual missions, including:

Littorals -The shallow ocean (or "near land") areas and adjacent coastlines reachable by sea-based forces.

- A variety of topographic settings, including surface and subsurface water backgrounds and land/water transitions or interfaces, that are representative of world-wide littoral environments.

- Climatic/seasonal variability (winter, spring, summer, fall).

Expanded use of the BIR would provide the Navy with access to an impact range that provides land, land/water transitions, or littoral target backgrounds for conducting range operations. This would enhance the capabilities of the Patuxent River Complex since the existing targets (Hooper, Hannibal, and Tangier) offer only a surface water background. Use of the BIR also would offer seasonal variability.

***Purpose*:** The purpose of the proposed action is to conduct RDT&E and training events at the BIR that would be compatible with the use of an existing Navy range asset that can provide land, land/water transitions, or littoral target backgrounds and full seasonal variability.

***Need*:** The proposed action would meet the Navy's need to test and train in controlled, but variable, range environments that are representative of those that may be encountered during real-world missions.

In addition, because the BIR is close to NAS Patuxent River (and contained within the boundaries of the Patuxent River Complex), the full range of NAVAIR Range Department infrastructure support systems are available to ensure that all BIR operations can be conducted safely and efficiently.

1.4 Environmental Issues Associated with the Proposed Action

The BIR was not under NAVAIR ownership during preparation of the *Final Environmental Impact Statement (FEIS) for Increased Flight Operations in the Patuxent River Complex*, an environmental planning document that covers RDT&E and military training operations conducted in the Patuxent River Complex (U.S. Navy December 1998) (hereinafter referred to as the Patuxent River Complex environmental impact statement (EIS)). Since 1998, the Navy's need to use the BIR has emerged as a requirement that fits within the overall mission of the Patuxent River Complex.

This EA fulfills the obligations of NEPA and the Navy regulations governing NEPA implementation (32 CFR 775). This EA also addresses the full range of environmental resources and identifies potential impact issues related to each of the components of the proposed action, including:

- Land use compatibility
- Range Operations and Safety
- Socioeconomics
- Water quality
- Wetlands
- Wildlife
- Operational noise (including aircraft, watercraft, and ordnance use)

2 Proposed Action and Alternatives

The United States Navy considered increasing the use of the land and surface water resources of the BIR for RDT&E and selected training operations. Three alternatives are proposed for analysis in this EA. **The No-Action Alternative is the Navy's preferred alternative and would maintain the current operational environment at the BIR.** The other alternatives would provide for expanded use of the BIR for range operations (RDT&E and training events) on a year-round basis. These two alternatives vary only by the number of hours per year (up to 1,200) that the Surface Danger Zone at the BIR could be cleared to accommodate the proposed range operations. Public access to the Surface Danger Zone could be restricted during such BIR operations.

2.1 Proposed Action

The proposed action considered expanding the use of land and surface water resources of the BIR to 12 months per year (day or night). The Navy considered performing the following BIR operations:

- Continuation of the natural resources management on the BIR and maintenance of the established heron rookery and platforms
- Continuation of non-impact operations that support Navy RDT&E, including aviation-related tests that use the Special Use Airspace overlying the BIR but not the surface impact areas on Bloodsworth or Pone islands
- Resumption of previous range operations that involved nonexplosive ordnance for air-to-ground impact operations on Bloodsworth and Pone islands.
- Range operations, compatible with natural resources management procedures at the BIR, which involve small boat platforms, amphibious craft, rotary- and fixed-wing aircraft, small arms (training and operational rounds), and ground forces.
- Range operations, compatible with natural resources management procedures at the BIR, proposed by other Navy commands, other military services, and federal agencies as authorized by the NAVAIR Range Department.

Nonexplosive Ordnance - Ordnance that does not contain any explosives but may contain a signal cartridge (spotting charge) that expels smoke/flame for impact marking.

Fixed-Wing Aircraft-The category of aircraft where the lift and forward thrust that allows the aircraft to fly is generated by a jet engine or engine-driven propeller. (e.g., F/A-18E/F).

Rotary-Wing Aircraft Category of aircraft where the lift and forward thrust that allows the aircraft to fly is generated by the rotating wing or rotor (e.g., helicopter).

In addition, the proposed action includes replacement and/or relocation of targets on the BIR and may require the construction and installation of infrastructure improvements on BIR to support proposed range operations.

2.2 Alternative Selection Criteria

The CEQ places significant importance on the discussion of reasonable alternatives in NEPA documents. As defined in 40 CFR 1502.14, the heart of a NEPA document is the analysis of alternatives, which provides decision makers and the public with a clear picture of the issues and rationale used to reach the preferred alternative.

The first step taken by NAVAIR in identifying reasonable alternatives for analysis in this EA was to develop a list of range operations that would be potentially acceptable for implementation at the BIR. In developing the list, NAVAIR considered the following attributes of the BIR, which are discussed in more detail in Table 2-1:

- NAVAIR's RDT&E requirements
- Navy's training priorities
- Range capability
- Size of the BIR
- Presence of unexploded ordnance
- Existence of important habitat for waterfowl and colonial water birds at the BIR and the presence of cultural resources
- Economic impact to Chesapeake Bay commercial and recreational fishery
- Proximity of noise-sensitive populations to the BIR
- Proximity to NAS Patuxent River

Table 2-1 Attributes of the BIR

Attribute*	Details
NAVAIR's RDT&E requirements	The mission of NAVAIR is "to develop, acquire, and support naval aeronautical and related technology systems with which the U.S. Navy Fleet can train, fight, and win." The BIR can provide land, land/water transition, and littoral target backgrounds that support the NAVAIR mission. It is also scheduled and controlled by the NAVAIR Range Department and therefore, is fully accessible for aircraft-related RDT&E.
Range Capability	The BIR was established to support Navy training and testing by providing an area for naval ship gunfire support exercises, air-to-ground bombing training, rocket firing training, and aircraft RDT&E activities.
Size of Range	The BIR is one of the smallest ranges in the Navy and restricts the type and scope of military surface, air, and air-to-ground activities that can be safely accommodated. This limitation of the range underscores the importance of planning operational activities such that hazard areas are always contained within the BIR boundaries in order to allow for adequate safety buffers. The use of explosive ordnance and NGFS, although formerly allowed at the range, are not considered feasible for future use at the BIR.
Presence of Unexploded Ordnance	Bloodsworth and Pone Islands contain unexploded ordnance as a result of military activities conducted on the islands between 1942 and 1996. This unexploded ordnance is a safety hazard that restricts pedestrian and vehicular movement. Therefore, transit on ground surfaces on Bloodsworth and Pone Islands during range operations will be limited.
Existence of Important Habitat for Waterfowl and Colonial Water Birds and the Presence of Cultural Resources	Bloodsworth Island and the waters surrounding the BIR provide significant and important habitat to waterfowl and colonial water birds. Identified cultural resources of interest (principally a cemetery) are also present on Bloodsworth and Pone Islands. A No Fire Zone has existed to the north of the impact area for the protection of roosting and nesting sites for waterfowl and colonial water birds and cultural resources since the 1980s. Future range operations should respect the continuation of the No Fire Zone and limit operational noise that could disturb wildlife.
Economic Significance on Chesapeake Bay's Commercial and Recreational Fishery	The Navy recognizes that Chesapeake Bay is a fishery important to the state and that the waters surrounding the BIR provide recreational opportunities, including boating, fishing, and seasonal waterfowl hunting. Future BIR operations should minimize disruptions to the local commercial fishery and recreational uses to the extent that national security remains uncompromised.
Proximity of Noise Sensitive Populations	Residential areas, with noise-sensitive populations are in proximity to the BIR -- Bishops Head to the north and Deal Island to the east.
Proximity to NAS Patuxent River	BIR is close to NAS Patuxent River (and contained within the boundaries of the Patuxent River Complex). The full range of NAVAIR Range Department infrastructure support systems are available to ensure that all range operations can be conducted safely and efficiently.
Navy's training priorities	The Navy must "train like it fights." Access to the BIR would provide an opportunity for nearby aircraft squadrons or special boat units to perform realistic training events involving one or two aircraft or surface craft. These training events would involve operations that are similar to RDT&E testing.

*Attributes are not listed in order of priority.

After carefully comparing various types of candidate range operations against each of the considerations identified in Table 2-1, NAVAIR determined that the following range operations are compatible with conditions at the BIR:

- Non-impact operations
- Nonexplosive air-to-ground weapons delivery impact operations
- Small boat and amphibious craft operations
- Search and rescue (SAR)/combat search and rescue (CSAR) and other rotary-wing operations
- UAV/UCAV operations
- Special warfare operations

Given the nature and scope of these proposed range operations, however, NAVAIR further determined that a number of necessary protective measures or standard operating procedures should be imposed as part of the proposed action (e.g., seasonal restrictions for certain types of operations) in order to minimize any potentially adverse environmental impacts. Proposed protective measures are identified in Section 2-4.

2.3 Alternatives

In this EA, the Navy is evaluating the environmental effects of three alternatives:

- **Alternative 1** – No-Action Alternative (Preferred Alternative)
- **Alternative 2** - BIR Surface Danger Zone Clearance for Up to 800 Hours per Year
- **Alternative 3** - BIR Surface Danger Zone Clearance for Up to 1,200 Hours per Year

Regardless of the alternative selected, the airspace overlying the BIR would be available for scheduling RDT&E activities; however, range operations that require clearance of the Surface Danger Zone would be allowed up to 1,200 hours annually, depending on the alternative selected.

2.3.1 Alternative 1: No-Action Alternative (Preferred Alternative)

The No-Action Alternative would allow the Navy to continue to conduct range operations involving aviation-related RDT&E using the SUA overlying the BIR. These range operations include the following RDT&E flight test activities:

- **Aircraft flying qualities and performance** - Includes flight tests to evaluate and measure rate of climb/descent, acceleration, turn performance, range, and other similar aircraft maneuvers to demonstrate

the ability of the test aircraft to meet mission and specification requirements.

- **Propulsion systems**: - Includes in-flight measurement of thrust, stall margin acceleration and deceleration performance, fuel consumption, airstart capability, and other specifics related to mission and specifications requirements.

- **Human factors (aircrew systems)** - Includes flight tests to evaluate aircrew survival systems, cockpit lighting, night vision systems, cockpit visibility, and other human-machine interface factors.

- **Missions systems** - Includes flight tests to evaluate radar systems, directed energy systems (laser designators, microwave communications, and other low energy systems), navigation systems, mapping systems, and other electronic systems.

- **Electronic warfare** - Includes flight test of systems designed to detect, classify, and provide counter-measures against various enemy threat systems such as missiles, radars, and gun control systems.

- **Flight crew proficiency** - Includes flight tests to maintain pilot and aircrew proficiency for navigation, target recognition, tracking, and other aviation-related skills.

The above RDT&E flight test operations that involve overflights of the BIR, but do not include the release of ordnance or other expendables from the test aircraft, were analyzed in the Patuxent River Complex EIS (U.S. Navy December 1998). During the migratory waterfowl season (November 15 to March 15), range operations would continue to maintain a 3,000-foot above ground level (AGL) minimum altitude restriction in accordance with Chief of Naval Operations Instruction (OPNAVINST) 3710.7T, *NATOPS General Flight and Operations Instructions,* and Naval Air Station Patuxent River Instruction (NASPAXRIVRINST) 3710.5T, Air Operations Manual.

The Navy would continue to voluntarily cease land impact operations at the BIR, including the dropping of live or inert ordnance.

The No-Action Alternative would provide for existing target maintenance, which includes replacement and/or relocation of targets on the BIR to meet specific RDT&E requirements. The existence of targets on the BIR allows aircrews to learn how to sight and recognize ground-based threats. The targets currently at the BIR consist of billboard-type signs, radar reflectors, simulated weapons platforms (e.g., full-size molded plastic tanks), discarded military and civilian vehicles (after removal of oil and gas), and other equipment.

In addition, the No-Action Alternative would allow for the continued maintenance of the natural and cultural resources found on the BIR.

2.3.2 Alternatives 2 and 3: BIR Surface Danger Zone Clearance

Alternatives 2 and 3 differ only in the number of hours the Surface Danger Zone could be cleared on an annual basis, and so are discussed together in this section of the EA. The Surface Danger Zone Clearance for Alternative 2 is up to 800 hours per year and for Alternative 3 is up to 1,200 hours per year. Under Alternatives 2 and 3, the Navy would keep the BIR available for scheduling 12 months per year, day or night, even during the migratory waterfowl season (November 15 through March 15). The protective measures identified in Section 2.4 would be applied to range operations scheduled for the BIR. Making the BIR available for scheduling for this duration would provide full seasonal variability for potential users.

Table 2-2 presents the maximum number of annual range operations that could be completed at the BIR. For Alternative 2, an estimated 200 range operations could be conducted with 120, or 60 percent, of these range operations involving air-to-ground weapons delivery. For Alternative 3, an estimated 300 operations could be conducted; 179, or 60 percent, of the operations could include air-to-ground weapons delivery. Table 2-3 provides an estimate of the maximum ordnance that might be expended over a year's set of proposed operations at the BIR for Alternatives 2 and 3.

It is important to note that even though the Navy has projected a need to close the Surface Danger Zone up to 1,200 hours annually, this does not mean that the maximum level of usage would actually occur each year. As mentioned previously, the past use of the BIR has been highly variable, which is a direct result of the number and status of the Navy's aircraft RDT&E programs coupled with the need for operating in an estuarine/littoral environment. In general, operational workloads are heaviest when RDT&E requirements for aircraft platforms are needed and during times of international conflict.

Table 2-2 Estimated Maximum Operations with Clearance of the BIR Surface Danger Zone for 800 Hours Annually (Alternative 2) and 1,200 Hours Annually (Alternative 3)

Type of Operation	Estimated Number of Annual Operations		Hours Surface Danger Zone Cleared Per Year[a]		Estimated Percentage of Day/Night Operations Alternatives 2 & 3
	Alternative 2	Alternative 3	Alternative 2	Alternative 3	
Nonexplosive Air-to-Ground Weapons Delivery Operations[b]					
High-altitude (>3,500 feet AGL) aircraft conducting air-to-ground delivery of nonexplosive ordnance and air-to-ground strafing with training rounds	95	142	380	568	90/10
Low-altitude (<3,500 feet AGL) aircraft conducting air-to-ground delivery of nonexplosive ordnance and air-to-ground strafing with training rounds	25	37	100	148	90/10
Small Boat and Amphibious Craft Operations					
Boat maneuvers	6	9	24	36	90/10
Platform/integration test and training	18	27	72	108	80/20
Amphibious assault landing	6	9	24	36	90/10
SAR/CSAR Operations	15	23	60	92	85/15
Rotary-Wing Operations	20	30	80	120	75/25
Special Warfare Operations	15	23	60	92	70/30
Total	**200**	**300**	**800**	**1,200**	--

[a] Estimated based on clearance of Surface Danger Zone for an average of 4 hours per operation.
[b] Some non-impact test events may require clearance of the surface danger zone, but timing is not predictable.

Table 2-3 Estimated Maximum Ordnance Expenditure per Year with Clearance of the BIR Surface Danger Zone for 800 Hours (Alternative 2) and 1,200 Hours (Alternative 3)

Ordnance Type	Nomenclature	Totals	
		Alternative 2	Alternative 3
Nonexplosive General Purpose and Practice Bombs	MK-76, MK-106, BDU-48/B, LGTR, MK-80	800	1,200
Nonexplosive Cluster Bombs		25	37
Nonexplosive Precision-Guided Munitions	Joint direct attack munition (JDAM), Hellfire	24	36
Nonexplosive Rockets (no white phosphorus warheads)	2.5- and 5-inch rockets	300	450
Flares		150	225
Small-Caliber Ammunition	.50cal, 5.56mm, 7.62mm, 9mm	120,000 (rounds)*	180,000 (rounds)*
Large-Caliber Ammunition	20mm, 25mm, 30mm, 40mm	25,000 (rounds)*	37,500 (rounds)*
Chaff		100 (pounds)	150 (pounds)
Signal Cartridges/Spotting Charges	MK-4, CXU-3, and CXU-4	800	1,200

*Denotes training rounds; no depleted uranium rounds would be used.

2.3.2.1 Non-Impact Operations

Under Alternatives 2 or 3, current RDT&E flight operations for NAWCAD test squadrons, the U.S. Navy Test Pilot School, and NAS Patuxent River and its tenants would continue within the SUA over the BIR. Compatible range operations also could be conducted at the BIR by other Navy commands, other military services, and federal agencies as authorized by the NAVAIR Range Department. These range operations could involve tests of aircraft radar systems, sensors, directed energy systems, night vision systems, and other electronic systems. RDT&E evaluations would be conducted on a variety of aircraft, including high-performance attack and fighter aircraft, helicopters, transports, and UAVs and UCAVs.

2.3.2.2 Nonexplosive Air-to-Ground Weapons Delivery

Weapons delivery operations to be conducted at the BIR under Alternatives 2 and 3 would involve strike aircraft as well as helicopters and UAVs/UCAVs. The air-to-ground exercises could involve bombing, strafing, and rocket firing from aircraft. Nonexplosive ordnance would be delivered at targets located within the designated impact areas that comprise portions of Bloodsworth Island and all of Pone Island. Impact areas at the BIR are shown on Figure 2-1. The following types of nonexplosive ordnance are proposed:

Precision Guided Munitions - stand off weapons that are launched at extended range from the target

- General-purpose, practice, and cluster bombs
- Precision-guided munitions
- Rockets (2.75- and 5-inch without white phosphorus warheads)
- Large-caliber practice round ammunition (20mm to 30mm); no depleted uranium rounds
- Small-caliber practice round ammunition (.50cal to 9mm); steel and lead rounds; no depleted uranium rounds
- Flares
- Chaff
- Signal cartridges and spotting charges

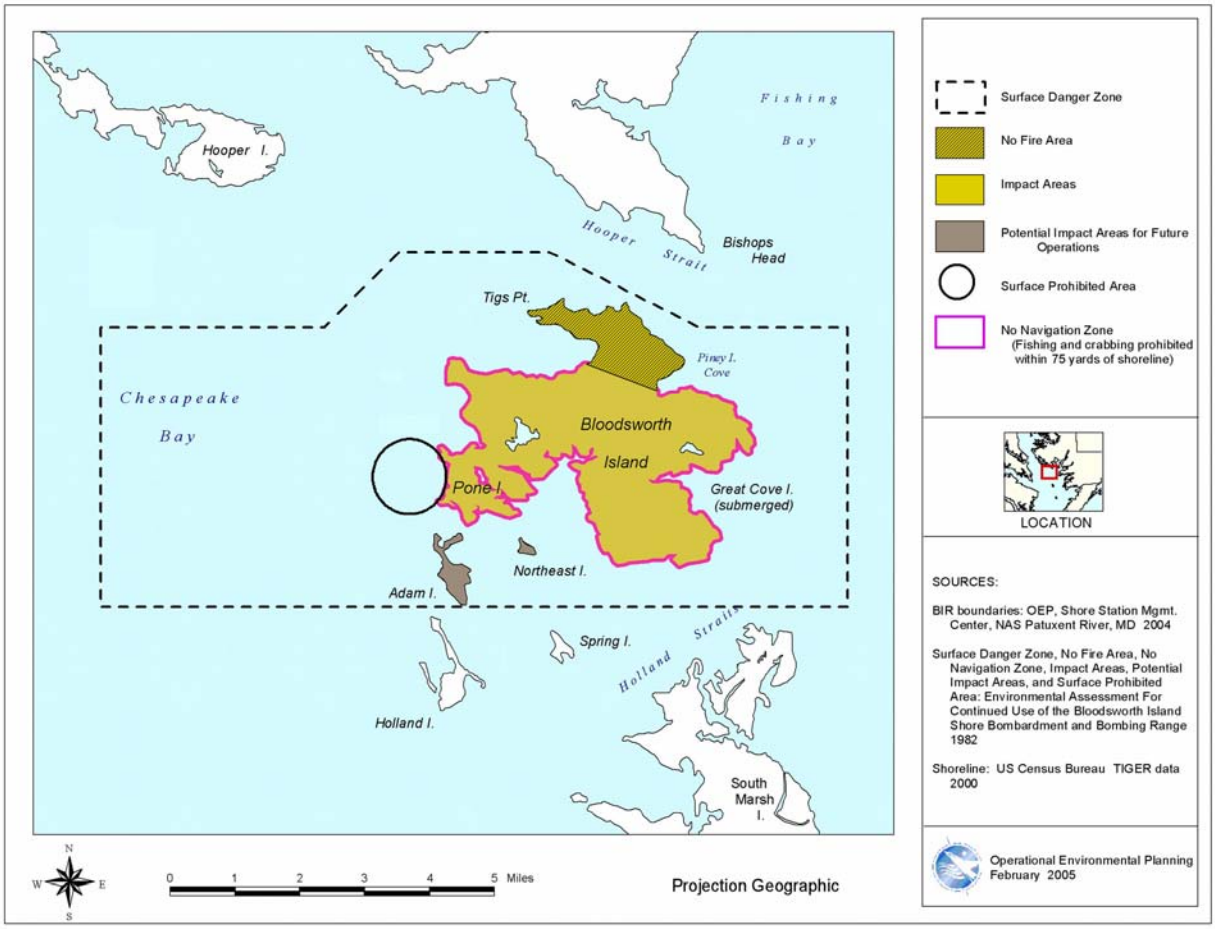

Figure 2-1 Designated Areas and Zones at Bloodsworth Island Range

Most air-to-ground operations conducted at the BIR would involve a single aircraft; however, some range operations may require groups of four to six aircraft. The initial approach to the BIR would normally be from the southeast towards the northwest at 15,000 feet AGL or higher followed by a climb or dive to the bomb release altitude. The aircraft would then make a 150-degree turn after bomb release and return to the southeast. Aircraft flight patterns for typical air-to-ground operations are shown on Figure 2-2. Bomb deliveries would be conducted at subsonic airspeeds, and most bombs would be released above 10,000 feet AGL. Air-to-ground aircraft gun firing (strafing) would involve similar ingress and egress, but strafing may occur at lower altitudes. Specific test requirements or safety considerations may require deviations from these normal procedures. Flight safety and human safety, as always, would be the primary consideration when range operations are planned for and conducted in the Patuxent River Complex.

With the exception of test or training activities involving the use of precision-guided munitions, all weapons to be used in conjunction with the proposed

exercises would be deployed from within the existing Surface Danger Zone around the BIR (see Figure 2-1). Testing of nonexplosive JDAM and Hellfire missiles would be released from within the existing SUA of the Patuxent River Complex at a distance of approximately 15 miles south of the BIR. The entire 15-mile line of fire could be cleared of aircraft, boats, and other human activity during such exercises.

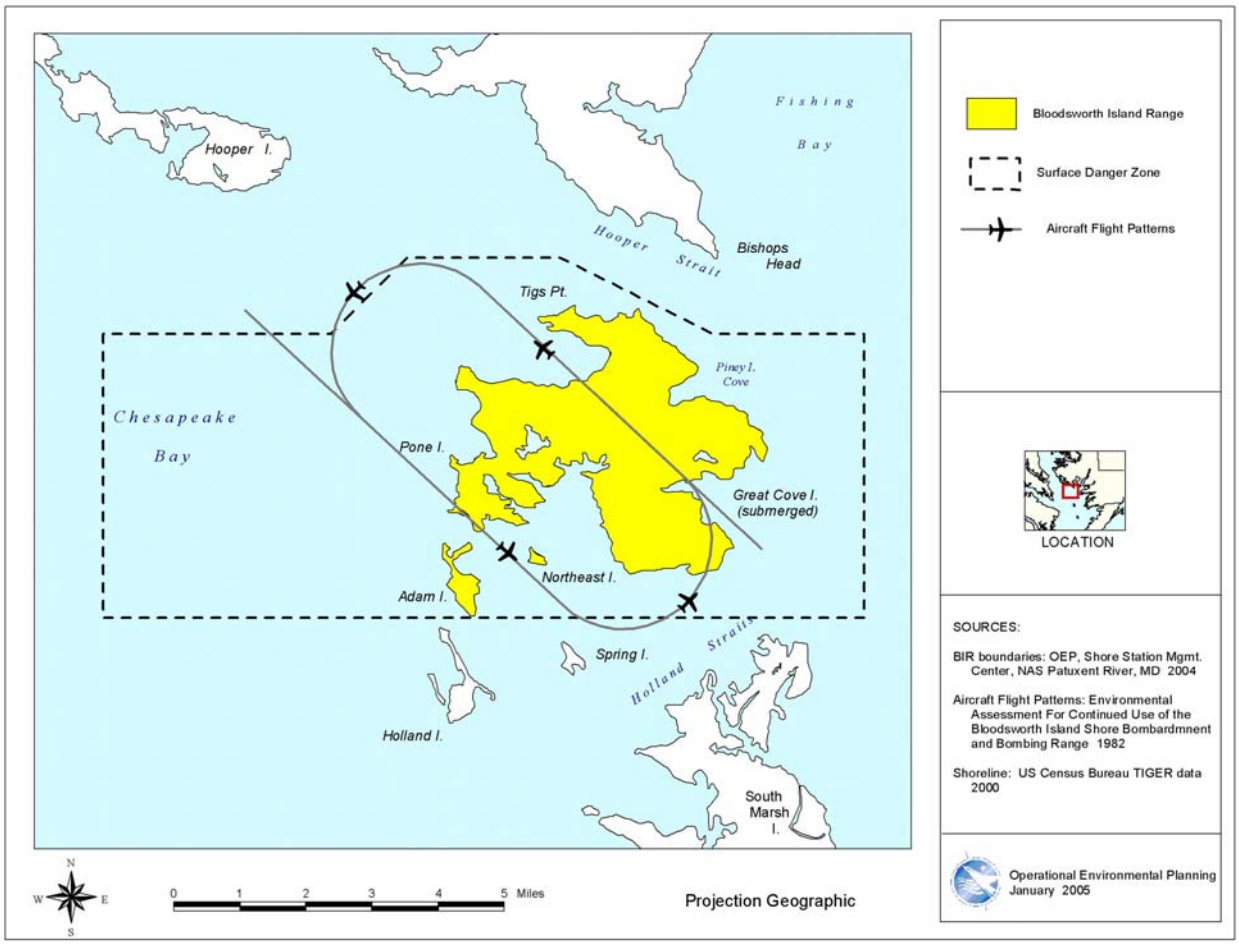

Figure 2-2 Typical Aircraft Flight Patterns for Nonexplosive Air-to-Ground Weapons Delivery at Bloodsworth Island Range

2.3.2.3 Small Boat and Amphibious Craft

Military and federal security agencies could conduct small boat test and training operations (insertions/extractions, rescues, interdictions, and platform/integration test and training) at the BIR. Participating agencies could include, but are not limited to, the Federal Bureau of Investigation (FBI) and the U.S. Coast Guard and U.S. Customs (both agencies of the Department of Homeland Security).

Small boat operations could involve conventional shallow-draft boats less than 50 feet in length. During boat maneuver operations, watercraft could operate at speeds up to 35 knots, presenting a target threat. The use of small arms fire could occasionally be incorporated into small boat operations as part of insertion/extraction scenarios. Platform/integration training could involve navigation, insertions/extractions, small arms fire, and use of night vision goggles.

In addition, testing activities using amphibious-type landing craft, such as the Expeditionary Fighting Vehicle (EFV) (formerly the Advanced Amphibious Assault Vehicle) could occur. This RDT&E activity would be limited to one or two vehicles. To accomplish such testing, two landing sites would be established at the BIR on the sandy beaches on the western and southern ends of Bloodsworth Island (see Figure 2-3). Having two landing sites available will provide flexibility to mission planners and give them the option to select the site that minimizes the impacts on waterfowl, recreational and commercial fishermen, and general boat traffic. Amphibious testing could include onshore landings both with and without accompanying small arms fire. The assault vehicles would not travel onto the land surface, but remain at the shoreline on existing areas of sandy soil.

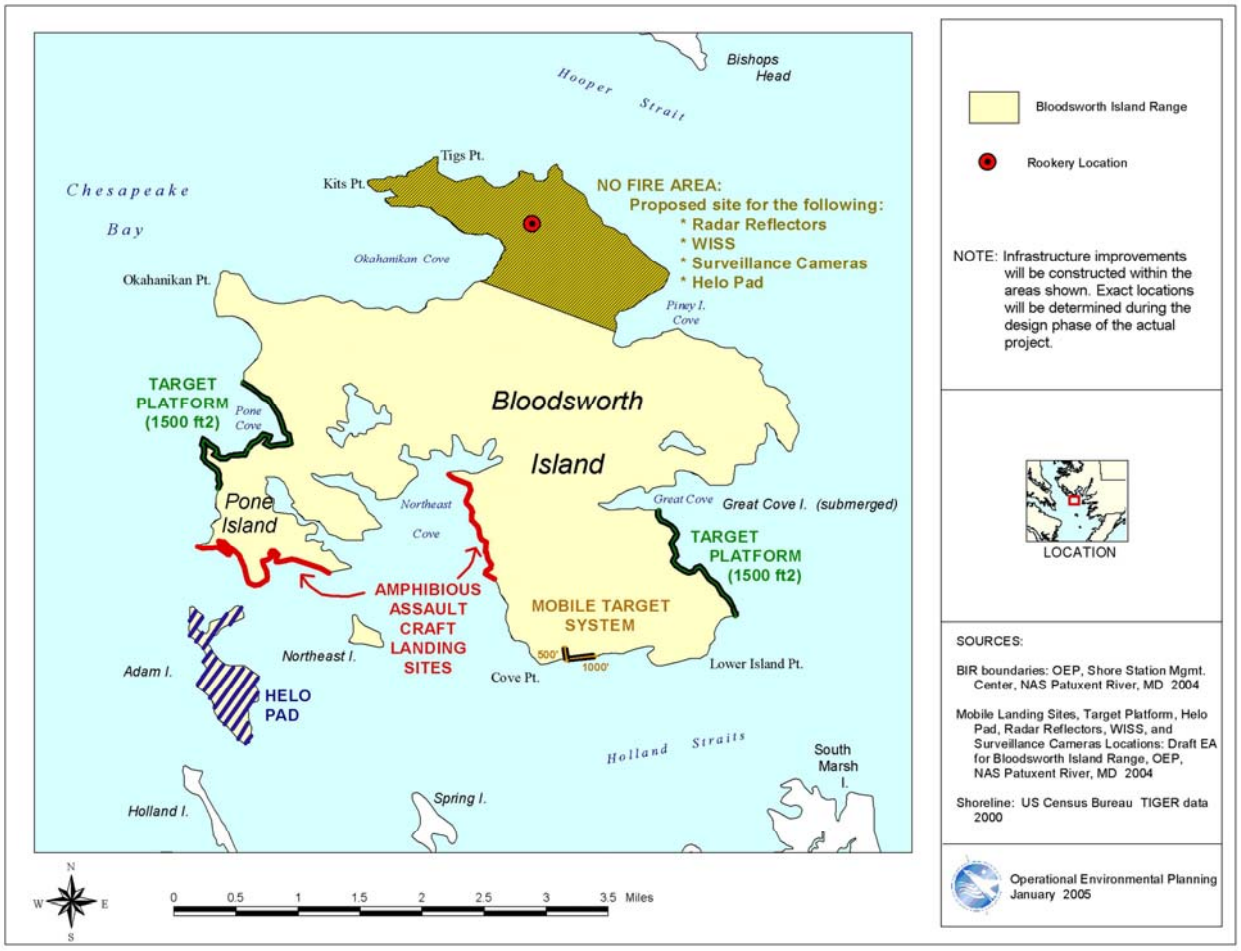

Figure 2-3 Proposed Infrastructure Improvements and Amphibious Assault Craft Landing Sites at Bloodsworth Island Range

2.3.2.4 Search and Rescue/Combat Search and Rescue

Proposed SAR and CSAR training could be conducted by aircrews from NAS Patuxent River and Fleet training units. These operations include the use of conventional shallow-draft boats and rotary- and fixed-wing aircraft. Aircraft would generally fly at low altitudes (<3,500 feet AGL) during the exercises. No ordnance would be fired during SAR training. CSAR exercises could include the use of small arms fire, including .50cal weapons.

2.3.2.5 Rotary-Wing Operations

Proposed rotary-wing operations could involve insertion/extraction training with night vision goggles and nonexplosive air-to-ground weapons delivery operations. Participating rotary-wing aircraft could operate from the surface to 3,500 feet AGL.

2.3.2.6 Special Warfare Operations

Naval Special Warfare (NSW) training exercises at the BIR could consist of swimmer insertion/extraction live-fire exercises, stationary and high-speed live-fire exercises, direct fire support exercises, and ship/craft target illumination exercises. Watercraft used during training could include combat rubber raiding craft up to MK V Special Operations Craft, which are high-speed patrol/insertion craft. The depth of the watercraft below the waterline would not exceed 7 feet. Small arms could be employed during the NSW training.

Consideration was given to allowing the use of short-range training ammunition (SRTA) on the BIR during range operations. SRTA is a plastic bullet with a limited flight profile that reduces safety area requirements to approximately 10 percent of a lead projectile. It is available in rounds of .22cal (5.56mm) to .50cal. However, insufficient data are currently available to assure that use of SRTA would be compatible with existing range operations and that overwintering waterfowl would not ingest the spent rounds. If sufficient data becomes available concerning the potential biological consequences of using SRTA, then this issue could be revisited by the Navy and analyzed in a separate environmental planning document.

All live-fire exercises would be conducted such that all ammunition and other ordnance would strike and/or fall within the BIR's existing Surface Danger Zone and south of the No Fire Zone established on the northern end of Bloodsworth Island (see Figure 2-1).

2.3.2.7 Infrastructure Improvements

Infrastructure improvements that may be needed to support the range operations proposed under Alternatives 2 or 3 are as follows:

- **Target Upgrades or Replacements** - Target maintenance, which includes replacement and/or relocation of targets on the BIR would be conducted in a manner similar to that identified for the No-Action Alternative. Improvements to the targets could include infrared, radio frequency (RF), and/or visual modifications to improve the fidelity of the target scene. All target improvements would not be done at the same time. Instead, they would be phased in over a period of years when required for a specific test and when funding is available.

- **Mobile Target System** - The mobile target system would be mounted on pilings and would provide a mobile target for use during air-to-ground strafing tests.

- **Weapons Impact Scoring System (WISS)** - The WISS could provide a capability to score weapons delivery accuracy for test personnel and aircrews. This system would include optical cameras mounted on 2 poles in the No Fire Area and approximately 18 calibration poles mounted between the cameras and the target area. The WISS system would not be installed until it is required for a specific test and when funding is available.

- **Surveillance Cameras** - Installation of the proposed area surveillance equipment would allow NAVAIR Range Department control personnel to verify that no individuals or watercraft are within the Surface Danger Zone at the BIR prior to and during range operations.

- **Electronic Warfare (EW) Emitters** - Portable EW emitters would improve the fidelity of range operations by providing a simulated environment that includes real world electronic threats.

- **Upgraded/New Helicopter Landing Pads** - The mesh helicopter landing pads would allow rotary-wing aircraft to safely land within the BIR and limit disturbance to marsh vegetation.

- **Beach Landing Zones** - The proposed landing zones for the amphibious type landing craft would serve to limit disturbances to soils and vegetative areas within the BIR to specific authorized locations. The beach landing zones would be improved to support the weight of amphibious assault craft and to protect potentially erodible soils.

The approximate locations of the new infrastructure are shown on Figure 2-3. Construction that could potentially affect the northern portion of Bloodsworth Island would be planned to avoid the nesting season of the colonial waterbirds present at the northern portion of Bloodsworth Island (approximately February 1 through August 15). In addition, poles and other structures would be outfitted to discourage nesting. Best management practices would be employed during construction to limit potentially adverse environmental impacts.

2.3.3 Alternatives Not Carried Further

In developing its proposed action, NAWCAD/NAS Patuxent River evaluated a number of alternatives to the use of the BIR. These alternatives included use of alternative military ranges on the U.S. East Coast, as well as the use of modeling and simulation.

2.3.3.1 Alternative Range Location

Within the eastern United States, the Navy was unable to identify alternative military ranges that could provide all of the same necessary testing conditions that are available at the BIR: full instrumentation, full range of target backgrounds, seasonal variability, and proximity to NAS Patuxent River. Only one military range, the BT-11 target at the Cherry Point Complex, was identified with the capability to provide two of the necessary testing conditions needed by NAVAIR (i.e., seasonal variability and the availability of a land/water interface target background). However, the BT-11 target is more than 230 nautical miles from NAS Patuxent River, and its use would require aircraft to refuel during a test mission in order to provide sufficient time on range. Other drawbacks associated with the potential use of the BT-11 target include lack of sufficient instrumentation to meet the technical or safety needs of aviation RDT&E programs and, with limited snow cover during winter because of its milder climate, less seasonal variability than the BIR would provide. Moreover, this range is heavily used by Navy and Marine Corps Fleet squadrons in meeting the requirements of the Navy Fleet Readiness Training Plan prior to deployment. It would be difficult for the NAVAIR Range Department to schedule a testing program at this range.

2.3.3.2 Use of Modeling and Simulation Systems

While modeling and simulation play a key role in NAWCAD's RDT&E programs, it cannot be a substitute for real-time testing on a range. Moreover, such real-time test programs need targets with seasonal variability and varied target backgrounds, including surface and subsurface water and land/water interfaces. Use of the simulation systems would not offer the depth of testing conditions that are necessary to meet the purpose and need for the proposed action. Use of simulation would also place limitations on Engineering and Manufacturing Development aircraft, requiring these aircraft to remain in

restricted airspace and areas of instrumentation coverage and would not facilitate the use of UAVs or UCAVs.

2.4 Proposed Protective Measures

Proposed protective measures associated with the proposed action are identified in Table 2-4.

Table 2-4 Proposed Protective Measures

Operational Category	Type of Operation	Operating Area/Impact Area[a]	Seasonal Restrictions/Rationale
Non-Impact Operations[b]	High-altitude (>3,500 feet AGL) tests of the following aircraft systems: radar, sensors, directed energy, night vision, and other electronic devices	Entire Range	None
	Low-altitude (<3,500 feet AGL) tests of the following aircraft systems: radar, sensors, directed energy, night vision, and other electronic devices	Entire Range	During the waterfowl migration season, which typically runs from November 15 to March 15, low-altitude aircraft operations will not be conducted.
Nonexplosive Air-to-Ground Weapons Delivery Impact Operations[b]	High-altitude (>3,500 feet AGL) aircraft conducting air-to-ground delivery of nonexplosive ordnance and air-to-ground strafing with training rounds	Impact Areas on Bloodsworth and Pone Islands	None
	Low-altitude (<3,500 feet AGL) aircraft conducting air-to-ground delivery of nonexplosive ordnance and air-to-ground strafing with training rounds	Impact Areas on Bloodsworth and Pone Islands	During the waterfowl migration season, which typically runs from November 15 to March 15, activity will be limited to one section of the impact area. Approach to target will be perpendicular to the shoreline to minimize noise disturbance.
Small Boat Operations	Boat maneuvers	Entire Range	Maneuvers will be restricted off the northern end of Bloodsworth Island from February 1 to August 30 to minimize disturbance of nesting birds.
	Platform/Integration Test and Training	Impact Areas on Bloodsworth Island and Pone Island	During the waterfowl migration season, which typically runs from November 15 to March 15, activity will be limited to one section of the impact area. Watercraft will make deep water perpendicular approach to the shoreline to minimize noise disturbance.

Operational Category	Type of Operation	Operating Area/Impact Area[a]	Seasonal Restrictions/Rationale
Amphibious Craft Operations	Amphibious Type Landing Craft Operations	Designated amphibious assault landing areas on the west/south sides of Bloodsworth Island	During the waterfowl migration season, which typically runs from November 15 to March 15, watercraft will make deep water perpendicular approach to the shoreline to minimize noise disturbance. In addition, personnel will monitor for the presence of marine mammals or sea turtles in order to avoid collision or other harm or harassment.
SAR/CSAR Operations	Boat maneuvers and fixed- and rotary-wing aircraft activities	Impact Areas on Bloodsworth and Pone Islands; Adam Island	During the waterfowl migration season, which typically runs from November 15 to March 15, activity will be limited to one section of the impact area. Approach to target will be perpendicular to the shoreline to minimize noise disturbance.
Rotary-Wing Operations	Rotary-wing aircraft activities	Entire Range	Low-level over-flights will be restricted from the No Fire Zone in the northern end of Bloodsworth Island from February 1 to August 15 to minimize disturbance of nesting birds.
UAV/UCAV Operations	Surveillance and overflights	Entire Range	During the waterfowl migration season, which typically runs from November 15 to March 15, activity will be limited.
Special Warfare Operations	Swimmer insertion/extraction live-fire exercises; Stationary and high-speed live fire exercises; Direct fire support exercises; and ship/craft target illumination exercises	Varies depending on the activity but could include Bloodsworth Island Amphibious Assault Landing Areas, Western shore of Bloodsworth Island/Impact Area, and Adam Island	No activities would occur during the waterfowl migration season, which typically runs from November 15 to March 15. At all times, landings will be restricted to immediate beach area (no incursions onto the rest of the island). Watercraft will make deep water perpendicular approach to the shoreline to minimize noise disturbance to waterfowl. Rotary-wing aircraft will also use perpendicular approach to the shoreline.

[a] No operations will be conducted in the No Fire Zone in the northern end of Bloodsworth Island.

[b] To minimize noise impacts to waterfowl and to avoid bird/aircraft strike hazards during the waterfowl migration season, aircraft flying over the BIR will maintain a 3,500-foot minimum altitude restriction. This is 500 feet higher than the minimum altitude restriction cited in OPNAVINST 3710.7T and NASPAXRIVRINST 3710.5T. Exceptions to these restrictions must be requested and submitted in the Project Plan, reviewed by the Aviation Safety Officer, and approved by the NAS Environmental Review Board.

In addition to specific aircraft procedures identified above in Table 2-4, the following additional modifications would be incorporated into BIR clearance procedures when rotary-wing aircraft are used in the clearance process during the waterfowl migration season, which typically runs from 15 November through 15 March:

- Rotary-wing pilots should strive to maintain a search flight altitude that is as high as feasible and consistent with established range clearance procedures. In addition, rotary-wing pilots should plan the range clearance flight in a manner that minimizes flight time over the BIR as much as possible.
- Rotary-wing pilots should only overfly those areas of the BIR that require clearance prior to conducting the military operation.
- When the entire BIR needs to be cleared to support a planned military operation, the rotary-wing pilot should conduct the clearance one section at a time, not in a grid pattern. Application of this methodology would eliminate the need to overfly any one section more than once. For example, the BIR would be divided into six sections: 1= Northeast Island, 2= Pone Island, 3= western lobe of Bloodsworth Island, 4= northern lobe (or the No Fire Area), 5= the eastern lobe, and 6= the southern lobe. Clearance would be conducted in numerical order by section, starting with section 1.

2.5 Summary of Potential Environmental Impacts

The maximum potential environmental impacts associated with each proposed alternative are identified in Table 2-5.

2.6 Identification of the Preferred Alternative

When the Navy began preparation of this EA, the alternatives analyzed herein were reflective of the Navy's RDT&E and training priorities for national security needs at that time. While the proposed action and purpose/need are still viable in the context of providing more diversified RDT&E and training opportunities, current Navy strategic planning, restructuring, and fiscal considerations make the need less urgent. Given the decreased urgency, NAVAIR has decided to concentrate on range operations that use the airspace overlying the BIR and not expand use of the BIR for surface activities. **The Navy will continue to voluntarily cease land impact operations at the BIR, including the dropping of live or inert ordnance. Therefore in order to finalize the draft EA, the Navy is selecting the No-Action Alternative as its preferred course of action.** Selection of the No-Action Alternative means ***NO*** change in the operational status of the BIR.

THE NAVY IS SELECTING THE NO-ACTION ALTERNATIVE AS THE PREFERRED ALTERNATIVE.

Table 2-5 Comparison of the Potential Environmental Impacts of Proposed Alternatives

Environmental Resource Area	Alternative 1 (No-Action Alternative Preferred Alternative)	Alternative 2	Alternative 3
Land Use	Continued use of the BIR as a range consistent with current use – no significant impact.	Continued use of the BIR as a range consistent with previous and current use –no significant impact.	Impacts same as described for Alternative 2.
Coastal Zone Management	Consistent with Maryland Coastal Zone Management Plan to the maximum extent practicable.	Consistent with Maryland Coastal Zone Management Plan to the maximum extent practicable.	Consistent with Maryland Coastal Zone Management Plan to the maximum extent practicable.
Range Operations/ Safety	No changes to use of range or use of SUA or range safety procedures – no significant impacts	• **Range Operations** – Increased level of use; however, the increased use of existing SUA would be within the type and tempo of usage identified and approved in the Patuxent River Complex EIS (U.S. Navy December 1998). • **Range Safety** – No change to existing safety procedures. • **Bird/aircraft strike hazard (BASH)** – No change with respect to aviation safety risks from potential BASH incidents.	Impacts same as described for Alternative 2.
Recreation and Open Space	No changes to public access to BIR for hunting nor direct or indirect impacts on federal or state open-space resources located in proximity to the BIR.	• **Open Space** – No significant direct or indirect impacts on federal or state open-space resources located in proximity to the BIR. • **Recreation** – Completion of maximum number of operations would exclude hunting from the BIR for up to 800 hours per year.	• **Open Space** – Impacts same as described for Alternative 2. • **Recreation** – Completion of maximum number of operations would restrict hunting for up to 1,200 hours per year.
Socioeconomics	No changes to local population, employment, or commercial and recreational fishing activities – no significant impact.	• **Population and Employment** – No changed to local population or employment – no significant impact. • **Commercial/Recreational Fishing** – Surface danger zone cleared up to 66 hours per month. • **Environmental Justice** – No disproportionately high and adverse human health or environmental effects on minority and low-income populations nor health or safety risks to children.	• **Population and Employment** – Impacts same as described for Alternative 2. • **Commercial/Recreational Fishing** – Surface danger zone cleared up to 100 hours per month. • **Environmental Justice** – Impacts same as described for Alternative 2.
Topography, Geology, and Soils	Infrequent target maintenance and no impact operations proposed – no significant impacts.	• **Topography** – Negligible effect on erosion and land loss – no significant impacts. • **Geology** – No deep excavation – no significant impacts. • **Soils** – Minor localized soil erosion – no significant impacts with application of best management practices.	Impacts same as described for Alternative 2.
Water and Sediment Quality	Infrequent target maintenance and no impact operations proposed – no significant impacts.	Nonexplosive ordnance use only – no significant impacts.	Impacts same as described for Alternative 2.

Environmental Resource Area	Alternative 1 (No-Action Alternative Preferred Alternative)	Alternative 2	Alternative 3
Vegetation and Wetlands	Infrequent target maintenance and no impact operations proposed - no significant impacts.	• **Wetlands** – Section 404 permit to be obtained for fill activities. Application of best management practices during construction activities and natural regrowth of plants and grasses limit impacts on wetland vegetation – no significant impacts. • **Submerged aquatic vegetation (SAV)** – Minor and unavoidable localized loss of SAV during construction. Operations in areas with high concentrations of SAV would be avoided - no significant impacts.	Impacts same as described for Alternative 2.
Wildlife and Fisheries	Infrequent target maintenance, flights overlying the BIR with no impact operations proposed – no significant impacts.	• **Wildlife** – Operational restrictions minimize potential impacts to wildlife. Design of poles/other infrastructure would discourage use by nesting birds – no significant impacts. • **Fisheries** – Construction/conduct of operational activities would minimize discharges of hazardous substances – no significant impacts. • **Marine Mammals** – Navy concludes no "takes" of marine mammals by harassment reasonably foreseeable. • **Essential Fish Habitat (EFH)** – Navy concludes that minor and temporary impacts would not adversely affect EFH.	Impacts same as described for Alternative 2.
Threatened and Endangered Species	Infrequent target maintenance, flights overlying the BIR with no impact operations proposed no significant impacts.	With seasonal restrictions, the Navy concludes that the proposed action would have no effect on all species listed under ESA.	Impacts same as described for Alternative 2.
Cultural Resources	Infrequent target maintenance and no impact operations proposed – no significant impacts.	No adverse effect on historic or archaeological sites or on their eligibility for listing in National Register of Historic Places (NRHP) - no significant impact.	Impacts same as described for Alternative 2.
Noise	Existing noise environment would remain the same – no significant impacts	• **Aircraft (Fixed-Wing and Rotary-Wing)** – Noise levels at sensitive receptors below 65 dB DNL – no significant impact. • **Boats and Watercraft** – Noise levels below 45 dBA at sensitive receptors - no significant impact. • **Weapons Employment** – Peak sound levels below the 87 peak decibel (dBP) and 115 dBP noise complaint thresholds - no significant impact.	Impacts same as described for Alternative 2.
Air Quality	Total emissions below de minimis thresholds – no significant impact.	Impacts same as described for Alternative 1.	Impacts same as described for Alternative 1.
Hazardous Materials Management	Infrequent target maintenance and no impact operations proposed – no significant impacts.	Only inert ordnance will be employed. Prior to the installation of any infrastructure, unexploded ordnance will be cleared and debris properly disposed – no significant impact.	Impacts same as described for Alternative 2.
Transportation	Infrequent target maintenance – no significant impacts.	Commercial shipping lane, 3 miles west of Surface Danger Zone, would not be affected – no significant impact.	Impacts same as described for Alternative 2.

3 Affected Environment

Study Area - land and water areas that would be affected by the proposed action. In this EA, the study area generally corresponds to the BIR Surface Danger Zone.

This chapter provides a characterization of the current or baseline environmental conditions of the land and water areas that would be affected by the proposed range operations being considered at the BIR. The geographic boundaries of this "study area" generally correspond to those of the BIR's Surface Danger Zone as shown on Figure 2-1.

3.1 Land Use and Coastal Zone Management

3.1.1 Land Use

The uninhabited BIR (islands and Surface Danger Zone) is located along the western edge of Maryland's Eastern Shore in the Lower Bay/Tangier Sound Region as defined by the Maryland Department of Natural Resources (MDNR). This region encompasses approximately 900 square miles and is roughly defined as the portion of Chesapeake Bay between the Little Choptank River in the north and the Maryland/Virginia border in the south.

Land areas in proximity to the BIR consist primarily of undeveloped wetlands, with federal and state wildlife management areas (WMAs) being the dominant land use, such as the South Marsh Island WMA, which is about 0.3 miles to the south of the BIR's Surface Danger Zone across Hooper Strait (see Figure 3-1). Chesapeake Bay's main shipping channel is about 3 miles to the west of the BIR's Surface Danger Zone.

The nearest developed land is at Bishops Head Point in mainland Dorchester County, which is across Hooper Strait (about 1.2 miles north of the BIR's Surface Danger Zone). Chesapeake Bay Foundation operates the Karen E. Noonan Center of Environmental Education along the shoreline at Bishops Head. The low-density communities of Crocheron and Wingate are located further inland to the northwest of the BIR.

Tangier Sound separates the BIR from Deal Island to the east by about 2.4 miles. This area comprises a corridor that extends along State Route 363 and includes the Somerset County, Maryland communities of Dames Quarter, Chance, Deal Island, and Wenona. Land uses within this corridor are low- and medium-density residential, interspersed with some commercial and institutional uses (Maryland Department of Planning 2001). Deal Island WMA borders this corridor to the east and isolates the area from other communities in Somerset County.

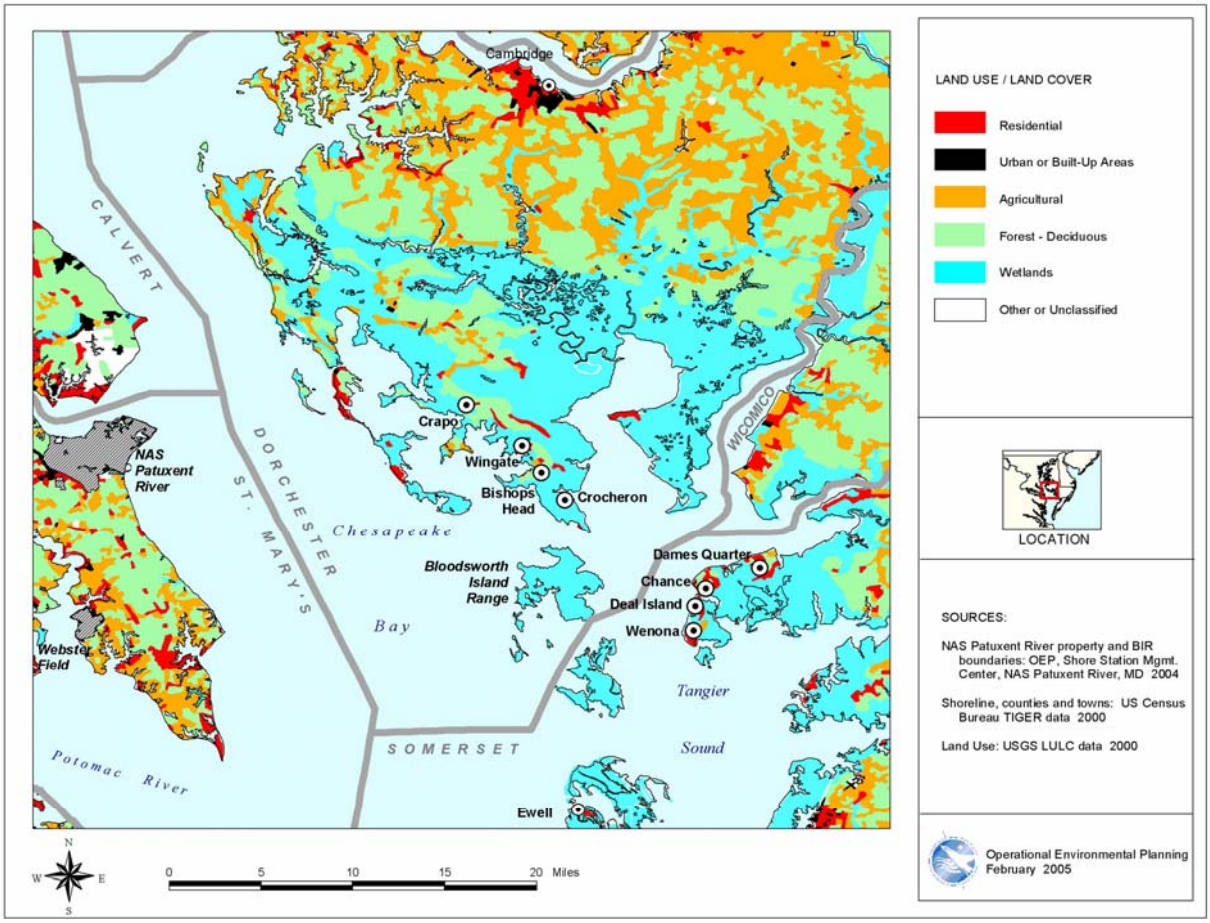

Figure 3-1 Land Use in Proximity to Bloodsworth Island Range

3.1.2 Coastal Zone Management Program

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. Section 1451 *et seq*., as amended) provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs in coastal zones. Section 307 of the Act stipulates that where a federal action results in reasonably foreseeable effects on any coastal use or resource (land, water use, or natural resource), the action must be consistent to the maximum extent practicable with the enforceable policies of the affected state's federally-approved coastal management plan.

Maryland has developed and implemented a federally-approved Coastal Resources Management Program (established in 1978) that describes current coastal legislation and enforceable policies. The key components of this program depend on federal laws, such as Section 404 of the Clean Water Act of 1977, and state laws and authorities, including the Chesapeake Coastal Bay Critical Area Program (established in 1984), the Tidal Wetlands Act of 1970, the Non-Tidal

Wetlands Protection Act of 1989, and the state's authority under Section 401 of the Clean Water Act of 1977.

Federal lands, such as the BIR, which are *"lands the use of which is by law subject solely to the discretion of...the Federal Government, its officers, or agents,"* are statutorily excluded from the CZMA's definition of Maryland's coastal zone (16 U.S.C. Section 1453[1]). If, however, the proposed federal activity affects coastal resources or uses beyond the boundaries of the federal property (i.e., has spillover effects), the CZMA Section 307 federal consistency requirement applies.

3.2 Range Operations and Safety

3.2.1 Airspace

As shown in Figure 3-2, the BIR is overlain and surrounded by the 1,800 square miles of SUA comprising the CTR, a major component of the Patuxent River Complex. Range operations in airspace such as the CTR typically involve multiple aircraft in high-speed and dynamic flight maneuvering. In order to maintain safe separation from all other air traffic, the Federal Aviation Administration (FAA) designates specific parcels of airspace (defined by lateral and vertical dimensions) as SUA for military use. This designation allows the military user to control and restrict the use of the designated airspace to authorized tests and related military flights. SUA designations include restricted airspaces, warning areas, and military operating areas. The SUA above the BIR includes three layers: R-4002 (surface to 20,000 feet), R-4006 (3,500 feet to 25,000 feet) and R-4008 (25,000 feet to 85,000 feet) (see Figure 3-2).

During periods that the Patuxent River Complex's SUA is activated (normally between 7a.m. and 11p.m.), the NAVAIR Range Department and NAS Patuxent River Air Traffic Control maintain a military radar unit that provides aircraft advisory surveillance. When the airspace is not in use (normally after 11p.m.), it is released back to FAA for command and control.

3.2.2 Danger Zones and Prohibited Areas

Designated danger zones and prohibited areas at the BIR that are subject to use restrictions are shown on Figure 2-1. The BIR is identified as a Navy shore bombardment, air bombing, air strafing, and rocket firing area by the U.S. Army Corps of Engineers (USACE). This designation is codified in 33 CFR 334.190. As part of this designation, the BIR includes a Danger Zone (also known as the "Surface Danger Zone") and a "Prohibited Area":

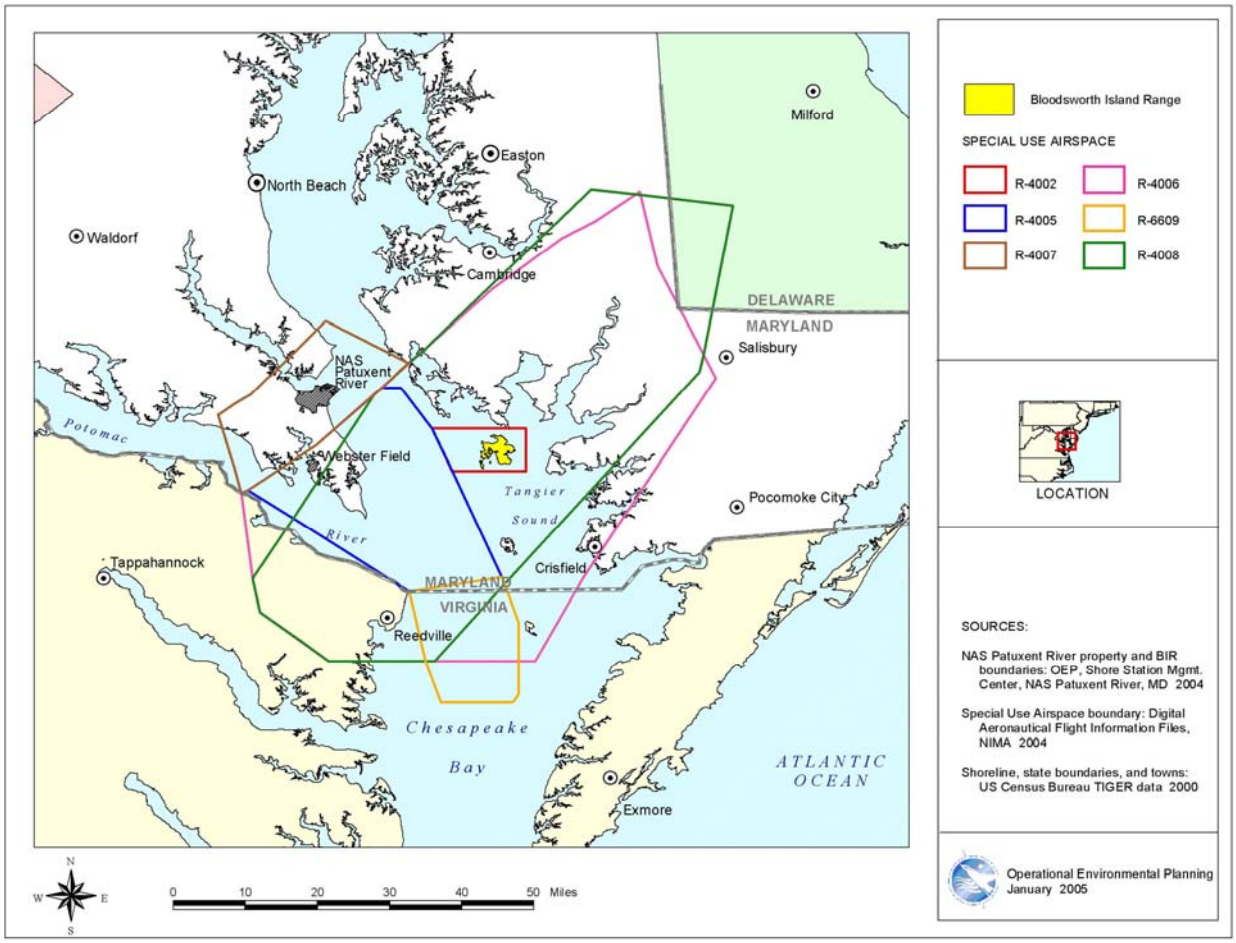

Figure 3-2 Special Use Airspace

Surface Danger Zone - A defined area (or areas) used for target practice, bombing, rocket firing, or other especially hazardous operations, normally for the armed forces. The danger zone may be closed to the public on a full-time or intermittent basis.

- **Surface Danger Zone** - This restricted area surrounds the four islands of the BIR and covers approximately 26 square miles, including surface water. It lies primarily within the footprint of R-4002. Civilian boat traffic is permitted to enter and navigate within this area unless range operations are underway. No persons, vessels, or other craft are permitted to enter or remain within the Surface Danger Zone when firing is in progress or about to begin.

- **Prohibited Area** - The Prohibited Area is a smaller area within the Surface Danger Zone and encompasses the waters west of Pone Island. No unauthorized individual or vessel is permitted to enter or remain in this area at any time.

Prohibited Area - Persons, vessels, or other craft shall not enter or remain in the prohibited area at any time unless authorized to do so by the enforcing agency.

Bloodsworth Island and Pone Island have historically contained "impact areas" where weapons have been delivered or fired and shore bombardment has occurred. Accordingly, the Commanding Officer of NAS Patuxent River has identified the surface of each of the four islands comprising the BIR as "No Trespassing Zones." For safety reasons, the surface of each of the islands is not

to be entered at any time unless authorized by the NAVAIR Range Department. Adam Island and Northeast Island are included in the restriction as No Trespassing Zones even though these islands do not have a history of previous bombardment and do not contain "impact areas."

The Commanding Officer of NAS Patuxent River has also established a No Navigation Zone within 75 yards of each of the islands comprising the BIR. No fishing, crabbing, or hunting is allowed within that 75-yard No Navigation Zone. This is another safety measure intended to protect the public from any navigation obstacles that may be present in the eroded shorelines of the BIR.

In 1983, a No Fire Area was designated in the northern portion of Bloodsworth Island. The intent of the No Fire Area is to protect the heron rookery that is established in that location.

3.2.3 Range Safety

Safety during all testing and training operations is a top priority of the Patuxent River Complex. The NAVAIR Range Department prepares and periodically updates a *Range Safety Manual* (NAWCAD Instruction 3710.1) that governs operations conducted within the CTR. Unique safety and security measures for flight operations are addressed in the *Range Safety Manual*. Range hazard patterns, the area that must be cleared to provide safety to the public and Navy test participants are developed by the NAVAIR Range Department. Additionally, safety oversight is applied through a wide range of other policies and procedures issued by the NAS Patuxent River Air Operations and Weapons Departments, NAVAIR, NAWCAD, Test Wing Atlantic, and others.

Unexploded Ordnance (UXO) - Military munitions/ explosive ordnance that has been primed, fused, armed, or otherwise prepared for action and that has been fired, dropped, launched, projected, or placed and remains unexploded either by malfunction, design, or for any other cause (i.e., duds).

The Navy has established a public safety program for the BIR. Some of these safety measures were practiced prior to 1996 when the BIR was open for impact operations and include using range boats to survey and clear the area prior to operations, and alerting watermen in the area in advance of scheduled operations via established working relationships. Because unexploded ordnance (UXO) is known to be present on the BIR, the primary focus of the safety program is to prevent unauthorized access onto the BIR. All UXO, whether intact or fragmented, present a potential safety hazard. No Trespassing signs are clearly located around the perimeter of the BIR to discourage unauthorized use of the area. As mentioned previously, the surface of each of the islands comprising the BIR are not to be entered at any time unless authorized by the NAVAIR Range Department. This restriction is complemented by the No Navigation Zone that has been established within 75 yards of the BIR islands. No fishing, crabbing, or hunting is allowed within the No Navigation Zone.

3.2.4 Bird/Aircraft Strike Hazard

BASH is a serious concern for military aircraft operations. Military aircraft are prone to strikes because they fly at high speeds and sometimes at lower altitudes

where birds are most active. Aircraft collisions with birds in flight have the potential to cause damage to equipment or even to destroy an aircraft, resulting in injury or death to aircrews.

Bird/Wildlife Strike - Any collision between a bird or other species of wildlife and an aircraft.

According to the U.S. Air Force's Aviation Safety Division, for those wildlife mishaps in both the airfield and low-level environments, where altitude is known, 98 percent occur at or below an altitude of 3,000 feet above ground level. Approximately 50 percent of bird strikes happened at airfields, with 25 percent occurring during low-altitude flight. The locations with the greatest hazard are migration corridors and other areas where birds congregate, such as water bodies or marshy coastal areas. This is especially true during the winter months when birds are present in large numbers.

The staff of the NAS Patuxent River Natural Resources Division has prepared a *BASH Plan* that outlines procedures to minimize the potential for bird/aircraft strikes during operations. The plan details responsibilities of personnel to deal with the hazard, practices to reduce BASH potential, and guidelines to decrease the attractiveness of the NAS Patuxent River airfield to birds.

3.3 Open Space and Recreation

3.3.1 Bloodsworth Island Range

Public waterfowl hunting has recently been authorized on Bloodsworth Island by the Commanding Officer of NAS Patuxent River. To access the BIR for waterfowl hunting, a prospective hunter must obtain a permit from MDNR and abide by the following rules when hunting at any of the licensed waterfowl hunting sites within the BIR:

- Licensed waterfowl hunting sites have been located below mean high tide and are accessible by boat. At no time shall hunters walk on any part of the BIR. Doing so will be considered trespassing on government property and all trespassers will be prosecuted to the fullest extent of the law.

- Boats shall be tied to the stake or anchored at the coordinates given for a particular site at all times.

- Each hunter must have a signed permit with them at all times while hunting.

In the event that the BIR becomes active during the waterfowl-hunting season, personnel from NAS Patuxent River will conduct range-clearing operations prior to any range activity. For safety reasons, hunters must adhere to the directions given to them by NAS personnel at all times and in a timely manner, a condition that is part of the permit to hunt at the BIR.

In addition to hunting, the public is also allowed to boat and fish within the designated Surface Danger Zone in the absence of warnings that firing is or soon will be in progress. However, in no case is the public allowed within the No Navigation Zone, the No Trespassing Zone, or the offshore Prohibited Area at any time.

3.3.2 Federal and State Lands

Primary open space and recreation areas in the vicinity of the BIR include various WMAs and national wildlife refuges (NWRs) as shown in Figure 3-3.

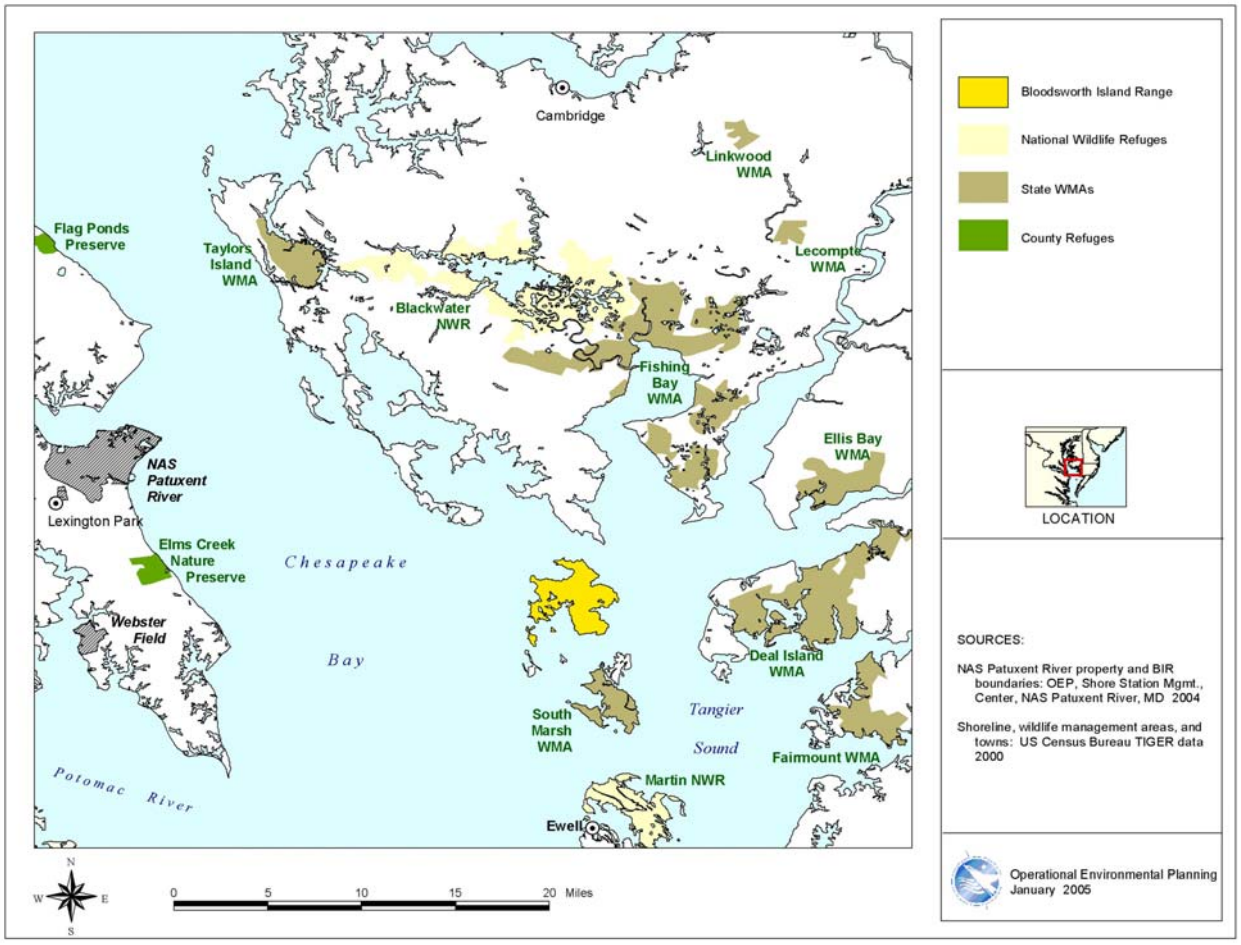

Figure 3-3 Wildlife Refuges and Management Areas in Proximity to the Bloodsworth Island Range

Blackwater national wildlife refuge (NWR) is approximately 12 miles north of the BIR on the mainland in Dorchester County. Established in 1933 as a sanctuary for migratory waterfowl, the refuge encompasses approximately 26,000 acres of tidal marsh habitat. Other habitat types include freshwater ponds, mixed evergreen and deciduous forests, and small amounts of cropland and managed impoundments that are seasonally flooded for waterfowl use. Thousands of

visitors participate in birding, biking, hiking, fishing, and hunting at Blackwater NWR each year (United States Fish and Wildlife Service USFWS 2004b).

Glenn L. Martin NWR is approximately 8 miles south of the BIR on Smith Island. This NWR encompasses about 4,548 acres and is situated amidst one of the largest feeding areas for waterfowl on the entire Chesapeake Bay and is mostly inaccessible to the public since it is situated on marshlands (U.S. Navy 1998). Bald eagles, osprey, peregrine falcons, and water birds occupy the refuge during their breeding seasons. Thousands of ducks, Canada geese, and tundra swans migrate to the salt marshes, creeks, and surrounding waters of the refuge for the winter months.

A number of state WMAs are located on the Eastern Shore within 10 miles of the BIR, including South Marsh Island WMA, Deal Island WMA, Fairmount WMA, Ellis Bay WMA, and Fishing Bay WMA. The mission of WMAs is "to preserve, protect, and/or enhance wildlife species and their respective habitats while providing for public enjoyment of the state's wildlife resources through hunting and other wildlife-dependent recreation." Each of these state lands primarily consists of large expanses of tidal wetlands and support significant populations of waterfowl, wading birds, and other wildlife. Numerous opportunities exist in these areas for birding, biking, crabbing, fishing, hiking, hunting, and trapping.

Chesapeake Bay is one of the nation's most significant cultural, recreational, and natural resources. In recognition of the bay's significance to the region and the nation as a whole, the National Park Service (NPS) recently studied the feasibility of establishing a new NPS park unit centered on Chesapeake Bay. The results of this study, in addition to a series of recommendations, were presented to the public in August 2004 in the *Final Chesapeake Bay Special Resource Study and Environmental Impact Statement* (NPS 2004). The preferred alternative selected by the NPS would establish Chesapeake Bay Gateway Network as a permanent program component of the NPS. Chesapeake Bay Gateway Network would integrate a system of more than 140 existing parks, refuges, museums, and historic sites throughout Chesapeake Bay watershed. The closest Gateway resource to the BIR is the Smith Island Center, which is located on Smith Island in the community of Ewell, approximately 11 miles south of the BIR (NPS 2004).

3.4 Socioeconomics

3.4.1 Population and Employment

The uninhabited BIR is in the southwestern corner of Dorchester County, Maryland and about 1.3 miles from the Somerset County, Maryland boundary. Dorchester County's 2000 population was 30,674, an increase of about 1 percent over 1990 levels (U.S. Census Bureau 2003). By 2010, Dorchester County is projected to increase by another 1 percent. The 2000 population of nearby

Somerset County was 24,747, which represented a 6 percent increase over its 1990 population of 23,440. The State of Maryland projects that Somerset County's population will increase by 4 percent by 2010 (Maryland Department of Planning 2004).

The BIR is located within Dorchester County Census Tract 9709 and Somerset County Census Tract 9802. In 2000, the populations of these two census tracts were 1,704 and 2,108, respectively. Between 1990 and 2000, both census tracts experienced significant decreases in population, with the Dorchester County Census Tract decreasing by 9 percent and the Somerset County Census Tract decreasing by 4 percent. This population decline indicates that little or no growth is occurring along the Eastern Shore coastline near the BIR (U.S. Census Bureau 2000).

Deal Island and Chance are the nearest communities to the BIR for which population data are available. Both of these communities are in Somerset County and are approximately 4.5 miles east of the BIR. The 2000 population for Deal Island was 578, while the 2000 population of Chance was 377. Specific population data are not available for the two small communities, Bishops Head and Wingate that are located in Dorchester County about 4 to 5 miles north of the BIR.

In 2000, the total labor force available in each of Dorchester and Somerset counties was 15,144 and 10,389, respectively. The public sector employed the greatest number of persons in both counties, an equivalent of 25 percent to 35 percent of the labor force. Manufacturing and trade occupations represented the most significant private sector industries in the counties (U.S. Census Bureau 2003). The average unemployment rates for Dorchester and Somerset counties were 5.9 percent and 5.3 percent, respectively, in September 2004. During this same period, the statewide average unemployment rate was 3.9 percent (Maryland Department of Labor 2004). The 2000 median income for Dorchester County was $34,077, compared to $29,903 for Somerset County.

3.4.2 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of a proposed action on minority and low-income populations. Disproportionately high and adverse effects occur when the risk or rate for a minority population or low-income population from exposure to an environmental hazard exceeds the risk or rate for the general population and, where available, for other appropriate comparison groups (Department of Defense (DoD) 1995; U.S. Environmental Protection Agency 1998).

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, mandates that federal agencies identify and assess

environmental health and safety risks that may disproportionately affect children as a result of the implementation of federal policies, programs, activities, and standards (62 *Federal Register* 19883-19888).

In order to comply with Executive Orders 12898 and 13045, ethnicity, poverty status, and age of the populations in the census tracts encompassing and adjacent to the BIR were compiled. Table 3-1 provides a summary of socioeconomic data for the area surrounding the BIR. As can be seen, neither census tract has higher percentages of minorities than their respective counties. Furthermore, the percent minority in these census tracts is also below the state and federal percentages. The analysis is documented later in this EA in Section 4.4.

Table 3-1 Minority Populations and Poverty Rate in Proximity to BIR

Location	percent Minority[a]	Poverty Rate[b]	percent Aged 17 Years or Younger
United States	24.9 percent	12.4 percent	25.7 percent
Maryland	36.0 percent	8.5 percent	25.6 percent
Dorchester County	30.6 percent	12.2 percent	23.3 percent
Tract 9709[c]	13.7 percent	16.3 percent	18.7 percent
Somerset County	43.6 percent	20.1 percent	18.5 percent
Tract 9802[c]	11.2 percent	12.7 percent	22.7 percent

Source: U.S. Census Bureau 2000.

[a] To calculate "percent minority," the numbers for only individuals in the "one race" category were included. The "one race" individuals represent 95-99 percent of the population and allow for an accurate portrayal of the entire population.

[b] The most recent data available for percentage below poverty level were for 1999.

[c] Data from census Tract 9709 and Tract 9802 were used since the BIR is located within the boundaries of these census tracts.

3.4.3 Commercial Fishing

Chesapeake Bay supports a significant commercial fishery that is an important source of income for bay residents and represents a vital sector of the Maryland economy. The Division of Fisheries Statistics and Economics of the NOAA National Marine Fisheries Service (also known as the NOAA Fisheries) compiles statistics on the commercial harvest of fish and shellfish. In 2003, the commercial harvest of fish and shellfish from Maryland waters totaled over 49 million pounds and had a reported retail value of $49 million (NOAA Fisheries 2004b). However, these statistics represent the commercial harvest from all marine waters in the State of Maryland, both the Atlantic Ocean and Chesapeake Bay (a breakdown of the commercial harvest of fish and shellfish caught only in the bay's waters is not available).

Maryland's three major fisheries are blue crab (*Callinectes sapidus*), oyster (*Crassostrea virginica*), and striped bass (*Morone saxatilis*). More than 26 million pounds of these species were harvested in 2002 (MDNR 2004c). The MDNR provides landings data by geographical area for each of these three fisheries (Table 3-2). The combined 2002 commercial landings of blue crab, oyster, and striped bass in the middle portion of Chesapeake Bay (including the main stem of the bay, the Honga River, Tangier Sound, and tributaries on the bay

side of the Easter Shore), where the BIR is located, totaled 10.9 million pounds, which accounts for approximately 41 percent of the total blue crab, oyster, and striped bass landings in Maryland (MDNR 2004c). The blue crab fishery is the largest commercial fishery in the vicinity of the BIR.

Species-specific data for other commercial fisheries in Maryland have been compiled by the MDNR. As with the NOAA Fisheries data, these data are not specific with regard to the portion of the catch attributable to Chesapeake Bay. However, when these data are viewed with regard to the fish species that inhabit the Bay in the vicinity of the BIR, some generalizations can be made regarding the potential nature of the harvest of fish and shellfish from the middle portion of Chesapeake Bay. Based on the landings data, other important commercial

Table 3-2 Annual Commercial Landings for Middle Chesapeake Bay (2001, 2002)

MDNR Area	MDNR Area No.	Blue Crab (2002)		Oysters (2001)[b]		Striped Bass (2002)	
		Landings (lbs)	% Total	Landings (lbs)	% Total	Landings (lbs)	% Total
Southern Chesapeake Bay	029	4,701,228	19.7	5,520	0.87	279,857	15.1
Big Annemessex River	005	175,165	0.7	N/A	--	N/A	--
Fishing Bay	043	1,083,648	4.5	N/A	--	40,722	2.2
Honga River	047	350,484	1.5	N/A	--	20,470	1.1
Hooper Strait	048	N/A[a]	--	N/A	--	9,697	0.5
Manokin River	057	162,932	0.7	160	0.03	N/A	--
Nanticoke River	062	323,095	1.4	1,053	0.17	22,209	1.2
Pocomoke Sound	072	856,573	3.6	45	0.01	16,937	0.9
Tangier Sound	092	2,766,120	11.6	3,127	0.5	13,449	0.7
Wicomico River/Monie Bay	096	64,010	0.3	71	0.01	20	0.0
Total South Chesapeake Bay/East Area	--	10,483,255	44.0	9,976	1.6	403,361	21.8
Total Chesapeake Bay	--	23,842,534	100.0	631,480	100.0	1,852,634	100

Source: MDNR, 2004c.

[a] Hooper Strait included with Tangier Sound totals for blue crab landings.

[b] Most recent year for which the most complete data available.

species of fish and shellfish likely in the middle portion of Chesapeake Bay in the vicinity of the BIR would include bluefish (*Pomatomus saltatrix*), Atlantic menhaden (*Brevooria tyrannus*), summer flounder (*Paralidhthys dentatus*), Atlantic croaker (*Micropogonias undulates*), American eel (*Anguilla rostrata*), spot (*Leiostomus xanthurus*), white perch (*Morone Americana*), and soft clams (*Mya arenaria*) (MDNR 2004c).

Commercial fishing regulations for harvesting blue crab, oyster, and striped bass in Chesapeake Bay limit most fishing to the daylight hours as follows:

- **Blue Crab** - Depending on the season, commercial crabbing may occur from 7-1/2 to 9 hours after sunrise (plus 30 to 60 minutes before sunrise).

- **Oyster** - Tonging and diving in October and January through March may only occur from sunrise until 3p.m. Monday through Friday or from November through March (Monday through Friday) from sunrise till sunset depending on the harvesting method.

- **Striped Bass** - Hook and line fishing in Chesapeake Bay from June 14 through November 30 is restricted to one hour before sunrise to one hour before sunset on Monday through Thursday - no fishing on Friday or weekends); fishing by drift gill net from December 1 through December 31 is permitted from 3a.m. to midnight; and fishing by net or haul seine has no restrictions.

3.4.4 Recreational Fishing and Boating

The recreational fisheries of Chesapeake Bay also are a significant source of income for the region and the state. The NOAA Fisheries Marine Recreational Fisheries Statistics Survey provides information on landings and angler effort for recreational fisheries in the inland marine waters of Maryland, which is primarily comprised of Chesapeake Bay. A variety of species are pursued by recreational anglers, including some that are also important commercial species. Table 3-3 presents the top 10 species by number of fish caught in Maryland's marine waters in 2003. Recreational fish species common in the vicinity of the BIR include bluefish, spot, summer flounder, black sea bass, white perch, and toadfish.

Table 3-3 Top Ten Recreational Fish Species Caught in Maryland in 2003

Species	Scientific Name	Fish Catch (in 1,000s)
White perch	*Morone Americana*	5,718
Striped bass	*Morone Saxatilis*	5,174
Spot	*Leiostomus xanthurus Morone Americana*	3,967
Atlantic croaker	*Micropogonias undulates*	2,939
Freshwater catfish	*Ictaluridae* spp.	922
Bluefish	*Pomatomus saltatrix*	607
Herrings	*Clupediae* spp.	614
Black sea bass	*Centropristus striata*	428
Summer flounder	*Paralidhthys dentatus*	401
Toadfish	*Opsanus tau*	193

Source: NOAA Fisheries 2004c.

An estimated 3,060,606 angler trips were made to the inland marine waters of Maryland in 2003. These angler trips contributed to the local economy through purchases of bait and tackle, fees for fishing piers or jetties, and charter and other boat rentals. Private boat rentals accounted for approximately 63 percent of total fishing trips to Maryland's inland waters, while fishing from piers, bridges, jetties, or other man-made structures represented about 33 percent of trips (NOAA Fisheries 2004c).

Like commercial fishers, recreational fishers in Chesapeake Bay must comply with time of day fishing restrictions for blue crab, oyster, and striped bass. Blue crab harvesting may only occur during daylight hours; oysters may only be harvested from sunrise to 3p.m. (Monday through Friday) and sunrise to noon on Saturday during the recreational season which lasts from October 1 through March 31; and striped bass fishing in the bay may not occur between midnight and 5:00 a.m. during the April 15 to December 15 season.

Recreational boating in Chesapeake Bay also provides significant revenue for the state economy. A recent study completed by the University of Maryland Sea Grant Extension Program found that expenditures related to recreational boating in Maryland exceeded $2 billion in 2002. According to the study, every eight boats registered in Maryland lead to a full-time job somewhere in the state's economy, and each boat contributes about $7,000 per year in economic activity (Maryland Sea Grant 2003).

3.5 Topography, Geology, and Soils

Chesapeake Bay was formed approximately 18,000 years ago at the close of the last ice age. Rising sea levels caused by glacial melting resulted in the creation of Chesapeake Bay from the drowned streambeds along the ancient Susquehanna River valley. Prior to the formation of the bay, the lands comprising the BIR were upland platforms lying between rivers and creeks that traversed the Susquehanna River drainage basin. The present dimensions of the bay were reached about 3,000 years ago as the rate of sea level decreased and eventually stabilized. The shape of the bay resembles a shallow tray with a few deep troughs that form a channel along the north-south length of the bay.

3.5.1 Topography

The BIR is located along the western edge of Maryland's Eastern Shore. The Eastern Shore is an area of flat, low, nearly featureless topography with elevations generally at or near sea level. The shorelines of the islands comprising the BIR are highly indented and are cut by numerous coves and inlets. These features are most pronounced on Bloodsworth Island. Nearly the entire land area of the BIR consists of a tidal marsh that is bisected by a series of low ridges, the most prominent of which is Fin Creek Ridge in the northeast section of Bloodsworth Island. The entire land area of the BIR lies below 5 feet above mean sea level.

Erosion of the islands comprising the BIR has increased rapidly during the last 500 to 1,000 years. During this period, rising sea levels have caused the tidal marsh to migrate into drier land, while the outer (seaward) edge of the marsh recedes because of wave action. A study completed by Downs et al. (1994) found that the land area of Bloodsworth Island decreased by 1,431 acres, or 26 percent, between 1849 and 1992. A Navy-sponsored study, Downs et al. (1995), identified

the rising sea level and the resultant shoreline erosion and interior breakup as the primary causes of the loss of land area, although it was also noted that bombing of the island had also contributed to land loss.

3.5.2 Geology

The underlying geology of the Atlantic coastal plain consists of a 2,000- to 4,200-foot-thick wedge-shaped mass of unconsolidated sand, gravel, silt, and clay ranging in age from Cretaceous to Holocene (Mack et al. 1971). Beneath the BIR, these sedimentary deposits are known as the Kent Island formation and are believed to be deposits of estuarine material consisting of loose, light-colored, cross-stratified sand that overlies dark-colored massive to thinly laminated clay-silt. Directly beneath this layer are Precambrian and Cambrian metamorphic and igneous rocks.

3.5.3 Soils

Three soils have been mapped on Bloodsworth Island: Elkton silty clay loam, tidal marsh, and swamp (Hutton et al. 1963). Elkton silty clay loam is poorly drained soils found only in the northeastern portion of Bloodsworth Island along a narrow, linear ridge referred to as Fin Creek Ridge. The underlying subsoil has low permeability and is usually located near sea level. That soil characterized as swamp is found in scattered locations, particularly in the northeastern portion of Bloodsworth Island. Areas mapped as swamp appear to represent portions of old ridge alignments or uplands that have been encroached by rising sea levels. The remainder of the BIR has been mapped as tidal marsh.

3.6 Water and Sediment Quality

3.6.1 Surface Waters and Sediments

The BIR is located in the northwest corner of Tangier Sound in the middle portion of Chesapeake Bay, approximately 15 miles northeast of the confluence of the Potomac River with the bay (see Figure 3-4). The Nanticoke and Wicomico rivers enter Tangier Sound approximately 7 miles east of the BIR. The BIR is separated from the Maryland mainland to the north by Hooper Straight, while Holland Strait separates the BIR from the South Marsh Island WMA to the south. Chesapeake Bay shipping channel is about 3 miles to the west of the western boundary of the BIR's Surface Danger Zone.

Chesapeake Bay is the largest estuary in North America, extending in a north-south axis for approximately 200 miles from the mouth of the Susquehanna River in northeast Maryland to Cape Henry in Virginia. The bay encompasses more than 4,400 miles of shoreline and, on average, contains more than 15 trillion gallons of water (Chesapeake Bay Program 2004a).

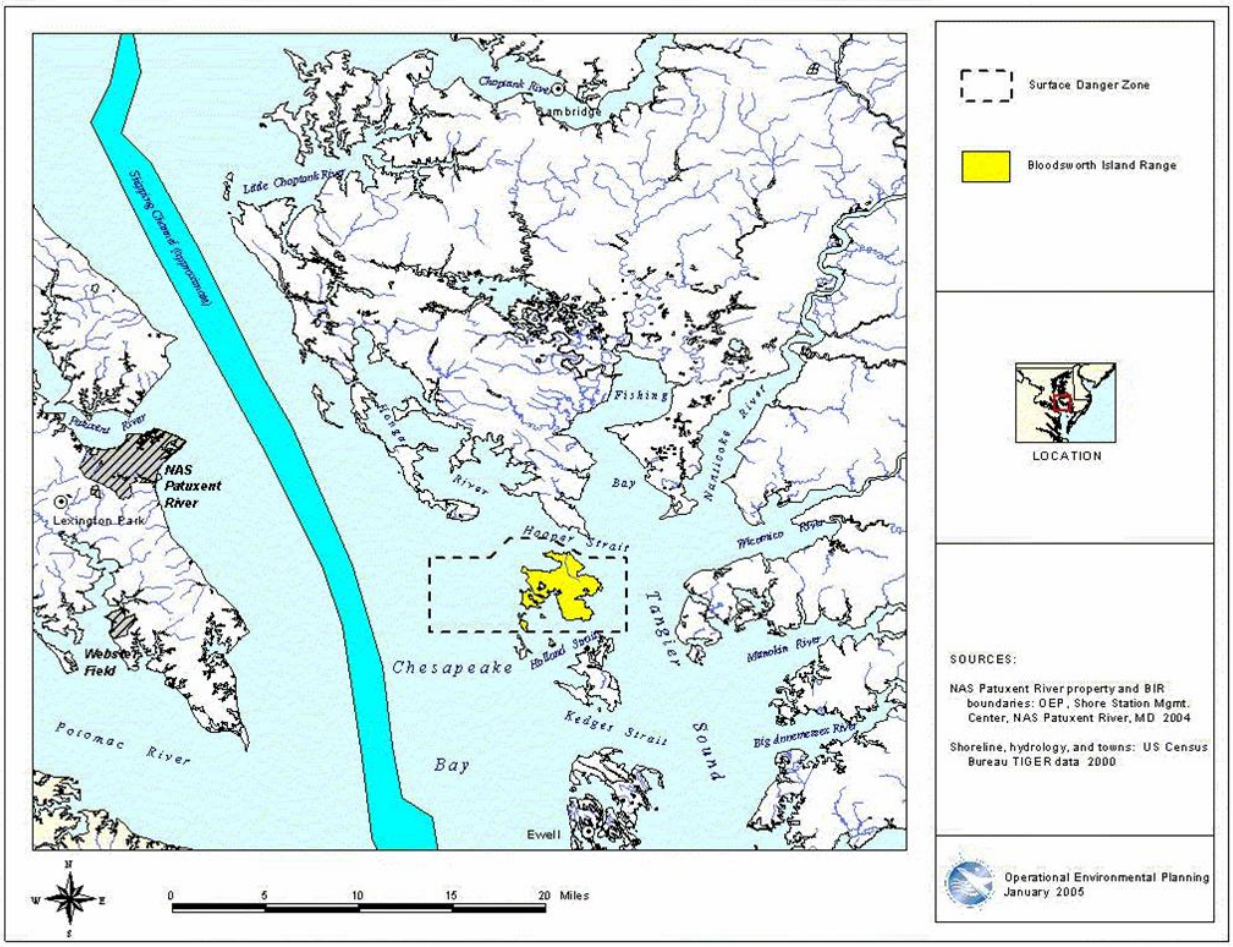

Figure 3-4 Water Resources in the Vicinity of Bloodsworth Island Range

Freshwater enters the bay from 19 principal rivers and over 400 smaller tributaries, which collectively drain an area of over 64,000 square miles (Lippson & Lippson 1997). Tributaries along the western shore drain large watersheds that extend to the Appalachian Mountains and are the primary contributors of freshwater to the bay. The Eastern Shore tributaries drain the low-lying Delmarva Peninsula and often form extensive tidal marsh areas near the coast. The Susquehanna, Potomac, and James Rivers are the principal tributary systems supporting the estuarine environment and collectively contribute over 80 percent of the freshwater inflow to the bay (Lippson & Lippson 1997).

Water circulation in Chesapeake Bay is generally characterized by higher salinity waters moving up the bay near the Eastern Shore and fresher surface waters flowing seaward near the western shore (U.S. Navy 1998). Salinity levels in the middle portion of Chesapeake Bay are typical of brackish waters and range between 10 and 20 parts per thousand (ppt). Vertical stratification occurs in the bay and can result in bottom waters having salinity levels of 2 to 3 ppt higher than

surface waters (U.S. Navy 1998). Typical surface salinity in the vicinity of the BIR ranges from 14 to 18 ppt (Cantillo, Lauenstein, and O'Connor, 1998). Chesapeake Bay has an average depth of 30 feet, although some portions of the central channel of the bay west of the BIR reach depths of up to 175 feet (U.S. Environmental Protection Agency 1998). Waters surrounding the BIR are shallow, ranging from 1 to 12 feet on the east side of the BIR to as much as 20 feet on the west side of the BIR **(**Naval Facilities Engineering Command Atlantic Division 2002**)**. The tidal variation on Bloodsworth Island is approximately 1.3 feet, which causes water to flow over most of the island at high tide.

Sediments in the middle portion of Chesapeake Bay are generally comprised of sands along the shallow, near-shore margins and on shelves surrounding the peninsulas and islands near the Eastern Shore. Silty clay sediments are common in the western portion of the bay in deeper water areas (Maryland Geological Survey 2004). Previous sediment sampling of the waters surrounding the BIR indicates that bottom materials consist almost entirely of soft substrates, including a relatively even distribution of fine sand, silt, and clay.

Surface water features on the BIR include the various tidal creeks that extend through Bloodsworth, Pone, Adam, and Northeast islands. A semi-enclosed open-water area identified as Swan Pond is located in the western end of Bloodsworth Island. Freshwater on the BIR is either nonexistent or scarce and limited to small, temporary pockets that form after storm events.

Water quality issues affecting Chesapeake Bay include excessive nutrient loading, which causes algal blooms, hypoxia, and loss of sea grasses; chemical contamination; air pollution; depleted shellfish and fish stocks; and outbreaks of the toxin-producing organism *Pfiesteria* (U.S. Environmental Protection Agency 2004a). Various government-commissioned studies have been completed during the last two decades to identify and address these issues. The majority of these studies have focused on nutrients and sediment contamination. Based on long-term water quality data collected by Chesapeake Bay Program, the waters to the east of the BIR are considered to have fair water quality with respect to nutrient loading, while the waters to the west of the BIR are characterized as good (Chesapeake Bay Program 2004a).

Various studies have been completed that assess water and sediment quality at and in the immediate vicinity of the BIR. The overall results of the studies indicate that operations conducted at the BIR have not resulted in significant impacts on water and sediment quality within the BIR boundary or in surrounding areas. Each of these studies is briefly summarized below.

3.6.1.1 1980 Navy Sampling and Analysis Study

Hoffsomer and Glover (1980) evaluated the potential for water contamination resulting from the release of explosive ordnance at the BIR. Six water samples were taken at the BIR near recent bomb craters where explosive contamination, if

present, would be highest. The water samples were analyzed for trinitrotoluene (TNT), cyclotrimethylene-trinitramine (RDX), and tetryl. The results of the analysis showed that no traces of explosive compounds were present in any of the water samples taken, despite the long-term use of ordnance at the BIR. Based on the sampling results, Hoffsomer and Glover (1980) concluded that there was no significant explosives contamination on the BIR.

3.6.1.2 1998 U.S. EPA Mid-Atlantic Integrated Assessment – Estuaries

A consortium of federal and state agencies participated in the 1997-1998 Mid-Atlantic Integrated Assessment - Estuaries conducted by the U.S. Environmental Protection Agency (USEPA) (USEPA 2004a). The purpose of this study was to characterize the environmental conditions of four major estuaries in the Mid-Atlantic region. It included an assessment of metal contaminants in sediments and their potential toxic effects on aquatic life. Sampling was conducted at over 800 stations. Five of these sampling stations were in the immediate vicinity of the BIR (see Figure 3-5). Sediment contamination was characterized according to Long et al. (1995). For nine metals observed to affect aquatic organisms, the study defined an impact level (i.e., the effects range-low value) as the lowest concentration of a metal that produced adverse effects in 10 percent of the data reviewed. Each of the sediment samples taken near the BIR had metal concentrations below the effects range-low value, indicating that sediments in these areas are not expected to adversely affect aquatic life (USEPA 2004b).

3.6.1.3 2001 Navy Sampling and Analysis Study

In 2001, the Navy initiated testing of surface water, sediment, and soils on and adjacent to the BIR to evaluate the environmental impact of previous use of ordnance on the BIR. A total of 31 water and sediment samples (see Figure 3-5) were collected as part of the study, including four background sediment samples and four background water samples in areas located outside the BIR boundary.

Each of the samples was analyzed for concentrations of metals and materials related to the use of ordnance, both explosive and nonexplosive. In addition to comparisons against background data, all samples were screened against risk-based criteria to determine the existence of any potentially unacceptable risks to human and/or ecological receptors. No explosive compounds were detected in any of the 23 water and sediment samples obtained on the BIR, indicating that the use of ordnance at the BIR since 1942 has not resulted in an observable release. None of the sediment samples taken at the BIR had metal concentrations higher than those measured in similar depositional environments at the background sample locations. In addition, none of the sediment samples exceeded any vegetative or wildlife screening criteria.

The surface water data indicated that six metals (iron, manganese, mercury, silver, thallium, and zinc) were present in the water samples at concentrations that exceeded the background screening criteria. None of these metals were identified as exceeding the vegetative screening criteria, and only iron and manganese were identified as being present at the BIR in levels exceeding the wildlife screening

criteria. In addition, iron and manganese exceeded the wildlife screening criteria in only one and two samples within the BIR area, respectively. Therefore, it was determined that concentrations of iron and manganese in the waters at the BIR pose a minimal potential risk to aquatic organisms (Naval Facilities Engineering Command Atlantic Division 2002).

Based on an evaluation of data collected as part of the 2001 water and sediment quality analysis, it was concluded that a historic "release" (i.e., an accumulation of metals/chemicals) had not occurred at the BIR and no metals are present in the water column or in sediments that would pose an unacceptable risk to human health or the environment (Naval Facilities Engineering Command Atlantic Division 2002).

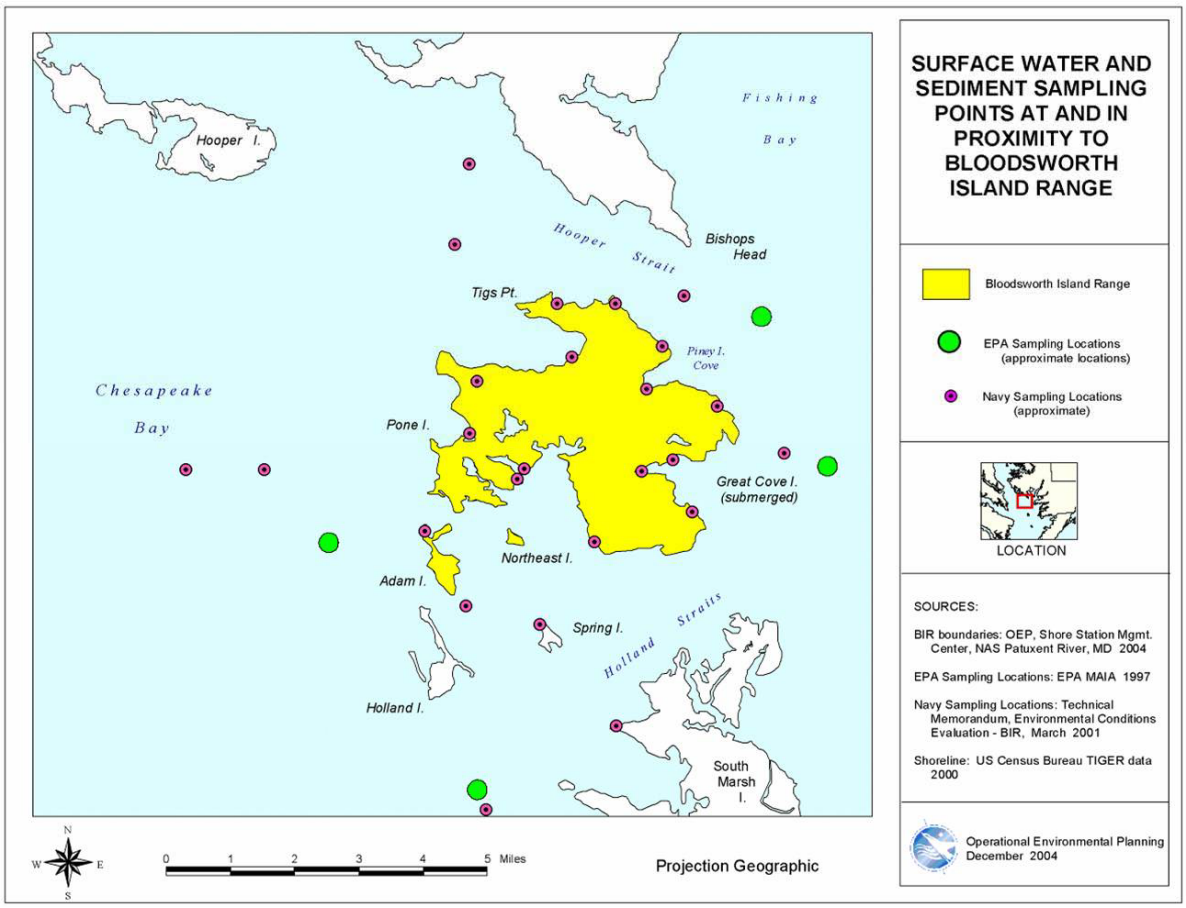

Figure 3-5 Surface Water and Sediment Sampling Points at and in Proximity to Bloodsworth Island Range

3.6.2 Groundwater

The BIR lies above the Kent Island Formation, which consists of a relatively thin layer of interstratified gravel, sand, silt, and clay with some organic matter (University of Delaware Mineralogical Museum 2004). Two shallow wells are located on Adam Island. However, water from these wells is not considered potable because of the high salinity levels of the groundwater. Underlying the Kent Island Formation is the Manokin Aquifer, which is characterized by fine to coarse sand with some silty sand and clay lenses. According to Rasmussen and Slaughter (1955), the portion of the aquifer near the BIR has a thickness of several feet and the chloride content of the groundwater is greater than 300 parts per million (ppm). Groundwater flow along the Delmarva Peninsula is generally from northeast to southwest towards Chesapeake Bay (NAS Patuxent River 2003).

3.7 Vegetation and Wetlands

3.7.1 Vegetation and Wetlands

Vegetative communities at the BIR were characterized by the MDNR in 1970. Subsequent field investigations conducted by biologists from the Maryland Wildlife Administration and personnel from the NAS Patuxent River Natural Resources Division indicate that there have been no significant changes to the vegetation communities at the BIR since the 1970 assessment (Rambo 2003). Figure 3-6 shows the distribution of vegetation communities at the BIR using data from previous surveys.

The islands comprising the BIR consist almost entirely of wetland habitats. The wetlands on the BIR are predominantly estuarine emergent marshes dominated by black needlerush (*Juncus roemerianus*). Areas comprising black needlerush marsh are also intermixed with open water as a result of tidal guts (channels) that extend through the islands and from craters caused by previous ordnance deliveries. Other wetland communities on the BIR are restricted primarily to the perimeters of Bloodsworth Island and Adams Island. Wetland communities in these areas are estuarine emergent and scrub-shrub systems dominated by saltmeadow cordgrass (*Spartina patens*), an inland saltgrass (*Distichlis spicata*), marsh elder (*Iva frutescens*), and groundsel tree (*Baccharis halimifolia*).

Several low ridges present on Bloodsworth Island and Adam Island historically supported upland vegetation communities. The most pronounced of these areas is Fin Creek Ridge in the northern section of Bloodsworth Island. Most of the upland vegetation along the low ridges, which includes red cedar (*Juniperus virginiana)*, hackberry (*Celtis occidentalis L.),* loblolly pine (*Pinus taeda)*, and black locust (*Robinia pseudoacacia*), is being replaced by groundsel tree and marsh elder as water levels rise and soil salinity increases.

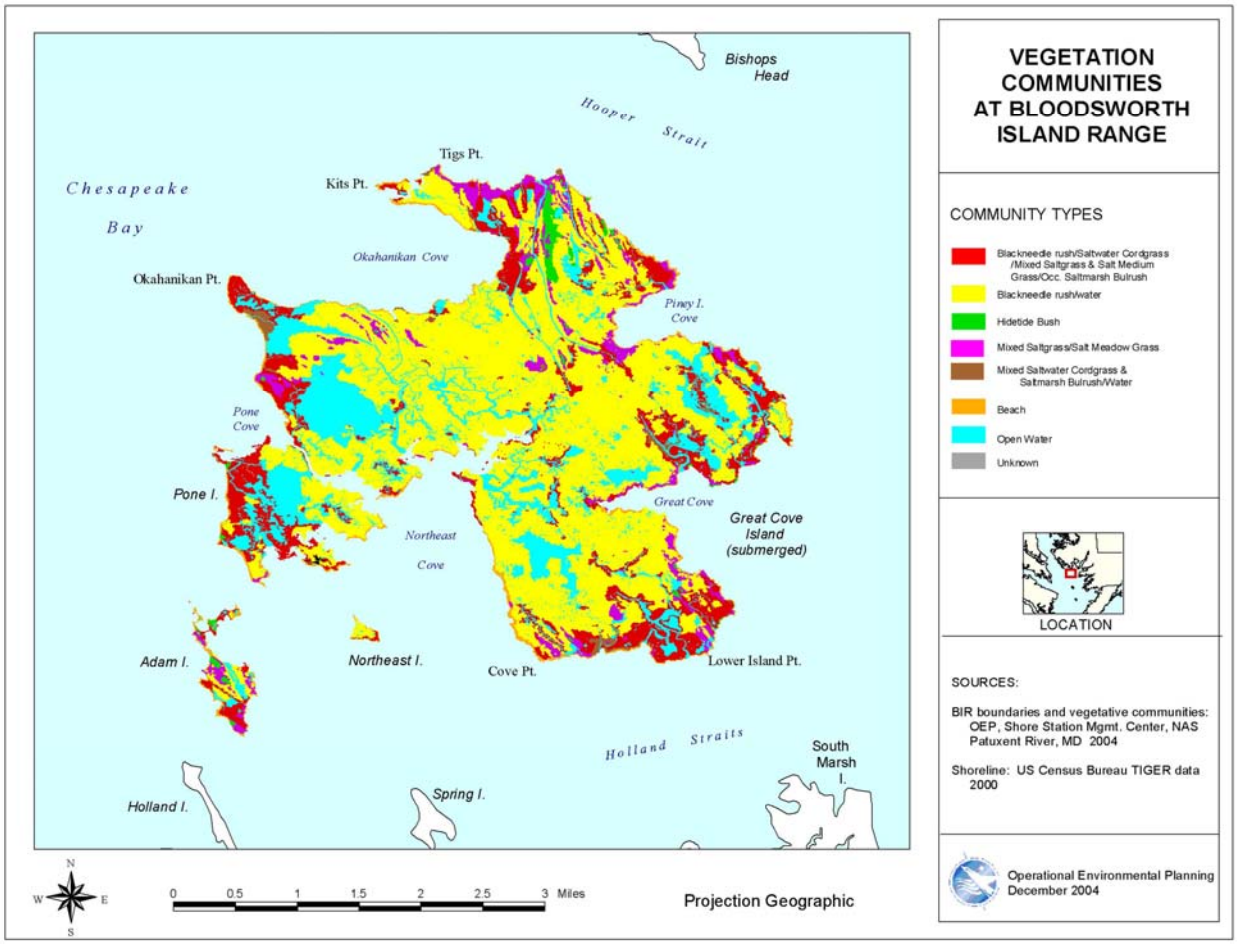

Figure 3-6 Vegetation Communities at Bloodsworth Island Range

3.7.2 Submerged Aquatic Vegetation

SAV is comprised of vascular plants that grow completely underwater below the low-tide line in water depths up to 9 feet (Chesapeake Bay Program 2004b). Eleven species of SAV are commonly found in Chesapeake Bay and its tidal tributaries. Eelgrass (*Zostra marina*) is the dominant SAV species in the lower portion of the bay in areas of higher salinities, while redhead grass (*Potamogeton perfoliatus*), sago pondweed (*Potamogeton pectinatus*), horned pondweed (*Pannichellia palustris*), and Eurasian milfoil (*Myriophyllum spicatum*) are common in the middle and upper portions of the bay where salinities are lower. Widgeon grass (*Ruppia maritime*) is tolerant of both high- and low-salinity waters and is common through all regions of the bay (Virginia Institute of Marine Science (VIMS) 1996).

SAV is an important contributor to the primary and secondary production of Chesapeake Bay. SAV beds provide food and habitat for waterfowl, fish, shellfish, and invertebrates. SAV beds also produce oxygen, filter and trap sediments, protect shorelines from erosion by reducing the energy of wave action,

and remove excess nutrients from the water column (thereby reducing the occurrence of algal blooms) (Chesapeake Bay Program 2004b).

Concentrations of SAV in Chesapeake Bay showed steady decline from the late 1950s through the 1970s. Historically, SAV had been present in more than 200,000 acres of the bay, but by 1978 only about 41,000 acres of SAV were present. The decrease of SAV in the bay is apparently the result of declining water quality, disturbance of SAV beds, and alteration of shallow water habitat. Declining water quality is the most significant factor in SAV loss (USFWS 2004a).

Over the last two decades, the trend in SAV decline has gradually been reversing as efforts have been made through Chesapeake Bay Agreement and other initiatives to restore and manage the water quality of the bay. This increase in SAV coverage has been mapped by the VIMS, which conducts annual aerial surveys of Chesapeake Bay. As of 2001, SAV coverage in the bay was over 80,000 acres (VIMS 2004).

Figure 3-7 shows the extent and relative density of SAV that was mapped at the BIR in 2002, which is most recent year of complete data for VIMS. A total of 1,437 acres of SAV is identified adjacent to the shorelines of the islands comprising the BIR and represents an increase in total acreage between 2001 and 2002 of approximately 100 acres. As can be seen, the largest SAV beds occur in Okahanikan Cove, which is the situated off the northwest end of Bloodsworth Island, and in the shallow waters between Adam Island and Northeast Island. These beds collectively comprise 983 acres, or 68 percent, of the SAV mapped at the BIR. SAV also is present at the BIR in craters that were created on the islands by previous bombardment. Establishment of SAV in these areas is random, with some craters consisting only of open water and others supporting dense concentrations of SAV, primarily widgeon grass. Evaluation of the SAV at the BIR indicates that most of the beds are dominated by widgeon grass.

It should be noted, however, that preliminary VIMS survey data for 2004 indicate that the SAV bed that was identified in 2002 between Pone, Adam, and Northeast Islands may no longer be viable.

3.8 Wildlife and Fisheries

3.8.1 Terrestrial Wildlife

Wildlife species using the BIR have decreased in number and diversity in direct correlation to the decrease in diversity in vegetation communities.

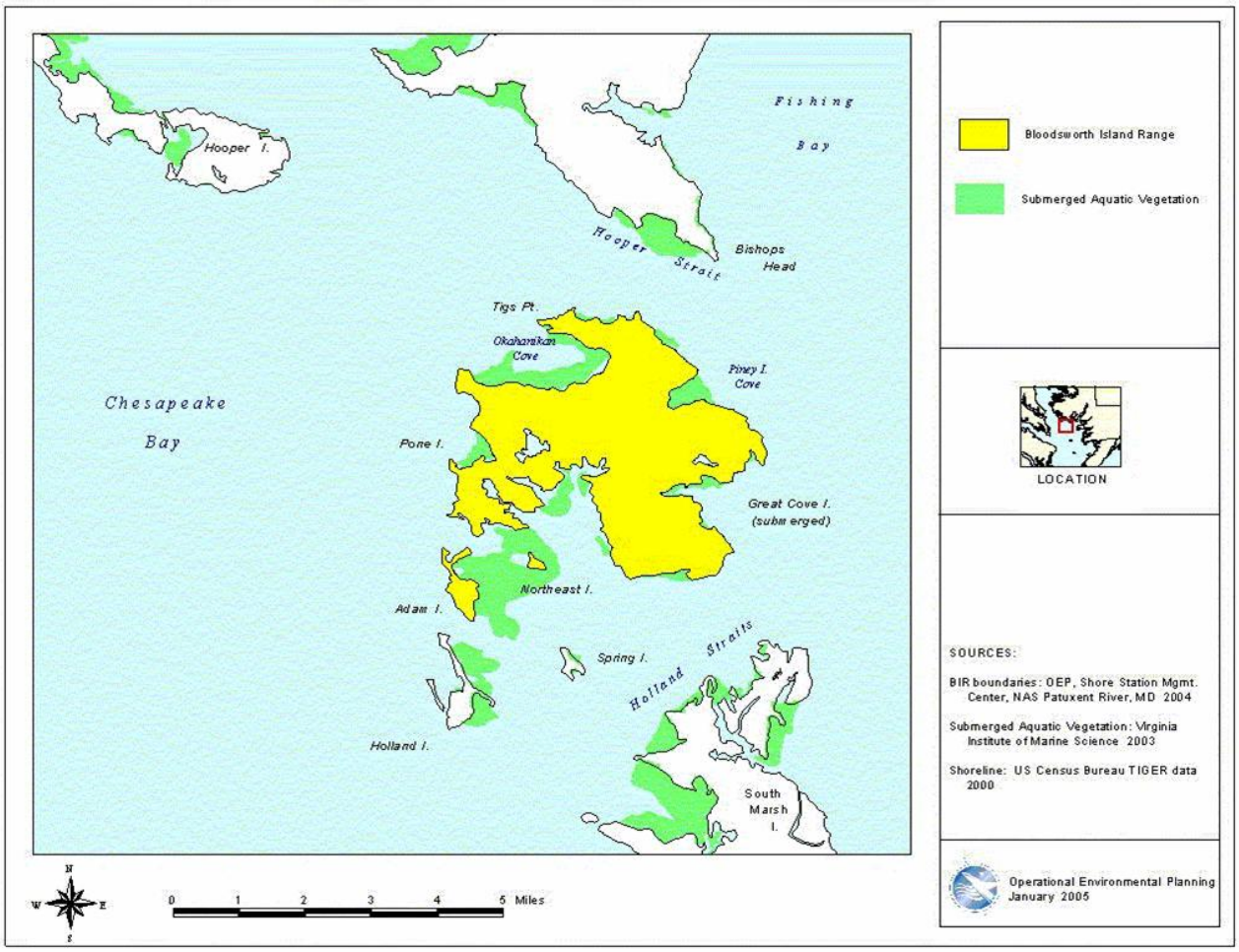

Figure 3-7 Submerged Aquatic Vegetation in Proximity to Bloodsworth Island Range

3.8.1.1 Mammals

The BIR does not support a diverse or abundant population of mammals because of the lack of upland habitat, the dominance of the needlerush marsh community, and the limited availability of freshwater. Mammals known to occur on the BIR in small populations include muskrat (*Ondatra zibethicus*), otter (*Lutra Canadensis)*, mink (*Mustela vison*), and raccoon (*Baylisascaris procyonis*). Whitetail deer (*Odocoileus virginiansis*) and red fox (*Vulpes vulpes*) have also historically been observed on the BIR in low numbers.

3.8.1.2 Reptiles and Amphibians

Sufficient habitat does not exist on the BIR to support diverse or abundant populations of terrestrial reptiles or amphibians. Species previously observed at the BIR include diamond-backed terrapin (*Malaclemys terrapin terrapin)* and northern water snake (*Nerodia sipedon sipedon).* Other reptiles and amphibians that could potentially inhabit the BIR, based on available habitat and occurrence in nearby areas, include ribbon snake (*Thamnophis sauritus sauritus)*, Eastern

mud turtle (*Kinosternon subrubrum subrubrum)*, spotted turtle (*Clemmys guttata)*, Eastern painted turtle (*Chrysemys picta picta)*, and Southern leopard frog (*Rana sphenocephala*).

3.8.1.3 Birds

The BIR is located within the Atlantic Flyway, which is a major migration route for migratory birds along the U.S. East Coast. Large numbers of birds are found in this corridor during the spring and fall migration periods. The BIR serves as an important stopover area during migration and as an over-wintering area for waterfowl. The extensive needlerush marsh limits the attractiveness of the BIR as a bird nesting area; however, certain sections of the BIR support significant nesting activity, particularly the heron rookeries.

Songbirds

Because of a lack of vegetation diversity and upland habitat, only a few species of songbirds nest at the BIR. Common breeders well suited to the habitat conditions at the BIR include the red-winged blackbird (*Agelaius phoeniceus*), long-billed marsh wren (*Cistothorus palustris*), seaside sparrow (*Ammodramus maritimus*), and Nelson's sharp-tailed sparrow (*Ammodramus nelsoni*).

Raptors

Ospreys (*Pandion haliaetus*) are common nesters at the BIR. During an August 1994 survey conducted by NAS Patuxent River personnel, 88 osprey nests were identified on the BIR. More recent surveys completed at the BIR also indicate that ospreys are common in the area (Swift 2003). The ospreys nest on the ground and on nesting platforms erected by the Navy. In addition, osprey have been observed nesting on pyramid targets previously used by the NAVAIR Range Department, on the tail fins of inert rockets, and on old cars that have been placed as targets.

Other raptor species known to use the BIR include the turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), sharp-shinned hawk (*Accipiter striatus*), broad-winged hawk (*Buteo platypterus*), red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperi*), red-shouldered hawk (*Buteo lineatus*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), barn owl (*Tyto alba*), bald eagle (*Haliaeetus leucocephalus)*, and peregrine falcon (*Falco peregrinus*). Use of the BIR by the bald eagle is discussed further in Section 3.9.

Waterfowl

American black duck (*Anas rubripes*), mallard (*Anas platyrhynchos*), and Canada goose (*Branta canadensis*) are the primary waterfowl species that breed in Chesapeake Bay region. The BIR supports only limited waterfowl nesting activity because of the extensive needlerush marsh community. Haramis et al. (2000) completed a study on the breeding ecology of black ducks on

Bloodsworth, Smith, and Great Marsh Islands. Their study found that the salt marsh habitats comprising the majority of the islands are of minimal value for black duck nesting. Their conclusion was based on a low frequency of nesting, limited re-nesting, low hatching success caused by predation, and vulnerability of nests to storm tides. Surveys completed by NAS Patuxent River natural resources personnel also have indicated that resident breeding black ducks are not nesting in large numbers on the upland ridges and hummocks of the BIR because of competition from gulls and crows and, in some locations, predation from red fox.

The BIR serves as an important overwintering and stopover area for migratory waterfowl. Large numbers of tundra swans (*Cygnus columbianus*), Canada geese, and over 15 species of ducks have been observed at the BIR during the wintering period. Many of the waterfowl species use the cordgrass/saltgrass marsh and SAV within the BIR as a source of food. Species such as old squaw (*Clangula hyemalis*), scoters (*Melanitta* spp.), and bufflehead (*Bucephala albeola*) feed on shellfish and other bottom-dwelling invertebrates that populate the marshes and nearshore waters. The natural pockets, coves, and tidal guts that occur at the BIR also provide abundant cover for idle or resting waterfowl.

Since 1965, the Navy (via letter notification) has voluntarily discontinued exercises at the BIR during the migratory bird season in recognition of the importance of the BIR as an important over-wintering area for waterfowl. Normally, closure has occurred from mid-October through mid-February, although actual closure dates have varied from year to year. During this period, the Navy has also suspended all overflights below 3,500 feet in order to minimize the potential for bird strike hazard to aircraft. These restrictions have, in effect, created a large, undisturbed refuge for migratory waterfowl during the migration season.

In addition, in 1991 the Navy entered into a cooperative agreement with the USFWS and MDNR for waterfowl management on the BIR as part of its commitment to the *North American Waterfowl Management Plan*. A recent update to the Plan signed in October 2004 recognizes the continuing commitment to waterfowl conservation. The 2004 *North American Waterfowl Management Plan - Strengthening the Biological Foundation* supports research and projects to improve wildlife habitat and establishes a working group with representation from the United States, Canada, and Mexico. Recommendations developed as part of the *North American Waterfowl Management Plan* that specifically address the BIR and documented in 1991 include:

- Voluntary closure of the BIR during the four-month Maryland migratory waterfowl season (typically mid-October to early-February)

- Permitted access by MDNR to the BIR to conduct annual aerial waterfowl surveys

- Development of recommendations for habitat improvement, including the installation and maintenance of nesting platforms in the heron rookeries

- Development and implementation of an Integrated Natural Resources Management Plan (INRMP) for the BIR. (The Navy intends to incorporate the BIR into the 2006 update to the *Patuxent River Complex INRMP*.)

Wading Birds

Nine species of wading birds are known to nest on the BIR, including large numbers of great blue heron (*Ardea herodius*), green heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), and yellow-crowned night heron (*Nycticorax violacea*). Other wading birds that nest on the BIR include little blue heron (*Egretta caerulea*), great egret (*Ardea alba)*, tri-colored heron (*Egretta tricolor),* glossy ibis (*Plegadis chihi*), and snowy egret (*Egretta thula*). Historically, nesting by wading birds on the BIR has been successful despite the heavy use of the BIR for military exercises during the summer months.

All of the wading bird species at the BIR are sustained by a variety of foods, including various fishes and crabs, which are associated with a variety of habitats from the interior marsh to offshore waters. Island habitats, such as those provided at the BIR, are attractive to these wading birds because they tend to have fewer predators, they place the birds in proximity to food resources, they improve the efficiency of foraging during the chick season, and they reduce the probability of human disturbance (Haramis and Jorde 1996). Most herons breed in localized colonies of up to hundreds of nesting pairs in what is often referred to as a rookery. Nesting sites are primarily trees (both living and dead tree snags) and bushes.

Figure 3-8 indicates the location of the heron rookery on the BIR on the northern part of Bloodsworth Island. This rookery includes artificial nesting platforms that were installed by the Navy in the early 1980s to address an observed decline in the number of heron nesting pairs. The decline was primarily due to a loss of nesting habitat, namely loblolly pines and other trees that were dying as a result of rising water levels and increasing salinity levels. Currently, 19 poles with four to six nesting platforms per pole are in the rookery on Bloodsworth Island. A survey completed in September 2001 identified 57 heron nests on these platforms, as well as numerous other nests in the remaining trees on the island (NAS Patuxent River 2003). As mentioned earlier in this chapter, to protect the heron rookery, the Navy designated the northern portion of Bloodsworth Island as a No Fire Area in 1983.

Rails, Shorebirds, Seabirds, and Pelicans

The BIR supports nesting populations of rails and shorebirds, although their presence at the BIR is more extensive during the migratory season. Clapper rails

(*Rallus longirostris*) are known to nest in relatively high numbers at the BIR, with migrating king rails (*Rallus elegans*), Virginia rails (*Rallus limicola*), and sora rails (*Porzana carolinus*) also present during the fall, winter, and spring months. Shorebird species known to use the BIR include the common tern (*Sterna hirundo*), Forster's tern (*Sterna forsteri*), royal tern (*Sterna maxima*), willet (*Catoptrophorus semipalmatus*), yellowlegs (*Tringa melanoleuca*), black-bellied plover (*Pluvialis squatarola*), ruddy turnstone (*Arenaria interpres*), red knot (*Calidris canutus*), least sandpiper (*Calidris minutilla*), and western sandpiper (*Calidris mauri*). Of these, willets are the most common and the only species that breeds at the BIR.

Various species of gulls are common at the BIR during the summer months, including the laughing gull (*Larus atricilla*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), and ring-billed gull (*Larus delawarensis*). None of these species is known to currently nest at the BIR. Future nesting activity by these species, if it occurred, would likely be limited to the sandy beaches and shoals at the southern end of the BIR (Rambo 2004). Brown pelicans (*Pelecanus occidentalis*) have been observed in large numbers on the nearby Spring Island; however, pelicans are not known to occur at the BIR, nor is it likely that they would migrate to the BIR in the future because of the dominance of low tidal marsh habitat at the BIR (Brinker 2004).

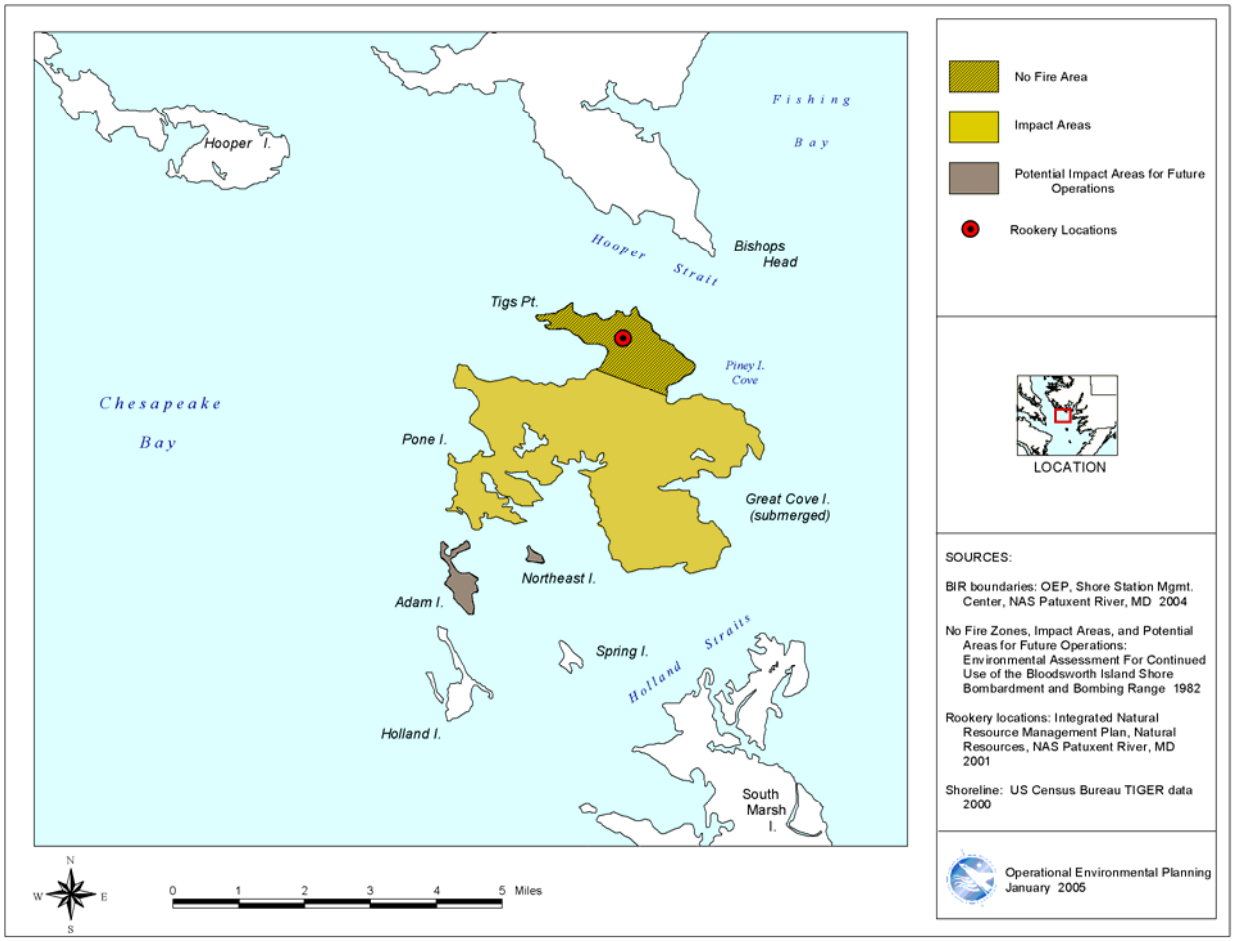

Figure 3-8 Location of Heron Rookeries on Bloodsworth Island

3.8.2 Marine Mammals

Marine mammals are protected under the MMPA (16 U.S.C. Section 1361). This law prohibits any person or vessel from "taking" marine mammals in the United States or on the high seas without authorization. Taking is "to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal" (16 U.S.C. Section 1362). The 1994 amendments to the MMPA establish two types of takings or harassment, one that involves injury (Level A) and one that includes direct or indirect disturbance (Level B). In 2004, the definition of harassment was modified as a result of the passage of the National Defense Authorization Act for Fiscal Year 2004. Specifically, Section 319 of this law states that:

> *Section 3(18) of the Marine Mammal Protection Act of 1972 (16 U.S.C. 1362(18)) is amended by striking subparagraphs (B) and (C) and inserting the following new subparagraphs:*

(B) In the case of a military readiness activity (as defined in section 315(f) of Public Law 107–314; 16 U.S.C. 703 note) or a scientific research activity conducted by or on behalf of the Federal Government consistent with section 104(c)(3), the term 'harassment' means—

(i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild; or

(ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered.

(C) The term 'Level A harassment' means harassment described in subparagraph (A)(i) or, in the case of a military readiness activity or scientific research activity described in subparagraph (B), harassment described in subparagraph (B)(i).

(D) The term 'Level B harassment' means harassment described in subparagraph (A)(ii) or, in the case of a military readiness activity or scientific research activity described in subparagraph (B), harassment described in subparagraph (B)(ii).

MDNR and NOAA Fisheries stranding and sighting data indicate that individual marine mammals occasionally enter the bay (MDNR 2004d; NOAA Fisheries 2004d); marine mammal species that could potentially be present near the BIR are listed in Table 3-4.

The stranding and sighting data indicate that bottlenose dolphins are prevalent in the bay from April through November or December and that humpback whales are common in the Maryland portion of the bay from December through February or March. Pinnipeds (seals) are becoming increasingly common during the winter months (U.S. Navy 1998). However, based on the stranding data, the number and diversity of marine animals in the bay is highest during the summer months.

It is important to note that these marine mammal species are present in the bay at very low densities. In the decade spanning 1995 and 2004, 272 marine mammal strandings and sightings were reported within 30 miles of the BIR. This equates to an average presence of 27 animals per year over a possible 500 square mile area or 0.054 animals per square mile. These stranding data further indicate that the bottlenose dolphin and harbor porpoise are the most common marine mammals occurring in the vicinity of the BIR, comprising 57.4 percent and 22.8 percent, respectively, of the 272 reported strandings and sightings.

Mysticetes (or baleen whale) - Any of several whales having symmetrical skulls, paired blow holes, and plates of whale bone (baleen plates) instead of teeth.

Odontocetes - Any of the toothed whales (without baleen plates) having a single blow hole and an asymmetrical skull. Odontocetes include orcas, dolphins, and porpoises.

Pinnipeds - Order of aquatic mammals that includes seals, sea lions, walruses, and similar animals having fin-like flippers for locomotion.

Table 3-4 Marine Mammal Species That May Occur in the Vicinity of BIR

Species	Scientific Name
Mysticetes	
Fin whale	*Balaenoptera physalus*
Humpback whale	*Megaptera novaeangliae*
Minke whale	*Balaenoptera acutorostrata*
Northern right whale	*Eubalaena glacialis*
Odontocetes	
Atlantic white-sided dolphin	*Lagenorhynchus acutus*
Bottlenose dolphin	*Tursiops truncatus*
Common short-beaked dolphin	*Delphinus delphis*
Gervais beaked whale	*Mesoplodon europaeus*
Harbor porpoise	*Phocoena phocoena*
Pygmy sperm whale	*Kogia breviceps*
Rough-toothed dolphin	*Steno bredanensis*
Short-finned pilot whale	*Globicephala macrorhynchus*
Striped dolphin	*Stenella coeruleoalba*
Pinnipeds	
Hooded seal	*Cystophora cristata*
Harp seal	*Phoca groenlandica*
Harbor seal	*Phoca vitulina*
Sirenians	
West Indian manatee	*Trichechus manatus*

3.8.3 Sea Turtles

Various species of sea turtles occur in the bay during portions of the year. Sea turtles enter the bay to feed, but there is no evidence that they use the beaches for nesting. Stranding and sighting data from MDNR and the NOAA Fisheries Cooperative Oxford Laboratory indicate that loggerhead and leatherbacks are present in Maryland waters, with loggerhead most common (MDNR 2004d). Kemp's ridley sea turtles are also known to occur in Maryland waters, but they are thought to be most common in the Virginia portion of the bay (U.S. Navy 1998). The NAS Patuxent River Natural Resources Division also has reported that two turtle species -- the Atlantic green sea turtle (*Chelonia mydas*) and Atlantic hawksbill turtle *(Eretmochelys imbricata*) -- may be transiently present in the waters near the air station and Webster Field (U.S. Navy December 1998).

Chesapeake Bay and its estuarine tributaries are considered important foraging areas for juvenile loggerhead and Kemp's ridley sea turtles (Byles 1988). Both species enter the bay in late April and May as water temperatures rise, and they remain until November. Sightings data indicate that loggerheads are most common in the bay from June through September (MDNR 2004d). Juvenile loggerheads reside along channel edges (5 to 13 meters deep) and forage along the bottom for bottom-dwelling crustaceans and bivalves (Lutz et al. 1977). Kemp's ridleys are more common in shallower waters that support submerged

aquatic vegetation, particularly eelgrass meadows (Virginia Department of Game and Inland Fisheries (VDGIF)).

Green and leatherback sea turtles are rare inhabitants of Chesapeake Bay and are present only during the warmer months. Green sea turtles prefer sea grass flats and would, therefore, be more likely to occur in the shallow areas of the bay, whereas leatherback turtles are pelagic and have been observed most commonly from the mouth of the bay to offshore waters.

Because of the small populations of sea turtles and the infrequent sightings or strandings of these animals, the estimated density of sea turtles in the bay would be even lower than that estimated in this EA for marine mammal species (0.054 animals per square mile).

3.8.4 Fisheries

3.8.4.1 Species Diversity

Chesapeake Bay, with its associated estuarine marshes, is not only the largest estuary in North America, but also one of the most productive in the world. In the middle portion of the bay, fish and shellfish populations are enhanced by vast expanses of estuarine marshes that line Maryland's Eastern Shore. These marshes shelter the young and enhance the fertility of the water. Where SAV beds are available, fish and shellfish gain nursery and refuge sites.

Bottom-Dwelling Invertebrates - Organisms that live on or in the bottom of a bay, lake, or river.

Data collected from 1990 through 1993 under USEPA's Environmental Monitoring and Assessment Program (EMAP) (USEPA 2004b) provide a picture of the nature of the fish and bottom-dwelling organisms in the vicinity of the BIR. Tables 3-5 and 3-6 provide EMAP data on fish and bottom-dwelling invertebrates from each of four sampling stations located within 4 miles of the BIR.

The sampling data for bottom-dwelling organisms indicates a diverse and relatively uniform assemblage of organisms at each of the sampling stations. The overall diversity and abundance of bottom-dweller identified at the sampling stations in the vicinity of the BIR are similar to those observed at other stations in the middle Chesapeake Bay. Common bottom-dwelling invertebrate species in the vicinity of the BIR include the blue crab, grass shrimp (*Palaemonetes pugio*), sand shrimp (*Metapenaeus monoceros*), and fiddler crab (*Uca minax*).

Table 3-5 EMAP Fish Data for Selected Sites Near the BIR

EMAP Sampling Station	General Location	Number of Species Collected	Number of Individuals Collected	Species Breakdown
VA90-045	East of Bloodsworth Island in Great Cove	2	6	Spot (4) Bay anchovy (2)
VA91-307	Approximately 2 miles north of Bloodsworth Island	7	19	Atlantic croaker (7) Spot (4) Lizardfish (3) Northern puffer (2) Atlantic spadefish (1) Striped anchovy (1) Hogchoker (1)
VA92-487	Approximately 2 miles west of Adam Island	1	2	Black sea bass (2)
VA93-631	South Marsh Island, approximately 4 miles south of Bloodsworth Island	4	84	Spot (78) Hogchoker (4) Atlantic silverside (1) Summer flounder (1)

Source: USEPA 1995.
Notes: VA90-VA93 refers to year sample was collected (i.e., 1990, 1991, 1992, or 1993).

Table 3-6 EMAP Benthic Data for Selected Sites Near the BIR

EMAP Sampling Station	General Location	Mean Number of Taxa per Grab	Mean Number of Organisms per Grab	Mean Biomass per Grab (grams)
VA90-045	Just east of Bloodsworth Island in Great Cove	19	152	0.1499
VA91-307	Approximately 2 miles north of Bloodsworth Island	23	181	0.1615
VA92-487	Approximately 2 miles west of Adam Island	19	176	0.1497
VA93-631	South Marsh Island, approximately 4 miles south of Bloodsworth Island	16	76	0.0469

Source: USEPA 1995.
Note: VA90-VA93 refers to year sample was collected (i.e., 1990, 1991, 1992, or 1993).

3.8.4.2 Essential Fish Habitat

EFH is defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (P.L. 94-265), as amended by the Sustainable Fisheries Act of 1996 (P.L. 104-267), as "those waters and substrate necessary to fish for spawning, breeding, and feeding or growth to maturity." The Sustainable Fisheries Act requires that EFH be identified for those species actively managed under federal fishery management plans (FMPs). This includes species managed by the regional fishery management councils (FMCs), established under the

MSFCMA, as well as those managed by NOAA Fisheries under FMPs developed by the Secretary of Commerce.

EFH designations emphasize the importance of habitat protection to healthy fisheries and serve to protect and conserve the habitat of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. EFH embodies both the water column (including its physical, chemical, and biological growth properties) and its underlying substrate (including sediment, hard bottom, and other submerged structures). Under the EFH definition, necessary habitat is that which is required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. EFH is designated for a species' complete life cycle, including spawning, feeding, and growth to maturity, and may be specific for each life stage (e.g., eggs, larvae).

NOAA Fisheries has identified EFH in major estuaries, bays, and rivers along the northeastern coast of the U.S. In the portion of Chesapeake Bay where the BIR is located (Tangier Sound), EFH has been designated for the following seven species (life stages are summarized in Table 3-7):

- **Windowpane flounder** (*Scopthalmus aquosus*)**.** EFH for juvenile and adult windowpane flounder at the BIR includes bottom habitats with a substrate of mud or fine-grained sand. Windowpane flounder could occur in the vicinity of the BIR throughout the year.

Pelagic Species - Fish that spend most of their life swimming in the water column as opposed to resting on the bottom of a water body.

- **Bluefish** (*Pomatomus saltatrix*)**.** Bluefish is a schooling pelagic species and thus is not generally associated with bottom habitats. EFH for juvenile and adult bluefish includes the pelagic water column. This species could be present in the vicinity of the BIR primarily from April through October.

Demersal Species - Fish that spend most of their life swimming at or near the bottom of a water body.

- **Summer Flounder** *(Paralicthys dentatus)*. EFH for juvenile and adult summer flounder includes the demersal (i.e., bottom) waters surrounding the BIR. Juveniles of this species could use the tidal guts and SAV that occur at the BIR. Summer flounder would be most common in the vicinity of the BIR from May through September.

- **Coastal Migratory Pelagic Species.** King mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculates*), and cobia (*Rachycentron canadum*) are considered highly migratory species by NOAA Fisheries. EFH has been designated for all life stages of these species in Tangier Sound. EFH includes sandy shoals of capes and offshore bars, high-profile rocky bottom and barrier island ocean-side water, from the surf to the shell-break zone, including coastal inlets. None of these habitats are known to occur in the vicinity of the BIR. For cobia, EFH also includes estuaries and SAV.

- **Red Drum** (*Sciaenops occelatus*)**.** EFH for the various life stages of red drum at the BIR include tidal inlets and creeks, salt marshes, SAV, and unconsolidated bottom (i.e., soft sediments).

EFH that is either important to the long-term productivity of one or more managed species populations or deemed to be particularly vulnerable to degradation may be identified by FMCs and NOAA Fisheries as a Habitat Areas of Particular Concern (HAPC). SAV beds occurring at the BIR are considered HAPC for adult and juvenile summer flounder and all life stages of red drum.

Table 3-7 Species with Identified EFH within Tangier Sound

Species	Eggs	Larvae	Juvenile	Adult
Windowpane flounder			X	X
Bluefish			X	X
Summer flounder			X	X
King mackerel	X	X	X	X
Spanish mackerel	X	X	X	X
Cobia	X	X	X	X
Red drum	X	X	X	X

Source: NOAA Fisheries 2004d.

Threatened Species Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

3.9 Threatened and Endangered Species

Under the mandates of the Endangered Species Act, federal agencies must protect and conserve the habitats under their control. Federal agencies must also conserve listed species and ensure that their actions do not jeopardize the continued existence of those species. The Navy ensures that consultations are conducted as required under Section 7 of the Endangered Species Act for any action that may affect a threatened or endangered species.

Endangered Species - Any species that is in danger of extinction throughout all or a significant portion of its range (other than a species of Class Insecta designated as a pest).

The potential occurrence of threatened and endangered species in the vicinity of the BIR was assessed based on a review of marine mammal and sea turtle sightings (Cooperative Oxford Laboratory Sighting Reports) (MDNR 2004d) and stranding data provided by NOAA Fisheries (2004a). Federally listed species potentially occurring within the project area are presented in Table 3-8.

3.9.1 Shortnose Sturgeon

The shortnose sturgeon is anadromous, inhabiting slower moving estuarine or nearshore marine waters and migrating periodically into faster moving freshwater to spawn (NOAA 2004e). Breeding occurs from April to June when both sexes migrate upstream to spawn. Spawning occurs in regions of fast flow with gravel or cobble substrates. The larval and juvenile life stages develop in freshwater and generally occupy areas of deep, strong currents. Once adult size is attained, the shortnose sturgeon begins a migratory pattern of moving downstream in the fall and upstream in the spring (VDGIF 2004**)**.

Approximately 50 shortnose sturgeon have been captured in the Maryland portion of Chesapeake Bay and its tributaries since 1996 as part of the Atlantic Sturgeon Reward Program administered by the USFWS, MDNR, and Chesapeake Bay Foundation. The captured sturgeon were primarily distributed within the upper Chesapeake Bay (Welsh et. al 2002).

Table 3-8 Protected Species and Species of Concern in the Vicinity of BIR

Species	Scientific Name	Status	
		Federal	State
Birds			
Bald eagle	*Haliaeetus Leucocephalus*	T	T
Peregrine falcon	*Falco peregrinus*		E
Plants			
Seaside knotweed	*Polygonum glaucum*		E
Slender sea-purslane	*Sesuvium maritimum*		E
Swamp dock	*Rumex floridana*		E
Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	E	E
Reptiles			
Loggerhead sea turtle	*Caretta caretta*	T	
Kemp's ridley sea turtle	*Leipidochelys kempii*	E	
Green sea turtle	*Chelonia mydas*	T	
Leatherback sea turtle	*Dermochelys coricea*	E	
Atlantic hawksbill turtle	*Eretmochelys imbricata*	E	
Marine Mammals			
Fin whale	*Balaenoptera physalus*	E	E
Humpback whale	*Megaptera novaeangliae*	E	E
Northern right whale	*Eubalaena glacialis*	E	E

Key: E = Endangered.
T = Threatened.

3.9.2 Bald Eagle

The federally state-listed threatened bald eagle is common in Chesapeake Bay region and occasionally uses the BIR. No bald eagle nests were identified on the island during a 2001 survey conducted by MDNR. When the area was flown by DNR in 2002, two eagles were observed in a large nest located on a loblolly pine near the edge of the No Fire Area, though active nesting or the presence of young could not be verified (Therres 2005). The Navy conducted a survey of the island in 2005, but no indication of bald eagle nesting activity was found (Rambo 2005). The closest known bald eagle nest previously reported is on the northern tip of Holland Island, approximately 0.5 mile from the southern end of Adam Island, and the last recorded activity at this nest was in 1994 (U.S. Navy 2002). Between 1990 and 2002, only four eagle sightings have been reported at the BIR: two in 1994, one in 2001, and one in 2002 (Rambo 2003).

3.9.3 Marine Mammals

Four federally listed marine mammals have been observed within Chesapeake Bay and have the potential to occur in the vicinity of the BIR: the fin whale, humpback whale, northern right whale, and West Indian manatee. A review of marine mammal stranding data for Chesapeake Bay provided by NOAA Fisheries Northeast Regional Stranding Network (2004a) shows that three humpback whales, two fin whales, and one northern right whale were among those species reported sighted or stranded within 30 miles of the BIR in the ten years spanning 1995 and 2004 (NOAA Fisheries 2004a). As a result, it may be concluded that these species are rarely present near the BIR. Part of the reason for this is the shallow depths that surround the islands.

According to information from MDNR and the NOAA Fisheries Cooperative Oxford Laboratory, only five manatee sightings have been recorded in the Maryland portion of Chesapeake Bay and its tributaries since 1992. Four of the sightings were made in the northern end of the bay, while the fifth and most recent sighting in September 2004 (NOAA Fisheries 2004a) occurred in the middle portion of the bay watershed in a tributary of the Potomac River. In summary, manatees are also infrequent and transient visitors to the bay.

3.9.4 Sea Turtles

All species of sea turtles are listed as threatened or endangered. As previously mentioned, species known to use the bay on a seasonal or transient basis include the loggerhead, Kemp's ridley, green, leatherback, and Atlantic hawksbill.

3.9.5 Other Species of Concern

Other Species of Concern - State-listed threatened or endangered species.

Other species of concern in the vicinity of the BIR that are listed as endangered by the State of Maryland include the peregrine falcon (*Falco peregrinus*), seaside knotweed (*Polygonum glaucum*), slender sea-purslane (*Sesuvium maritimum*), and swamp dock (*Rumex floridana*). The current protection status of each of these species is indicated in Table 3-8.

The peregrine falcon has been delisted federally as a recovering species; however, it is listed as endangered by the State of Maryland. The last known nesting of peregrines on the BIR occurred in 1997, when peregrines were observed nesting on a tower on Adam Island. In cooperation with the USFWS, this nest box was relocated to Spring Island in 1998 to discourage further nesting within the BIR. The peregrines have successfully nested in this new location, producing two young in 2000.

Seaside knotweed, slender sea-purslane, and swamp dock are listed as endangered by the State of Maryland. Seaside knotweed occurs along the western beaches of Bloodsworth, Pone, and Adam Islands. All sandy overwash areas of actively eroding sand beaches are considered potential habitat for this species. A

comprehensive survey for protected plant species was completed at the BIR from 2002-2003 (Smith 2004). During this survey, 78 seaside knotweed plants in 10 separate sites were observed on Bloodsworth and Pone Islands. Typical sites had fewer than six plants, though one site had 50 plants. An individual seaside knotweed plant was also found on Adams Island in 2003.

Slender sea-purslane is typically found on damp coastal sands, and swamp dock occurs in tidal freshwater swamps. During the 2002-2003 plant survey, each species was observed at only a single location on the BIR: slender sea-purslane was identified on the wetland edge of the overwash sands on the west shore of Pone Island, and swamp dock was observed on the western shore of Bloodsworth Island in the damp sands at the edge of the overwash zone.

3.10 Cultural Resources

Cultural Resources
Buildings, structures, sites, districts, and objects eligible for or listed in the National Register of Historic Places.

The National Historic Preservation Act of 1966 (P.L. 96-515), as amended (1980, 1992), and its implementing regulations (36 CFR 60, 63, and 800) established the policy of the Federal Government to protect significant cultural properties, including archaeological sites, historic structures, landscapes, and districts. The Navy completed a range-wide cultural resources survey in 1980 as part of an assessment of the ongoing effects of operations at the BIR (Maryland Historic Trust 1980). Additional cultural resource surveys have subsequently been completed at sites identified during the initial survey.

Human occupation of the islands comprising the BIR has been significantly influenced by the geomorphologic changes discussed in Section 3.5. These changes have affected the carrying capacity of the islands with regard to exploitable populations of wildlife.

While the environmental history of the islands suggests a rich potential for prehistoric resources, geomorphologic changes have eliminated or seriously disrupted a large portion of the landforms that may have contained these materials. It is expected that any prehistoric materials on the upland platform areas are currently beneath 1.5 to 3 feet of marsh, with the exception of a few remnant upland areas such as Fin Creek Ridge. Sites relating to exploitation of river or floodplain resources have been lost to inundation. Shell middens, which tend to be sited along the land/sea interface, have been destroyed and submerged as shoreline positions have changed.

Historic occupation of the islands began after initial flooding of the upland platform that existed between rivers and creeks within the ancient Susquehanna River drainage basin. Historic occupation would have been restricted to ridges or other high areas where drainage was sufficient to permit residences, farming, and transportation. However, the rising sea levels continued to reduce the size of these areas.

Table 3-9 summarizes the known cultural resources at the BIR. A discussion of the historic and prehistoric resources at the BIR is provided below.

Table 3-9 Cultural Resources at Bloodsworth Island Range

Site No.	Location	Type	Comments/ Recommendations	No Fire Area
18DO79	Bloodsworth Island	Bloodsworth family cemetery	Not individually eligible for the National Register of Historic Places but are contributing elements to an historic district.	In
18DO80	Bloodsworth Island	Late 19th to early 20th century domestic site.	Individually eligible and a contributing element to an historic district.	In
18DO81	Bloodsworth Island	Late 19th to early 20th century domestic site.	Individually eligible and a contributing element to an historic district.	In
18DO82	South Pone Island	Brick rubble	Not eligible	Out
18DO107	South Pone Island	No information	Not eligible	Out
18DO108	South Pone Island	No information	Not eligible	Out
18DO407	Bloodsworth Island	Scatter of historic and prehistoric artifacts.	Not evaluated for eligibility	In

Source: U.S. Navy 1980.

3.10.1 Historic Resources

The BIR archaeological survey completed in 1980 focused on two major areas most likely to contain resources -- uplands and shorelines. The survey methods and results are discussed in detail in the report entitled "*Cultural Resources Survey of U.S. Naval Reservation Bloodsworth Island, Dorchester County, Maryland"* (Maryland Historic Trust 1980).

The survey identified an historic cemetery (18DO79), one historic structure (18DO80), and eight artifact-find spots on Fin Creek Ridge in the northern part of Bloodsworth Island. Site 18D079 represents the Bloodsworth family cemetery, while Site 18DO80 is a late 19th to early 20th century domestic occupation also associated with the Bloodsworth family. One historic site (18DO81) and six artifact-find spots were identified on another upland, West Ridge, which is immediately west of Fin Creek Ridge. Site 18DO81 is also a domestic site of roughly the same time period as Site 18DO80. All three of these sites are within the No Fire Area. The shoreline survey resulted in the discovery of 37 historic artifact-find spots and one prehistoric artifact-find spot.

The survey included a reconnaissance of Pone Island, which resulted in the identification of sites 18DO107, 18DO108, 18DO82 and a scatter of historic artifacts (Find Spot X21-X30). Sites 18DO107 and 18DO108 had undergone severe disturbance; thus, no additional investigations were conducted at those

locations. Additional investigations were conducted at Site 18DO82 and Find Spot X21-X30. The investigators concluded that Site 18DO82 (a brick rubble pile) had been severely impacted by ordnance impacts and erosion. The investigators also concluded that the artifacts at Find Spot X21-X30 had been deposited by wave action and that intact archaeological deposits did not exist at that location.

The Maryland Historic Trust required the then-current owner, NAB Little Creek, to conduct a Phase II survey of Sites 18DO79, 18DO80, and 18DO81 identified along Fin Creek Ridge. The Phase II survey was completed by the Navy in 1999. The survey methods and results are provided in the report entitled *"Getting on with Living: History and Community of a Chesapeake Oystering Family, Phase II Investigation at Sites 18DO79, 18DO80, and 18DO81 Aboard the U.S. Naval Reservation, Bloodsworth Island, Dorchester County, Maryland* (Gray & Pape, Inc. 1999).

Phase II testing of the Bloodsworth family cemetery (18DO79) focused on delineating the site's boundaries and identifying unmarked burials. With respect to its significance, site types such as this cemetery are not ordinarily considered eligible for listing in the NRHP unless they meet special requirements (Potter and Boland 1992). Site 18DO79 was not determined to possess any of the required qualities necessary for NRHP listing.

Site 18DO80 contains archaeological deposits and cultural features associated with a dwelling, possible outbuildings and livestock areas, a refuse disposal, and possibly other components of the past cultural landscape. Residents of the site were involved in oyster tonging during the intensive exploitation of this resource beginning in the late 19th century. Based on the site's association with an historically significant event (the growth and transformation of Chesapeake Bay oyster industry) and because of its ability to convey this association, the site has been recommended as eligible for listing in the NRHP.

Site 18DO81 did not contain clear evidence of a dwelling, although the presence of a dwelling was suggested by a brick building pier and deposits of domestic artifacts. Additional features appear to represent a boat landing, a stock pond, a refuse disposal, and other elements of the past cultural landscape. Similar to Site 18DO80, this site appears to have the potential to provide insights into the adaptations and adjustments required of 19th-century families living on the bay and particularly the marginal circumstances of living on Bloodsworth Island. Therefore, the site has been recommended as eligible for listing in the NRHP.

Based on the findings of the Phase II archaeological survey, it was recommended that the three sites form an historic district that reflects domestic aspects of the 19th-century Chesapeake Bay oyster fishery. Site 18DO79, the cemetery, lacks archaeological and historical significance on its own, but it comprises a visible feature of the historic landscape associated with the other two sites and, therefore, is recommended as a contributing element to the proposed historic district. The

boundary of the proposed historic district encompasses the northern part of Bloodsworth Island and conforms to the bounds of the existing No Fire Area. The Maryland State Historic Preservation Office has concurred with the recommended historic district designation, although a formal designation of the northern part of Bloodsworth Island as an historic district has not yet been made (Lister 2003).

3.10.2 Prehistoric Resources

The 1980 archaeological survey resulted in the discovery of one prehistoric artifact-find spot in proximity to the shoreline, which was determined not to be significant. It is likely that additional prehistoric deposits have been washed away as erosion has increased and the beach line advances.

Site 18DO407 was an unexpected discovery that resulted from the Phase II archaeological investigation of sites 18DO79, 18DO80, and 18DO81. A cursory inspection of the beaches resulted in the identification of 83 prehistoric artifacts and 92 historic artifacts. Some of the prehistoric artifacts date to the Late Woodland Period. The historic materials were thought to be part of a domestic assemblage from the late 18th or early 19th century and the late 19th or early 20th century. No subsurface investigations were conducted in this area, and none of the artifacts were identified in situ. The site has therefore been designated as an unconfirmed site (Gray & Pape, Inc. 1999).

This site was not fully delineated, subsurface tested, or evaluated for its potential to be eligible for inclusion in NRHP. It is, however, within the boundaries of the proposed historic district and outside of the No Fire Zone.

3.11 Noise

The existing sound environment at the BIR is characterized by relatively extensive periods of natural noise generated by the numerous waterfowl and wading birds that seasonally inhabit the BIR and by the wave action in Chesapeake Bay.

Aircraft conducting subsonic and supersonic flight operations within the SUA and low-altitude, high-speed training flights along military training routes (MTRs) are the primary sources of transient aircraft noise in the vicinity of the BIR. MTRs are established by the FAA and DoD to ensure safety for both military and general aviation. Two MTRs in proximity to the BIR (VR1711 and VR1712) are available for scheduling by Andrews Air Force Base from 7:30 a.m. to sunset daily. Besides the Navy, other users of the MTRs are the U.S. Air Force and the Air National Guard.

Supersonic RDT&E flight operations above the BIR and its associated Surface Danger Zone must be conducted above 30,000 feet. This policy is in place to

minimize the impacts from supersonic operations. An average of 190 supersonic flights occur each year in the SUA. Only 15 percent (29) of those supersonic flights occur directly over the BIR and its associated Surface Danger Zone. The remaining 85 percent (161) are distributed throughout the remaining 1,800 square miles (approximate) of SUA. The noise impacts that result from RDT&E operations are described in the 1998 Patuxent River EIS. Other transient noise sources include commercial and recreational boats and small arms fire from hunting activities.

The Navy periodically conducts noise studies to assess the noise impacts of aircraft operations on the community. Noise exposure is typically evaluated using the day-night average sound level (DNL). The DNL averages aircraft sound levels at a given location over a 24-hour period, with a 10-decibel adjustment added to noise events that occur between 10p.m. and 7a.m. This 10-decibel "penalty" accounts for the increased intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically 10 dB lower than during daytime hours. In general, residential land uses are normally not compatible with outdoor DNLs above 65 dB; therefore, the best means of assessing noise impacts is to focus on the land area and population exposed to DNLs of 65 dB and higher.

Aircraft operations that occur along the low-altitude MTRs and Restricted Areas, like those of the CTR, generate a noise environment different from other community noise environments. Overflights can be highly sporadic, ranging from many (e.g., 10 per hour) to few (less than one per week). This situation differs from most community noise environments in which noise tends to be continuous or patterned.

Furthermore, individual military overflight events also differ from typical community noise events because of the high airspeed, sometimes low altitude, and the operating characteristics of military aircraft. Thus, a variation of the DNL called the onset-rate adjusted day-night sound level (Ldnmr) was developed to reflect these special characteristics and is based on the number of average daily operations in the month with the highest number of operations.

The Navy completed detailed noise modeling for operations within the Patuxent River Complex in 1998 (NAS Patuxent River 1998). Modeled noise levels in R-4002 overlying the BIR ranged from 45 to 50 Ldnmr, indicating that high noise levels from aircraft (i.e., >65 dB) do not generally occur in the vicinity of the BIR.

The highest noise levels in the Patuxent River Complex were identified as occurring in the vicinity of the water-based target areas, particularly Hooper, where noise levels were modeled as 50 Ldnmr or slightly above. The higher noise levels in these areas are mainly attributable to the lower altitude structure of operations that are conducted on the targets and the overlapping of all of the

individual airspace components within the CTR. Noise levels would also be greater on the east side of the SUA comprising the CTR, immediately east of the BIR, where the MTRs (VR 1711 and VR 1712) enter the BIR boundary. Other military aircraft operations using these MTRs to gain access to the Patuxent River Complex, in addition to flight operations in R-4006 and R-4008, would contribute to the increase in noise level in this area.

3.12 Air Quality

3.12.1 National Ambient Air Quality Standards

The Clean Air Act (CAA) of 1970, 42 U.S.C. 7401 *et seq.*, amended in 1977 and 1990, is the primary federal statute governing air pollution. The CAA designates six pollutants as criteria pollutants, for which National Ambient Air Quality Standards have been promulgated to protect public health and welfare. The six criteria pollutants are particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and ozone.

The ambient air quality standards include primary and secondary standards. The primary standards are established at levels to protect public health, with an adequate margin of safety. The secondary standards are established at more stringent levels in order to protect the public welfare. The Maryland Department of Environment (MDE) has adopted the EPA's NAAQSs without any exceptions. These standards are presented in Table 3-10.

Federal law requires states or local air quality control agencies to have a State Implementation Plan (SIP) that prescribes measures to eliminate or reduce the severity and number of violations of NAAQSs and to achieve expeditious attainment of these standards. Areas that meet the NAAQSs for a criteria pollutant are designated as being in "attainment." Areas where the criteria pollutant level exceeds the NAAQSs are designated as being in "nonattainment." Areas redesignated from nonattainment to attainment are commonly referred to as maintenance areas, indicating that the area is in attainment but subject to an EPA-approved maintenance plan for a specific pollutant.

The BIR is located in Dorchester County, Maryland, which is designated by the EPA as being in attainment for all criteria pollutants; therefore, existing air pollutant levels are considered to be in compliance with the NAAQSs.

3.12.2 The General Conformity Rule

The General Conformity Rule, which was been promulgated by EPA, ensures that the actions of federal agencies conform to the applicable SIP. Only federal actions that are located in nonattainment or maintenance areas for any of the criteria pollutants under the CAA are subject to the requirements of the General Conformity Rule. Since the BIR is located in an attainment area for all criteria

pollutants, a CAA conformity determination is not required for the proposed action.

Table 3-10 National and Maryland Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard	Secondary Standard ($\mu g/m^3$)
Respirable Particulate matter - 10 micron	24-hour maximum[b] Annual arithmetic mean	150 $\mu g/m^3$ 50 $\mu g/m^3$	150 50
Respirable Particulate matter - 2.5 micron[c]	24-hour maximum[b] Annual arithmetic mean	65 $\mu g/m^3$ 15 $\mu g/m^3$	15 65
Sulfur dioxide	24-hour maximum[a] 3-hour maximum[a] Annual arithmetic mean	365 $\mu g/m^3$ None 80 $\mu g/m^3$	None 1,300 None
Carbon monoxide	8-hour maximum[a] 1-hour maximum[a]	9 ppm 35 ppm	None None
Nitrogen dioxide	Annual arithmetic mean	100 $\mu g/m^3$	100
Lead	Quarterly Arithmetic mean[a]	1.5 $\mu g/m^3$	1.5
Ozone	1-hour maximum[b] 8-hour maximum[c]	0.12 ppm 0.08 ppm	0.12 ppm 0.08 ppm

Source: MDE 2003

[a] Not to be exceeded more than once per year.

[b] Not to be exceeded on more than an average of one day per year for a three-year period. The 1-hour ozone standard will be no longer applicable after June 2005.

[c] Not to be exceeded on more than an average of one day per year for a three-year period.

Key:
ppm = Parts per million.
$\mu g/m^3$ = Micrograms per cubic meter.

3.12.3 Existing Conditions

Since the BIR is located in a region that is in attainment for all criteria pollutants, air quality is considered good. Existing military flight operations do not result in significant ground-level air emissions at the BIR because the aircraft operations normally occur above an elevation of 3,000 feet. Any emissions above this elevation are dispersed and do not impact the region's air quality.

Ordnance Store - Any device intended for internal or external carriage and mounted on aircraft suspension and release equipment, whether or not the item is intended to be separated in flight from the aircraft. Examples of stores include missiles, rockets, bombs, mines, torpedoes, pyrotechnic devices, and detachable fuel tanks.

3.13 Ordnance, Hazardous Materials Management, Radio-Frequency Sources, and Directed Energy Systems

3.13.1 Ordnance Use and Hazardous Materials Management

As discussed in Chapter 1, surface forces and aircraft have historically delivered a variety of ordnance at the BIR, including gun ammunition, missiles, practice bombs, live explosives, decoys (chaff, flares, and jammers), and other items (fuel tanks and launchers). The principal type of military operation that would involve the release of ordnance stores at the BIR is weapons/stores separation testing.

Weapons/stores separation tests are conducted to assess the ability of a store to safely and reliably separate (be released) from an aircraft. Released stores have included fuel tanks, pods, and other miscellaneous systems hardware.

The use of explosive ordnance can result in the presence of certain compounds in the soils and shallow water sediments (e.g., TNT and its breakdown products, RDX, cyclo-1, 3, 5, 7-tetramethylene-2, 4, 6, 8-tetra-nitramine, tetryl, and picric acid). However, as mentioned previously in this chapter (Section 3.6.1), sampling at the BIR has not resulted in identification of these compounds in range soils or sediments.

3.13.1.1 Installation Restoration Program

On June 11, 1981, the Navy incorrectly submitted a Notification of Hazardous Waste Site (EPA Form 8900-1) for the BIR to the USEPA. This resulted in the USEPA classifying the BIR as a hazardous waste site and placing it on the Federal Agency Hazardous Waste Compliance Docket. In April 1988, the Navy conducted an environmental Preliminary Assessment (PA) study for the BIR, as required under the DoD's Installation Restoration Program, in compliance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act for former waste sites and Resource Conservation and Recovery Act (RCRA) for sites associated with ongoing operations. The PA noted that the BIR was an active shore and air bombardment range and stated "ordnance clearance operations are performed periodically to remove scrap metals and unexploded ordnance." The PA further noted that the Navy decontaminated all removed scrap metals of explosive residue prior to resale by the Defense Reutilization and Marketing Office. The PA also stated that the facility "has never been used as an ordnance burning ground or for testing chemical ordnance." Based on this information, the Navy concluded that no further action was required under the Installation Restoration Program. However, in October 1999, the USEPA formally requested that the Navy conduct a Site Investigation at BIR. In 2001, the Navy conducted an environmental conditions evaluation at the BIR and concluded that Navy activities at the BIR have not resulted in unacceptable risk to human health or environment. USEPA Region III concurred with this conclusion.

3.13.1.2 Military Munitions Rule

On February 12, 1997, the EPA published its *Final Military Munitions Rule* at 40 CFR Parts 260-266, 270 in the *Federal Register*. These rules were developed as required by Section 107 of the Federal Facility Compliance Act of 1992, which added subsection 3004(y) to the RCRA (42 USC Section 6924[y]). The rules identify when conventional and chemical military munitions become a hazardous waste under RCRA and provide for the safe storage and transport of such waste. As stated in 40 CFR 266.202, when military munitions are used for their intended purpose, they are not considered a solid waste for regulatory purposes, even if the intended purpose results in the deposit of munitions on land. Furthermore, 40 CFR 266.202(a)(1)(I) clarifies that military munitions used in the training of

military personnel constitutes normal use of the product, rather than waste disposal. As these regulations are applied to range operations conducted at the BIR, ordnance and stores deposited within the boundaries of the BIR are not considered solid waste unless removed and transported off-range for disposal.

3.13.2 Radio-Frequency Sources

Manmade sources of RF energy are generally intended to make use of the electromagnetic environment for communications, radar, lighting, etc. There are no manmade sources of RF energy currently on the BIR.

3.13.3 Directed Energy Systems

Directed Energy Systems - A weapons system using advanced lasers, particle beams, plasma beams, or microwave beams, all of which travel at the speed of light.

Range operations involving the use of directed energy systems, which include lasers, are currently conducted at the BIR. The targets at the BIR used with such systems have been approved by the NAVAIR Range Department in accordance with applicable Navy regulations to ensure that safety requirements are met for all operational events and exercises for the protection of military personnel and the public.

3.14 Transportation

No roadways are located on the BIR or within the Surface Danger Zone. Access to the BIR is possible only by boat or helicopter. The main shipping channel of Chesapeake Bay follows the drowned river valley of the ancient Susquehanna River through the center of the bay. Millions of tons of cargo pass through this channel each year en route to major ports such as Baltimore and Norfolk. The shipping channel is located about 3 miles west of the western boundary of the BIR's Surface Danger Zone.

State Route 363, which begins on the south end of Deal Island near Wenona, and Bishops Head Road on Bishops Head are the primary roadways providing access to the Eastern Shore communities closest to the BIR.

4 Environmental Consequences

This chapter describes the potential environmental impacts that may result from conducting range operations at the BIR. A useful synonym for the term "impact" is "effect." In other words, an analysis of the environmental impacts of an action identifies the "effects" that the action would have upon the various components of the environment. In this chapter, an analysis of effects was conducted for three alternatives; however, it should be noted that **the No-Action Alternative is the Navy's preferred alternative and would maintain the current operational environment at the BIR:**

The No-Action Alternative means *no change* in operational status of the BIR.

- **Alternative 1 (No-Action Alternative/Preferred Alternative)** - The No-Action Alternative would allow the Navy to continue to conduct aviation-related RDT&E activities that use the Special Use Airspace that overlies the BIR. In addition, the Navy's voluntary suspension of all ordnance expenditures on the BIR (Bloodsworth Island and Pone Island) would be maintained. **Thus, NO impact operations are proposed for the BIR's surface impact area**. This alternative would also provide for existing target maintenance, which includes replacement and/or relocation of targets on the BIR and continued management of the range's natural resources. In summary, the No-Action Alternative means ***NO*** change in the current operational status of the BIR.

- **Alternative 2 (BIR Surface Danger Zone Clearance for up to 800 Hours Per Year)** - The BIR would be available for 12 months per year. However, range operations requiring the clearance of the BIR's Surface Danger Zone would be allowed for up to 800 hours per year. This level of usage is projected on the basis of historic use and likely future use. Although the Surface Danger Zone could be closed to non-test participants for up to 800 hours annually, this does not mean that the maximum level of usage would occur each year. Historically, the use of the BIR has been highly variable, which is a direct result of the number and status of the Navy's aircraft RDT&E programs coupled with the need for operating in an estuarine/littoral environment. In general, operational workloads are heaviest when RDT&E requirements for aircraft platforms are needed and during times of international conflict.

- **Alternative 3 (BIR Surface Danger Zone Clearance for up to 1,200 Hours Per Year)** - The BIR would be available for 12 months per year. However, those range operations requiring the clearance of the BIR's Surface Danger Zone would be allowed for up to 1,200 hours per year. As with Alternative 2, the need to close the Surface Danger Zone for up to 1,200 hours per year would depend on the number and status of the Navy's aircraft RDT&E programs during any one year.

In general, the impacts resulting from Alternatives 2 and 3 are very similar and are therefore not discussed separately. The impacts of Alternative 1 (No Action Alternative/Preferred Alternative) are examined at the beginning of each resource section and the analysis of Alternatives 2 and 3 follows.

4.1 Land Use and Coastal Zone Management

4.1.1 Land Use

4.1.1.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, there would be no change in the type and tempo of existing range operations conducted at the BIR. These currently involve overflights of the BIR in existing SUA and target maintenance, which includes the replacement and/or relocation of targets on the BIR. Impact operations are not conducted.

The targets currently at the BIR consist of billboard-type signs, radar reflectors, simulated weapons platforms (e.g., full-size molded plastic tanks), discarded military and civilian vehicles (after removal of oil and gas), and other equipment. These targets are located on the island's surface. The No-Action Alternative would provide for existing target maintenance, which includes replacement and/or relocation of targets on the BIR to meet specific RDT&E requirements. The existence of targets on the BIR allows aircrews to learn how to sight and recognize ground-based threats. The continued existence of targets on the BIR would be consistent with its designation as a Navy range. In addition, the Navy would continue to manage the natural and cultural resources found on the BIR, including maintenance of the established heron rookery and platforms. Consequently, implementation of the No-Action Alternative would result in no direct or indirect impacts on land use at the BIR or in Eastern Shore communities.

4.1.1.2 Alternatives 2 and 3

The BIR has been used as a military training range since 1942. Since the voluntary closure of the BIR to impact operations in 1996, the Navy has continued to use the BIR as a visual target (for non-impact operations) for RDT&E operations by NAWCAD and by the U.S. Navy Test Pilot School. Unauthorized civilian access to the BIR has continued to be prohibited. At the same time, the Navy has maintained the No Fire Area at the northern end of Bloodsworth Island to protect the existing heron rookeries. Initiating nonexplosive impact operations and other range operations under Alternatives 2 or 3 would be consistent with previous and existing military land uses occurring at the BIR. The No Fire Area would continue to be maintained.

Alternatives 2 and 3 would have no direct effect on land use patterns on Maryland's Eastern Shore in the vicinity of the BIR. Residential uses are located more than 4 miles from the impact areas on the BIR. The visual setting of the Bloodsworth Island archipelago would remain essentially the same as it is now. Indirect impacts, specifically noise impacts (see Section 4.11), would not significantly increase under either alternative in the developed areas closest to the BIR (i.e., Deal Island and Bishops Head). Therefore, there would be no significant impacts on existing land uses or future land use development patterns at or in the vicinity of the BIR.

4.1.2 Coastal Zone Management

4.1.2.1 No-Action Alternative (Preferred Alternative)

Compliance with relevant state and federal regulatory programs constitutes federal consistency with the enforceable policies of the Maryland Coastal Zone Management Program (CZMP). A total of 14 permits/approvals comprise the Maryland CZMP enforceable policies (see Table 4-1).

Under the No-Action Alternative, activities affecting the land area on the BIR would be limited to the occasional target maintenance, which includes replacement and/or relocation of targets on the BIR and activities associated with the management of the natural and cultural resources found on the BIR. Target maintenance, which includes replacement and/or relocation of targets on the BIR to meet specific RDT&E requirements, would be infrequent and environmentally benign such that there would be no effect on the coastal zone. The use of targets provides realism in sensor testing; no ordnance would be delivered at the target. Activities conducted for the management of the BIR's natural and cultural resources would be environmentally beneficial. Consequently, the Navy has made a negative determination that the No-Action Alternative would have no effect on the coastal uses or resources of the State of Maryland. Copies of the February 2005 Draft EA containing the Navy's negative determination in Appendix A, were sent to the Maryland State Clearinghouse for distribution to the appropriate state agencies. The Federal Consistency Coordinator at the MDE has concurred with this negative determination. A copy of the letter to the Maryland State Clearinghouse, Navy's negative determination and the correspondence from MDE is included in Appendix A.

Table 4-1 Enforceable Policies of the Maryland CZMP, No-Action Alternative

Permit/Approval	Circumstance	Applicability to Project
Air Quality Permit	Proposal to construct and operate an activity that discharges emissions to the outside air.	Not Applicable
Aquaculture Permit	Proposal to engage in aquaculture or related activities.	Not Applicable
Chesapeake and Atlantic Coastal Bays Critical Area Approval	Proposal to conduct various activities within the Chesapeake and Atlantic Coastal Bays Critical Area.	Not Applicable
Controlled Hazardous Substances Facility Permit	Proposal to treat, store, or dispose of hazardous waste.	Not Applicable
Erosion and Sediment Control and Stormwater Management Plan	Proposal by state or federal agencies for construction that disturbs 5,000 square feet or more of land or results in 100 cubic yards or more of earth movement.	Not Applicable
Nontidal Wetlands and Waterways Permit	Proposal for work in a nontidal stream, 100-year floodplain, or nontidal wetland, including a 25-foot buffer.	Not Applicable
Oil and Gas Exploration and Production	Proposal to drill and operate a gas or oil well.	Not Applicable
Oil Operations Permit	Proposal to store more than 10,000 gallons of oil in aboveground tanks, transport oil, or operate oil transfer facilities.	Not Applicable
Refuse Disposal Permit	Proposal to install, alter, or extend a refuse disposal system.	Not Applicable
Tidal Wetlands License or Permit	Proposal for any work that may change a tidal wetland.	Not Applicable
Water Appropriation and Use Permit	Proposal to appropriate or use any of the state's surface and/or underground waters.	Not Applicable
Water Quality Certification	Proposal to place fill or discharge pollutants in waters of the U.S. (including adjacent wetlands).	Not Applicable
Water Discharge Permit	Proposal to dispose of wastewater into the state's groundwater or surface waters.	Not Applicable
Wetlands Mitigation Plan	Accompanies Tidal Wetlands Permit.	Not Applicable

Source: MDNR 2004b.

4.1.2.2 Alternatives 2 and 3

Five of the 14 permit/approvals comprising the Maryland CZMP enforceable policies pertain to the range operations proposed under Alternatives 2 and 3 (see Table 4-2). These enforceable policies concern the Chesapeake and Atlantic Coastal Bays Critical Areas, Air Quality, Tidal Wetlands, Water Quality Certification, and Wetlands Mitigation.

- **Air Quality.** Implementation of either Alternative 2 or Alternative 3 would result in some air emissions from aircraft and watercraft operations, weapons firing, and the construction of range infrastructure. However, the Navy has determined that all emissions would be well below the *de minimis* thresholds established under the CAA General Conformity Rule. Therefore, the proposed action would have no significant impacts on local

or regional air quality (a complete discussion of air quality impacts is provided in Section 4.12). Therefore, Alternatives 2 and 3 would be consistent with Maryland's air pollution control policy.

- **Chesapeake and Atlantic Coastal Bays Critical Areas.** According to the Critical Areas Act, all land within 1,000 feet of tidal waters or adjacent tidal wetlands are considered Critical Areas. Habitats of threatened and endangered species and species in need of conservation are designated as Habitat Protection Areas (HPA) under the act. The heron rookery on the northern end of Bloodsworth Island is considered an HPA. Implementation of either Alternative 2 or Alternative 3 could involve the construction of some permanent infrastructure within this HPA. In addition, some range operations would be conducted on portions of the island; however, no range operations would be conducted in the No Fire Zone. The effect of installing new infrastructure on existing vegetation and conducting range operations on the BIR could result in less than 0.2 acre of new semi-impervious surfaces in the Critical Area. Impacts on the heron rookery will be avoided by continued enforcement of the No Fire Area in the northern end of Bloodsworth Island. Consequently, the proposed action would be consistent with the requirements of Maryland's Critical Areas Act.

- **Tidal Wetlands.** Implementation of either Alternative 2 or Alternative 3 could include construction of infrastructure that would convert a total of approximately 0.6 acre of tidal marsh to semi-impervious surface. Accordingly, the Navy will obtain a Section 404 permit from the USACE prior to completing this work. Completion of the USACE permitting process will represent compliance with the tidal wetlands enforceable policy of the Maryland CZMP (a complete discussion of impacts on tidal wetlands is provided in Section 4.7).

- **Water Quality Certification.** A Section 401 Water Quality Certification from the MDE for impacts on tidal wetlands concurrent with the federal Section 404 permitting process described above would be required. Upon obtaining the permit, the proposed action would be consistent with the water quality certification enforceable policy of the Maryland CZMP.

- **Wetlands Mitigation.** Wetlands mitigation may be required for the conversion of 0.6 acre of tidal marsh to semi-impervious surface. The exact mitigation measures (e.g., wetlands enhancement, replacement) would be determined through the USACE and MDE wetlands permitting processes. Completion of the agency permitting processes will represent consistency with the wetlands mitigation enforceable policy of the Maryland CZMP (a complete discussion of impacts on tidal wetlands is provided in section 4.7).

Table 4-2 Enforceable Policies of the Maryland CZMP, Alternatives 2 and 3

Permit/Approval	Circumstance	Applicability to Project
Air Quality Permit	Proposal to construct and operate an activity that discharges emissions to the outside air	Consistent
Aquaculture Permit	Proposal to engage in aquaculture or related activities	Not Applicable
Chesapeake and Atlantic Coastal Bays Critical Area Approval	Proposal to conduct various activities within the Chesapeake and Atlantic Coastal Bays Critical Area	Consistent
Controlled Hazardous Substances Facility Permit	Proposal to treat, store, or dispose of hazardous waste	Not Applicable
Erosion and Sediment Control and Stormwater Management Plan	Proposal by a state or federal agency for construction that disturbs 5,000 square feet or more of land or results in 100 cubic yards or more of earth movement	Not Applicable
Nontidal Wetlands and Waterways Permit	Proposal for work in a nontidal stream, 100-year floodplain, or nontidal wetland, including a 25-foot buffer	Not Applicable
Oil and Gas Exploration and Production	Proposal to drill and operate a gas or oil well	Not Applicable
Oil Operations Permit	Proposal to store more than 10,000 gallons of oil in aboveground tanks, transport oil, or operate oil transfer facilities	Not Applicable
Refuse Disposal Permit	Proposal to install, alter, or extend a refuse disposal system	Not Applicable
Tidal Wetlands License or Permit	Proposal for any work that may change a tidal wetland	Consistent
Water Appropriation and Use Permit	Proposal to appropriate or use any of the State's surface and/or underground waters	Not Applicable
Water Quality Certification	Proposal to place fill or discharge pollutants in waters of the U.S. (including adjacent wetlands)	Consistent
Water Discharge Permit	Proposal to dispose of wastewater into the state's groundwater or surface waters	Not Applicable
Wetlands Mitigation Plan	Accompanies Tidal Wetlands Permit	Consistent

Source: MDNR 2004b.

The Navy has determined that the proposed action would be undertaken in a manner consistent to the maximum extent practicable with the applicable, enforceable policies of the Maryland CZMP. The Navy's negative determination is included in Appendix A.

4.2 Range Operations and Safety

4.2.1 Airspace

4.2.1.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, the airspace overlying the BIR would continue to be used for aircraft RDT&E flight test operations, which is consistent with the use of SUA. Therefore, the No-Action Alternative would have no effect on airspace use.

4.2.1.2 Alternatives 2 and 3

As discussed in Section 3.2.1, the BIR is fully contained within the Patuxent River Complex, an existing military range and is directly overlain by restricted SUA (R-4002). As is currently the case, the NAVAIR Range Department will control and schedule all range operations conducted on the BIR in accordance with applicable mission planning policies, and current air control and other operating procedures (including range clearance) to ensure that Navy-authorized users of the airspaces operate safely and separately from nonparticipating military and civilian aircraft. Therefore, implementation of either Alternative 2 or 3 would involve no changes to the existing operational safety procedures within the SUA comprising the Patuxent River Complex.

Implementation of either Alternative 2 or 3 would result in an increase in the annual number of operations conducted within the Patuxent River Complex and R-4002 when compared to existing conditions; however, this increased use of existing SUA would be within the type and tempo of usage identified and anticipated in the Patuxent River Complex EIS (U.S. Navy December 1998). Consequently, the proposed increase in airspace usage within R-4002 and other existing SUA would not interfere with other users of that airspace and have no significant impacts.

4.2.2 Danger Zones and Prohibited Areas

4.2.2.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, there would be no change to the existing range operations conducted at the BIR. Authorized Explosive Ordnance Detail (EOD) and target maintenance personnel would continue having access to the BIR to maintain targets, which includes replacement and/or relocation of targets on the BIR. Consequently, implementation of the No-Action Alternative would maintain the currently designated Surface Danger Zone and Prohibited Area that exists at the BIR as identified in 33 CFR 334.190. There would also be no changes to the Surface Prohibited Areas and No Navigation Zone designated by the Commanding Officer at NAS Patuxent River. The No Fire Zone would also be maintained.

4.2.2.2 Alternatives 2 and 3

Similar to the No-Action Alternative, the existing Surface Danger Zone, Prohibited Area, Surface Prohibited Area, No Navigation Zone, and No Fire Area on the northern end of Bloodsworth Island would continue to be maintained as part of the proposed operations under Alternative 2 and Alternative 3. Adam Island, which has not been used as an impact area, could be used to support special warfare training exercises involving small arms; however, no air-to-ground ordnance delivery would be permitted on Adam Island. The northern end

of Bloodsworth Island would continue to be a No Fire Area under Alternatives 2 and 3. Implementation of Alternatives 2 and 3 would not impact the existing designated Surface Danger Zone, Prohibited Area, Surface Prohibited Area, or No Navigation Zone.

4.2.3 Range Safety

4.2.3.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, aircraft operations and flight safety in the Patuxent River Complex would continue to be accomplished through rigorous test planning, preparation, and adherence to air traffic control instruction. In addition, under the No-Action Alternative, the same safety measures used to prevent unauthorized access to the BIR, as described in Section 3.2.3, would continue to be enforced. Target maintenance personnel would access the BIR to maintain targets. These activities could require clearance of any UXO prior to the target maintenance team arriving at a target site on the island surface. There would be no impacts to range safety from these activities.

4.2.3.2 Alternatives 2 and 3

Under Alternatives 2 and 3, safety measures used to prevent unauthorized access on the BIR as described in Section 3.2.3 would continue to be enforced. The following safety procedures would also be implemented by the NAVAIR Range Department to ensure public health and safety when range operations are conducted under either Alternative 2 or Alternative 3. Adherence to these safety procedures would ensure safe range conditions.

4.2.3.2.1 Fixed- and Rotary-Wing Operations and Nonexplosive Air-to-Ground Ordnance Delivery

The same flight safety requirements identified for the No-Action Alternative apply to any fixed- or rotary-wing operations conducted in the BIR under both Alternatives 2 and 3. In addition, fixed- and rotary-wing aircraft flying over the BIR will maintain a 3,000-foot minimum altitude restriction as cited in OPNAVINST 3710.7T and NASPAXRIVRINST 3710.5T from November 15 to March 15 in order to minimize noise impacts to waterfowl and to avoid bird/aircraft strike hazards. On rare occasions, test projects may require a waiver from the 3000-foot restriction in order to meet specific program objectives or to provide range clearance. When this occurs, aviation safety and natural resources specialists, who work together to develop mitigation measures to ensure flight safety and to minimize impacts to waterfowl, review project requirements. The Aviation Safety Officer must approve all requests for waivers, which is only done after careful consideration of flight safety and BASH impacts.

With the exception of the proposed range operations that would involve the use of precision-guided munitions, all nonexplosive ordnance to be employed in

conjunction with air-to-ground ordnance deliveries would occur within R-4002 and be contained within the existing Surface Danger Zone. The Surface Danger Zone would be cleared approximately one hour before each scheduled use. The specific procedures that would be used to clear the Surface Danger Zone could vary depending on the type of operation and the season of the year, but would generally include visual sweeps of the area using one or more surface craft and chase aircraft and/or radar surveillance.

Recreational boaters, fishermen, or watermen could be requested to exit the Surface Danger Zone via radio transmission, written signs, hand signals, or other appropriate methods. If appropriate, helicopters equipped with loudspeakers would be used. Should an individual refuse to leave the area, the NAVAIR Range Department would coordinate with local law enforcement personnel or the U.S. Coast Guard to escort the individual out of the area.

As an additional safety measure, prior to the release of any nonexplosive ordnance, the pilot would be required to fly over a target to perform a visual check to verify that the targets were clear. In addition, all involved parties (range clearance boats, Range Computation and Control System engineers, Air Operations control tower staff, and other range safety personnel) would be continuously linked by voice radio system to ensure coordinated and controlled testing.

As noted in Table 2-3, a small percentage of the proposed nonexplosive air-to-ground ordnance delivery operations could be conducted at night. When these occur, the Surface Danger Zone would be cleared using radar surveillance and dispatching a range clearance boat to the Surface Danger Zone to verify clearance. As a further safety measure, aircraft conducting night operations could, when possible, be equipped with night vision equipment that could be used to determine that the range is clear prior to releasing a weapon. The area surveillance system (radar, infrared, electro-optical) proposed for installation at Bishops Head and in the Bloodsworth Island No Fire Zone would enhance security and safety during range operations conducted by day or night at the BIR.

As described in Section 2.3, the Navy proposes to release nonexplosive precision-guided munitions from within the existing SUA of the Patuxent River Complex at various points between 1 and 15 miles south of the BIR. The entire line of fire would be cleared during such operations in accordance with the procedures identified above. Figures 4-1 and 4-2 provide example range hazard footprints for release of both a JDAM and hellfire missile at the BIR. The entire range hazard footprint would be cleared before operations were conducted.

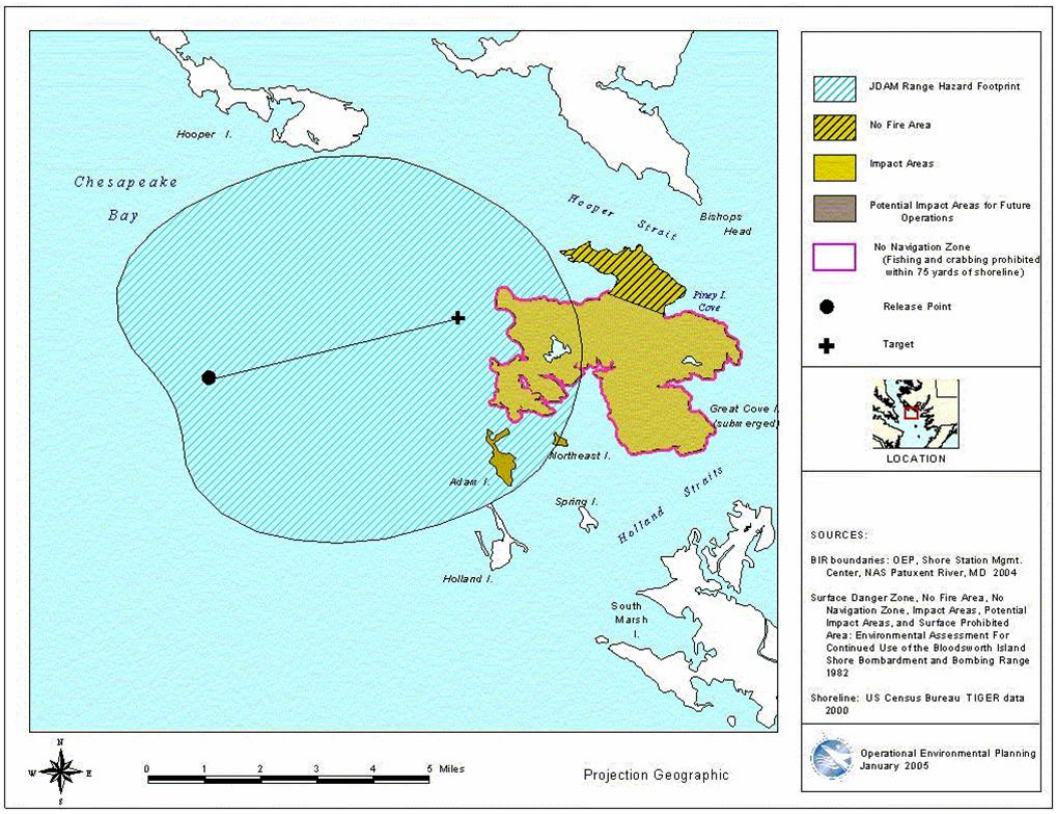

Figure 4-1 Example JDAM Range Hazard Footprint

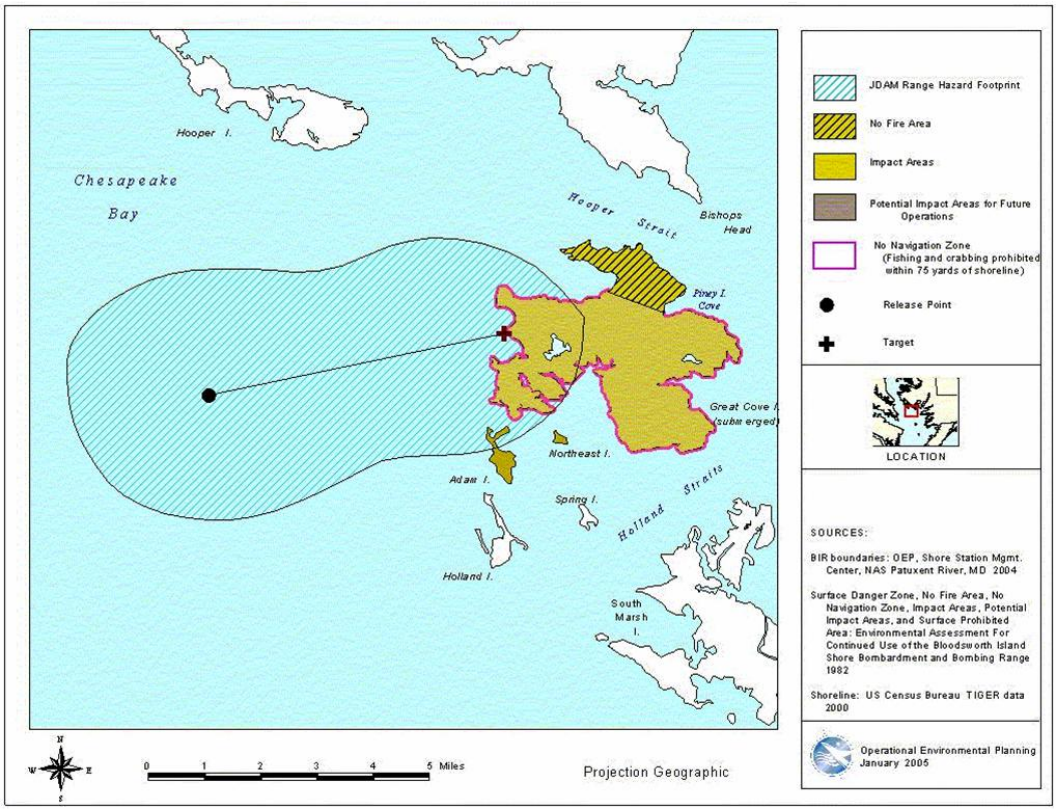

Figure 4-2 Example Hellfire Missile Range Hazard Footprint

4.2.3.2.2 Small Boat and Amphibious Assault Craft and Special Warfare Operations

The discharge of small arms fire associated with these proposed range operations would be deployed in a manner that would ensure all ordnance fired is contained within the existing Surface Danger Zone and south of the No Fire Area on Bloodsworth Island. The projectiles with the greatest maximum ranges would be .50cal (4.8 miles) and 25mm cannon (4.5 miles). The Surface Danger Zone is of sufficient size (roughly 11.5 miles long by 5.5 miles wide) to contain all small arms training activities within its boundaries.

The Navy would identify approved operating procedures for the proposed range operations to ensure that all discharged nonexplosive ordnance is contained within the Surface Danger Zone. These procedures would include a definition of the geographic box in which the operating combatant vessels or aircraft could safely fire, as well as the allowed bearings for firing.

The Officer Conducting the Exercise (OCE) would supervise all training involving Naval Special Warfare combatant vessels and other watercraft participating in small arms fire. The OCE would be aboard the craft and would ensure that the vessels are operating in the correct area. If the vessels approach the edge of the firing zone, they will be directed to ceasefire. Either a geographic positioning system or visual markers on shore would be used to define the firing zone.

Safety procedures used to ensure that the Surface Danger Zone is cleared of boats would be similar to those discussed above for the nonexplosive air-to-ground exercises (e.g., visual/radar surveillance). During the exercises, safety boats would continue to patrol the Surface Danger Zone to visually inspect for boats in the area and monitor radar. Operations would be immediately suspended if a boat entered the Surface Danger Zone.

4.2.4 Bird Aircraft Strike Hazard

The potential risk for BASH is assessed as a function of flight hours flown in a given airspace as well as the population and distribution of waterfowl and raptors that may be present annually and seasonally in the same area. The following factors were considered in evaluating the BASH risk associated with range operations at the BIR:

- Large populations of migratory waterfowl are present at BIR from roughly November 15 to March 15.

- According to data provided by the United States Air Force (USAF) Aviation Safety Division, for wildlife mishaps where altitude is known, 97 percent occur at or below an altitude of 3,000 feet AGL

- Mishaps related to wintering waterfowl are most likely to occur at altitudes below 1,000 feet AGL (United States Marine Corps (USMC) 2001) because waterfowl moving between roosting and feeding areas generally fly at altitudes below 1,000 feet AGL (Lowell 1997; Ebbinge and Buurma 2000).

- Fixed-wing aircraft are more susceptible to bird-aircraft strikes than rotary-wing aircraft due to their higher flight speeds and the associated reduced maneuverability.

4.2.4.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, range operations involving aircraft overflights of the BIR would adhere to the BASH program in effect for the Patuxent River Complex, including altitude restrictions. As a result, there would be no change with respect to aviation safety risks from potential BASH incidents.

4.2.4.2 Alternatives 2 and 3

With implementation of Alternative 2 or 3, and based on the factors identified above, the aviation safety risks posed by BASH at the BIR for all range operations involving high altitude operations (i.e., altitudes > 3,500 feet AGL) for fixed- and rotary-wing aircraft could be low, regardless of the season. Aircraft operations at low altitudes (i.e., < 3,500 feet AGL) would be subject to the protective measures identified in Table 2-2 as well as the restrictions identified in OPNAVINST 3710.7T and NASPAXRIVINST 3710.5T. These instructions prohibit overflights of areas where waterfowl seasonally congregate, such as the BIR, at altitudes less than 3,000 feet. On rare occasions, test projects require a waiver from the 3,000 foot restriction in order to meet specific program objectives or to provide range clearance. When this occurs, aviation safety and natural resources specialists, who work together to develop mitigation measures to ensure flight safety and to minimize impacts to waterfowl, review project requirements. The Aviation Safety Officer must approve all requests for waiver, which is only done after careful consideration of flight safety and BASH impacts. As a result, implementation of Alternatives 2 or 3 would not result in significant BASH impacts.

4.3 Open Space and Recreation

4.3.1 Open Space and Recreation in the Vicinity of the BIR

4.3.1.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, public access restrictions (No Navigation Zone and No Trespassing Zones) for the BIR would remain in effect. In addition, waterfowl hunting would continue as currently permitted and described in

Chapter 3. For safety reasons, hunters are obligated by the terms of their signed hunting permit to adhere to the directions given to them by Navy personnel at all times and in a timely manner. Therefore, implementation of the No-Action Alternative would have no significant impacts on recreational activities conducted in proximity to the BIR.

4.3.1.2 Alternatives 2 and 3

Under Alternatives 2 and 3, public use of the BIR for waterfowl hunting would continue to be allowed on a permitted basis during Maryland's waterfowl hunting season, which occurs for a total of 127 days from September 1 to February 15 (this estimate excludes Sundays when no waterfowl hunting may occur). Since military use of the BIR would increase under Alternatives 2 and 3, the amount of time that the BIR would be available for permitted hunting use would decrease under both alternatives. Table 4-3 shows the impact of range operations on the percentage of daylight hours available for hunting.

Table 4-3 Maximum Weekly Restrictions to Waterfowl Hunting for Alternatives 2 and 3

Alternative	Average Hours Surface Danger Zone Cleared Per Week[a]			percent Weekly Daylight Hours Hunting Restricted[b]
	Day	Night	Total	
No Action	*	*	*	*
Alternative 2	14.3	2	16.3	23
Alternative 3	21.3	3	24.3	39

[a] Estimated based on clearance of Surface Danger Zone for 4 hours per test or training event.

[b] Waterfowl hunting season occurs during daylight hours for about 127 days (Monday through Saturday) from September to February. During a typical hunting season, an average of 63 daylight hours are available per week for waterfowl hunting.

* Some non-impact test events may require clearance of the Surface Danger Zone, but timing is not predictable.

If the maximum number of operations was completed under Alternative 2, hunting on the BIR could be restricted for about 23 percent of the available daylight hours per week; if the maximum number of operations was completed under Alternative 3, hunting on the BIR could be restricted for 39 percent of the available daylight hours per week or approximately 4 hours per day during the hunting season. Since most operations would be conducted during the weekdays, Monday through Friday, restrictions to waterfowl hunting on the weekends would be far less. Additionally, because only 10 stake sites are available for hunting at the BIR and because many areas within the bay are available for hunting, closures on this scale would not significantly impact recreational hunting activities that could be conducted in the vicinity of the BIR.

At the same time, it is also important to recognize that closure of the Surface Danger Zone for up to 800 or 1,200 hours annually does not necessarily mean that the maximum level of usage could occur each year. As previously mentioned, annual historic use of the BIR and its overlying restricted airspace has been highly

variable, a direct result of the number and status of the RDT&E programs being undertaken by NAWCAD and the Navy's need for operating in an estuarine/littoral environment. Operational workloads are heaviest when needed to meet RDT&E requirements for aircraft platforms and at times of international conflict.

4.3.2 Federal and State Open Space and Recreational Resources

4.3.2.1 No-Action Alternative (Preferred Alternative)

With respect to impacts on NWRs and state WMAs, existing range operations under the No-Action Alternative would continue to involve overflights of the BIR. As a result, there would be no change to the existing type or tempo of activities conducted at the BIR. The maintenance of targets would not affect existing federal NWRs or state WMAs. Consequently, implementation of the No-Action Alternative would result in no direct or indirect impacts on federal or state open-space resources located in proximity to the BIR.

4.3.2.2 Alternatives 2 and 3

As discussed in Section 3.3, various NWRs and state WMAs are located in the vicinity of the BIR. The open-space resource nearest to the BIR is the South Marsh Island WMA, which is approximately 0.3 miles to the south of the BIR Surface Danger Zone across Hooper Strait (or 3 miles south of the Bloodsworth Island impact area). None of the NWRs or WMAs is within the BIR Surface Danger Zone. In addition, as shown on Figure 2-2, flight patterns associated with range operations proposed for the BIR would not occur directly over any WMA or NWR. Furthermore, the discharge of small arms fire would be oriented to ensure that none of the nonexplosive ordnance falls outside the Surface Danger Area. Therefore, there would be no significant direct impacts on federal and state open space resources due to the range operations proposed for the BIR under Alternatives 2 or 3.

However, aircraft transiting to the BIR may fly over the NWRs and state WMAs. This is because each of the NWRs and WMAs in proximity to the BIR are located under Patuxent River Complex restricted airspace R-4006. The authorized floor of R-4006 is 3,500 feet MSL. Therefore, aircraft flights within R-4006 would be permitted to fly no lower than 3,500 feet MSL. This is 1,500 feet greater than the 2,000-foot minimum advised by an FAA interagency agreement with the U.S. Department of the Interior (FAA Advisory Circular 91-36C) concerning overflights of noise-sensitive areas, like NWRs and 500 feet greater than the 3,000 foot minimum altitude cited in OPNAVINST 3710.7T and NASPAXRIVRINST 3710.5T.The 3,500-foot altitude minimum associated with R-4006 would protect the NWRs and WMAs from annoyance and other disturbances associated with low-level aircraft overflights. Consequently, there would be no significant impacts on these open-space resources due to aircraft

overflights when conducting range operations at the BIR under Alternatives 2 and 3.

As discussed in Section 3.3.1, the NPS is considering making Chesapeake Bay Gateway Network a permanent program of the NPS. All of the existing 140 parks, refuges, museums, and historic sites that comprise Chesapeake Bay Gateway Network are more than 10 miles away from the BIR. Therefore, the range operations proposed for the BIR under Alternatives 2 and 3 would have no effect on resources being considered for integration into the NPS.

4.4 Socioeconomics

4.4.1 Population and Employment

4.4.1.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, existing range operations would be conducted with existing personnel. Therefore, the No-Action Alternative would involve no change to local or regional population and employment and would have no socioeconomic impact.

4.4.1.2 Alternatives 2 and 3

Similar to the No-Action Alternative, implementation of Alternative 2 or 3 would be accomplished with current personnel and not require any increase or relocation of personnel to the vicinity of BIR. Therefore, the increased operations proposed under Alternatives 2 and 3 would involve no change to local or regional population and employment and have no socioeconomic impact.

4.4.2 Environmental Justice

4.4.2.1 Alternatives 1, 2 and 3

The BIR is uninhabited and the Eastern Shore communities within 4 to 5 miles of the BIR are largely rural and sparsely populated. Potential environmental justice impacts have been evaluated by analyzing ethnicity, poverty status, and demographic data for the census tracts adjacent to and encompassing the BIR that could potentially be affected by noise from proposed range operations conducted at the BIR.

As indicated in section 3.4.2, minority populations comprise a small percentage of the total population in these census tracts. In addition, the percentage of the population aged 17 years or younger in these census tracts is comparable to the respective Dorchester and Somerset County levels and percentages. However, while the percentage of individuals below poverty level in Dorchester Census Tract 9709 is comparable to the corresponding county percentage, the percentage

of individuals below the poverty level in Somerset County Census Tract 9802 is higher than the corresponding county percentage. However, Somerset County residents are more than 2.4 miles from the BIR Surface Danger Zone and would not be subject to any discernable physical environmental impacts. Based on this analysis, there are no discernible populations of minority or low-income individuals in proximity to the BIR that could potentially be exposed to impacts, particularly noise, associated with the proposed range operations. Consequently, implementation of any of the alternatives under consideration -- the No-Action Alternative (Alternative 1) and Alternatives 2 and 3 -- would not have disproportionately high or adverse health or environmental effects on minority or low-income populations pursuant to Executive Order 12898, nor would they pose disproportionate environmental health or safety risks to children pursuant to Executive Order 13045.

4.4.3 Commercial Fishing

4.4.3.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, the Surface Danger Zone surrounding the BIR would rarely be cleared of watermen. This is because existing range operations at the BIR would only involve overflights of the range; impact operations would not occur. Maintenance of onshore targets would not affect commercial fishing activities. Therefore, there would be no significant impact to commercial fishing with implementation of this alternative.

4.4.3.2 Alternatives 2 and 3

Proposed range operations at BIR involving nonexplosive air-to-ground weapons delivery and small arms fire would require the clearance of the Surface Danger Zone to ensure the safety of military participants and civilian nonparticipants. During clearance, fishermen would be instructed to move out of the area into other waters for the duration of the range operation. Although the Surface Danger Zone would be closed for varying durations according to the specific type of operation being completed, the BIR would likely be closed for a minimum of one to two hours during certain air-to-ground weapons delivery operations and up to six hours during special warfare training. An estimated 10 percent to 15 percent of the proposed operations could occur during the night, depending on the alternative. Nighttime closures would not significantly impact commercial fishing operations since Maryland's regulations for the major commercial species (i.e., blue crab, oyster, striped bass) largely limit fishing to daylight hours (see section 3.4).

Under Alternative 2, the 26-square-mile Surface Danger Zone could be cleared for up to 800 hours per year; under Alternative 3, the Surface Danger Zone could be cleared up to 1,200 hours per year. Table 4-4 provides a breakdown of the weekly range clearance requirements that could be imposed on commercial fishing in the waters surrounding the BIR for both alternatives.

Table 4-4 Maximum Weekly Restrictions to Commercial Fishing Activity for Alternatives 2 and 3

Alternative	Average Hours Surface Danger Zone Cleared per Week[a]			percent Surface Danger Zone Clearance During Summer Daylight Hours[b]
	Day	Night	Total	
No Action	*	*	*	*
Alternative 2	13	2	15	22
Alternative 3	20	3	23	33

[a] Estimated based on clearance of Surface Danger Zone for 4 hours per test or training event.

[b] Summer daylight hours available for commercial fishing based on Maryland regulations governing commercial crabbing activities in the main stem of Chesapeake Bay – 6 days per week for 10 hours per day, or a total of 60 hours per week.

* Some non-impact test events may require clearance of the surface danger zone, but timing is not predictable.

As shown, the frequency and duration of Surface Danger Zone clearance under Alternatives 2 and 3 could potentially average a total of 15 and 23 hours per week, respectively. If the maximum number of range operations were conducted as proposed, the BIR Surface Danger Zone could be closed to commercial fishing for up to 22 percent of summer daylight hours under Alternative 2 and 33 percent of summer daylight hours under Alternative 3. Summer daylight hours are defined by Maryland regulations (MDNR 2004b) as the period from June through September, when fishing yields are most productive.

However, clearance of the Surface Danger Zone for this amount of time during the daylight hours would not have a significant impact on commercial fishing activities in proximity to the BIR for the following reasons:

- Clearance of the BIR Surface Danger Zone (about 26 square miles) would restrict only about 3 percent of the 900-square-mile Lower Bay/Tangier Sound Region (middle portion of Chesapeake Bay as described in section 3.1) from commercial fishing activities.

- Clearance of the BIR Surface Danger Zone would not prohibit access through Hooper Strait to fishing grounds in Tangier Sound north and east of the BIR or around Holland and South Marsh islands and through the Holland Straits.

- Given the limited average duration of Surface Danger Zone closure (two to four hours), watermen would be able to plan around range operations being conducted at the BIR and return to the Surface Danger Zone after those operations have been completed.

4.4.4 Recreational Fishing and Boating

4.4.4.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, the Surface Danger Zone surrounding the BIR would rarely be cleared of recreational fishermen or boaters. This is because range operations currently conducted on the BIR only involve overflights; impact operations do not occur. Maintenance of onshore targets would not affect recreational fishing and boating activities. Therefore, there would be no impact to recreational fishing, including charter fishing activities, and boating with implementation of this alternative.

4.4.4.2 Alternatives 2 and 3

Recreational fishing and boating could be prohibited from the Surface Danger Zone while range operations are being conducted under Alternatives 2 and 3. Table 4-5 provides a breakdown of the weekly restrictions on recreational fishing and boating that could occur with clearance of the 26-square-mile Surface Danger Zone for range operations under each of the alternatives. Use of the BIR for range operations at the identified levels could close the Surface Danger Zone to recreational fishing and boating for up to 13 percent of summer daylight hours under Alternative 2 and 20 percent of summer daylight hours under Alternative 3. The summer daylight hours are identified as they represent the most active times for recreational boating and fishing activities. The relatively infrequent nighttime closures would not have a significant impact on recreational fishing, including charter fishing activities, or boating.

Table 4-5 Maximum Weekly Restrictions to Recreational Fishing and Boating Activity for Alternatives 2 and 3

Alternative	Average Daylight Hours Surface Danger Zone Cleared per Week[a]	percent Surface Danger Zone Clearance During Summer Daylight Hours[b]
No Action	*	*
Alternative 2	13	13
Alternative 3	20	20

[a] Estimated based on clearance of Surface Danger Zone for 4 hours per test or training event.
[b] Summer daylight hours available for recreational boating/fishing based on 14.5 hours of daylight per day, seven days per week, for a total of 101.5 hours per week.
* Some non-impact test events may require clearance of the surface danger zone, but timing is not predictable.

In general, these closures would not result in significant impacts to recreational fishing, including charter fishing activities, or boating activities that occur in Chesapeake Bay. Although closure of the Surface Danger Zone would preclude recreational activities in the 26-square-mile area around the BIR, as previously mentioned, this represents only about 3 percent of the Lower Bay/Tangier Sound Region of the bay. The vast majority of the bay would still remain available to conduct fishing and recreational activities.

4.5 Topography, Geology, and Soils

4.5.1 Topography

4.5.1.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, there would be no change to the type and tempo of existing range operations conducted at the BIR, which currently involve only aircraft overflights. The infrequent maintenance of range targets would have no effect on topography. Consequently, implementation of the No-Action Alternative would result in no direct or indirect impact on topography at the BIR.

4.5.1.2 Alternatives 2 and 3

As discussed in section 3.5, a study of the BIR completed in 1995 determined that the land area of Bloodsworth Island had decreased by 26 percent from 1849 to 1992. The rising water level of the bay was identified as the primary cause of land loss, although Navy bombing activities were noted as a minor contributing factor (Downs et al. 1995). Although not specifically stated in the study, it is assumed that explosive ordnance could contribute most significantly to any military-induced land loss, given the much larger impact area that is generated compared with the impact made from the relatively small-diameter nonexplosive ordnance. Consequently, the nonexplosive ordnance delivery activities proposed for the BIR under Alternatives 2 and 3 would result in a negligible effect on erosion and land loss, especially in comparison to the overall natural erosion rate.

Operations involving amphibious assault landing craft or other insertions on land would be restricted to Adam Island or the sandy beach areas at Bloodsworth Island. Vehicles, vessels, or personnel would not be allowed on the interior of the island. As a result, impacts to topography as a result of implementation of Alternatives 2 and 3 would not be significant.

Only minor construction activities are planned at the BIR under either Alternative 2 or 3, including construction and/or installation of targets, radar reflectors, a WISS, an area surveillance system, repair/replacement of the existing helicopter landing pad on Adam's Island, and construction of a new helicopter landing pad on Bloodsworth Island. These activities would not involve deep excavations or deposition of fill material and would result in only minor, if any, changes to the local topography. No significant impact to topography would occur.

4.5.2 Geology

4.5.2.1 No-Action Alternative (Preferred Alternative)

Implementation of the No-Action Alternative would not involve any deep excavations of underlying geological resources. Therefore, implementation of this alternative would not cause significant impact to geology.

4.5.2.2 Alternatives 2 and 3

Poles could be installed for the WISS and other infrastructure improvements; however, their placement would not result in disturbance to the underlying geological strata. Therefore, there would be no significant impact to geology as a result of implementing this alternative.

4.5.3 Soils

4.5.3.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, the infrequent maintenance of a target on the BIR would have no significant effect on soils. Consequently, implementation of the No-Action Alternative would result in no direct or indirect impact on soils at the BIR.

4.5.3.2 Alternatives 2 and 3

The potential exists for the erosion of soils within the range and along the shorelines of the islands with implementation of the impact operations proposed under Alternatives 2 and 3. As can be seen from the discussions below, however, implementation of either Alternative 2 or Alternative 3 would not result in significant adverse impacts on soils at the BIR with adherence to the protective measures identified in Table 2-2 and the application of best management practices during construction activities.

4.5.3.2.1 Fixed- and Rotary-Wing Operations and Nonexplosive Air-to-Ground Ordnance Delivery

As discussed in section 4.5, delivery of nonexplosive air-to-ground weapons in the designated impact areas on Bloodsworth Island and Pone Island are expected to cause only minor and highly localized depressions in the soils.

4.5.3.2.2 Small Boat and Amphibious Assault Craft Operations

Small boat operations around the perimeter of Bloodsworth, Adam, Pone, and Northeast Islands could potentially result in minor shoreline erosion. However, only shallow-draft boats would be used during the proposed range operations; therefore, the waves produced would be small and unlikely to significantly exacerbate the natural erosion process.

Amphibious assault craft landings could occur at designated landing sites on Bloodsworth Island and Pone Island (see Figure 2-3). Depending on its size and operating speed, the amphibious assault craft may produce significant wave action in transiting to the BIR. However, when the amphibious assault craft approaches 15 to 20 feet of water depth, it will slow its speed to approximately 10 miles per hour, which would reduce wake size. Given the depth of the waters surrounding

the BIR (2 to 5 feet), it is expected that the amphibious assault craft would reduce its speed within 0.6 miles of the coastline of the islands to allow significant dissipation of the boat wake prior to reaching the shore. Given the dynamic nature of the littoral environment, and the fact that a maximum of six and nine amphibious assault craft landing exercises would be conducted annually under Alternatives 2 and 3, respectively, the impacts resulting from these activities would represent a minor deviation from the naturally occurring processes of deposition and erosion.

In general, the sandy beaches at the BIR are not wide enough to allow amphibious assault craft to land and maneuver without entering the inshore tidal marsh. The peat mat, which comprises the surface of the tidal marsh, is not strong or resilient enough to tolerate repeated amphibious assault craft landings over the years without experiencing significant erosion. To minimize potential erosion of the peat mat associated with amphibious assault craft landing exercises, an engineered landing pad will be constructed at a location within each of the identified amphibious assault craft landing zones (see Figure 2-3). The landing pads will consist of sand fill bordered by reinforced concrete walls, which will function to prevent erosion outside of the designated landing areas. The exact location of the two landing pads on Bloodsworth and Pone Islands will be determined, as part of the engineering design component of the project, and both landing pads will be sited in areas that maximize the use of existing sandy shoreline.

Sandy soils in the immediate path of the amphibious assault craft could be compacted during the operations, thereby increasing runoff and erosion rates. However, this impact would be contained within the designated landing zone and, if necessary, fill material may be added to stabilize the substrate. Based on the localized nature of the soil disturbance, and considering the relatively low number of annual exercises (maximum of six under Alternative 2 and nine under Alternative 3), no significant impact related to soil erosion or compaction would be expected from the proposed amphibious assault craft landings.

4.5.3.2.3 Special Warfare Operations

Insertions by special warfare personnel at Bloodsworth Island would be restricted to the same immediate sandy beaches identified for use by amphibious assault landing craft. Troop movement on the island's tidal wetlands would not be permitted. Since only 15 and 23 special warfare exercises are proposed annually, depending on the alternative selected, and not all of these exercises would involve a beach landing on Bloodsworth Island, neither long-term or significant soil erosion impacts would occur. Impacts would be further minimized by the installation of an engineered landing pad as described later in this section.

The use of Adam Island during special warfare insertion/extraction and direct fire support exercises would result in some short-term, localized disturbance to soils as ground personnel traverse portions of the island. Since landing areas and

inland movement would vary within and around the island, and given the relatively limited number of maximum annual operations that are proposed under both Alternatives 2 and 3 (15 and 23, respectively), neither long-term nor significant impacts to soil erosion are anticipated.

4.5.3.2.4 Installation of Infrastructure

Construction of the permanent targets, mobile target system, radar reflectors, WISS, helicopter landing pads, and area surveillance system could require the installation of up to 166 mounting poles on Bloodsworth Island. As shown on Figure 2-3, all of this new infrastructure would be installed adjacent to the Bloodsworth Island shoreline. This would allow for most, if not all, of the mounting poles to be installed from an offshore barge, which would minimize impacts related to soil erosion and compaction that could occur from tracking construction equipment across the saturated soils present on the island. Installation of the mounting poles from the nearshore waters would ensure that only minor, short-term soil erosion would occur in the immediate vicinity of each pole.

In addition, matting would be installed to serve as helicopter landing pads on Bloodsworth and Adam islands. This matting would allow water flow around and through the material as well as vegetation to grow though it. There would be no excavation of the underlying soils. A small storage shed could be mounted on the matting. There would be no excavation for installation of this storage shed.

The total area that would be affected by construction activities at the BIR is expected to total less than 5,000 square feet; therefore, preparation of a Notice of Intent under the requirements of the National Pollutant Discharge Elimination System General Permit for Small Construction Activities would not be required.

4.6 Water and Sediment Quality

4.6.1 Surface Waters and Sediments Impacts

4.6.1.1 No-Action Alternative (Preferred Alternative)

Since the No-Action Alternative would involve only aircraft overflights and no ground impact operations, there would be no direct effects on surface waters or sediments. However, should an aircraft mishap occur, fuel or hydraulic fluids could be released. The magnitude and duration of the spill would be controlled through rescue and spill response procedures, as outlined in NAS Patuxent River's EPA-approved Emergency Spill Control and Countermeasures Plan. Implementation of these procedures would allow quick containment of any spill and minimize any potential water quality impact on the bay, resulting in no significant impacts.

The targets on the BIR would not contain any hazardous materials; oils and other fluids are drained from vehicles before use as a target. Therefore, maintenance of targets would not have impacts on surface waters or sediments.

4.6.1.2 Alternatives 2 and 3

4.6.1.2.1 Fixed- and Rotary-Wing Operations and Nonexplosive Air-to-Ground Ordnance Delivery

Releases of Nonexplosive Air-to-Ground Ordnance Constituents. Proposed range operations could involve the release of nonexplosive ordnance into tidal waters on the BIR and into the adjacent open water of the bay. Potential impacts on surface water and sediment quality from these activities are discussed further below.

Impacts Resulting from the Release of Missiles, Bombs, and Rockets. Various metals are used in munitions components. Lead is found in primers, and zinc, lead, antimony, copper, manganese, and iron are found in shell casings and various projectile components. All of these metals are also found at some natural background levels in soils (Naval Facilities Engineering Command Atlantic Division 2002). Nonexplosive missiles, bombs, and rockets are comprised mainly of iron/steel casings filled with sand, concrete, or vermiculite. These materials would not adversely affect surface water quality.

Signal cartridges (i.e., spotting charges) could be used with practice bombs to assist in visual observation in weapons-target impact testing. A spotting charge emits smoke or flames and is similar in explosive strength to a firecracker. Three different signal cartridges could be used with practice bombs (MK-4, CXU-3/B, and CXU-3A/B). The MK-4 cartridge, depending on the model, contains 10 grams of red phosphorus (Stahl January 25, 2005). The red phosphorus ignites on impact and produces a bright flash and white smoke. The CXU-3/B and CXU-3A/B cartridges contain about 22 or 17 cubic centimeters, respectively of titanium tetrachloride.

Combustion of red phosphorus produces phosphorus oxides, which have a low toxicity to aquatic organisms (Yon et al. 1983) but may cause an increase in phytoplankton growth (i.e., algal blooms) and increased eutrophication in aquatic systems where phosphorus limits primary production (Wetzel 1983). According to data from the MDNR Chesapeake Bay Monitoring Program, phytoplankton growth is phosphorus-limited in the northern portion of Tangier Sound for approximately 40 percent of the year (MDNR 2004a). On a seasonal basis, growth is phosphorus-limited 20 percent of the time in the summer, 50 percent of the time in the fall, 0 percent of the time in the winter, and 90 percent of the time in the spring.

However, additional data from the monitoring program indicate that total phosphorus and dissolved inorganic phosphorus concentrations in northern

Tangier Sound are relatively good and are improving (i.e., decreasing). In addition, based on the higher concentration of nitrogen in the aquatic environment, continued reduction of this nutrient as opposed to phosphorus is identified as being important in further limiting phytoplankton growth. Considering that a maximum of approximately 800 and 1,200 spotting charges could be used per year under Alternatives 2 and 3, respectively, and considering the above data, the introduction of phosphorus into the aquatic environment at the BIR from spotting charges is unlikely to cause a significant increase in phytoplankton growth.

Titanium tetrachloride undergoes rapid hydrolysis in surface water to form chloride ion (Cl^-), hydrogen ion (H^+), and a titanium hydroxide complex ($Ti(OH)_4$) (Uhrmacher et al. 1985). Chloride ion is naturally abundant in marine and estuarine waters. Consequently, the chloride contribution from CXU-3/B and 3A/B signal cartridges to surface water chloride levels would be insignificant. Since the bay is characterized by a neutral pH, the increased hydrogen ion inputs from the CXU-3/B and 3A/B signal flares would have a short-term, but not significant, impact on surface water pH in the immediate vicinity of where a CXU-3/B and 3A/B signal cartridge discharges. Similarly, because the titanium concentration in seawater is low (0.001 ppm, according to Horne [1978]), the titanium concentration in the waters near the discharged CXU-3/B and 3A/B signal cartridge may increase in the short term. However, dilution with nearby unaffected surface water would make all such increases temporary in nature.

Some nonexplosive ordnance (missiles and general purpose bombs) may have attached telemetry units, which in the past had a battery-powered electrical system using nickel-cadmium (Ni-Cd) batteries. However, weapons/stores separation testing conducted in the mid-1990s proved that lithium-iron disulfide batteries (a environmentally friendly type of battery) could be substituted for the Ni-Cd battery. Consequently, the increased use of lithium-iron disulfide batteries would result in no significant environmental impact on water quality.

Impacts from the Release of Flares and Illumination Rounds. The use of flares and illumination rounds at the BIR would also have no adverse effect on water or sediment quality. A study conducted by the USAF Headquarters Air Combat Command found that impacts from flares on water resources that are subjected to substantial, repeated flare use would only be of potential concern in small water bodies which support organisms sensitive to the chemicals released from flares (USAF 1997). Toxicity is not a concern with flares, since the primary material in flares, magnesium, is a naturally occurring, widespread element in surface waters, soils, and sediments. Properly functioning flares will burn for only a short time (less than 10 seconds), with only incidental debris from the packaging remaining. Impacts associated with deployment of flares would, therefore, be limited to a small volume of scattered debris.

The use of illumination rounds in the BIR would have similar impacts to those described for the use of flares since the primary components of illumination

rounds include non-toxic magnesium and sodium or barium nitrates. The Navy would make every attempt to recover the small parachutes that are deployed by the illumination rounds.

Impacts from the Release of Chaff. Similar to the use of flares, release of chaff at the BIR would not adversely affect surface water or sediments. Chaff is comprised of fiberglass fibers coated with aluminum and biodegradable stearic acid. The study conducted by the U.S. Air Force found that adverse effects from the release of chaff could only potentially occur in small, confined water bodies that receive extremely high concentrations of chaff (USAF 1997). Since chaff released at the BIR under the proposed operations will disperse over a wide area into an unconfined marine environment, no adverse impact on surface waters or sediments will occur.

Impacts from the Use of Small Arms Ammunition. The maximum amounts of small arms ammunition that would be expended annually at the BIR under Alternatives 2 and 3 are shown in Table 2-4. Some debris generated during missions would be retrieved, such as flare chutes or brass shell casings deposited within a boat or the land surface during firing. Small arms firing during wading could result in 100 percent deposition of brass shell casings in the water.

Brass casings consist of 70 percent copper and 30 percent zinc. Water-deposited shell casings would come to rest on the sandy or muddy bottom of Chesapeake Bay surrounding the BIR. These casings would tend to be incorporated into the sediment layer or be buried by sediment influx. Casings could be exposed and relocated by nearshore wave action and the high-energy sediment relocation events associated with hurricanes and storm surge. The presence of shell casings in the sediments would not cause a significant impact on water quality since brass would undergo slow corrosion, even in a salty environment, and would be quickly diluted by bay waters.

Most of the ammunition expended during operations involving small arms fire is comprised of steel with small amounts of aluminum and copper. Steel practice bullets may release small amounts of iron, aluminum, and copper into the sediments and the overlying water column as the bullets corrode. All three elements are widespread in the natural environment, although elevated levels can cause toxic reactions in exposed plants and animals. Any elevation of metals in sediments would be restricted to a small zone around the bullet, and any release to the overlying water column would be very quickly diluted. Thus, continued use of steel bullets would not adversely affect water quality in the bay.

The projectiles for 5.56mm and 7.62mm small arms ammunition have lead cores. Lead has been identified as a toxic contaminant under Section 307 of the Clean Water Act. The total estimated amount of lead that would be annually deposited on the BIR from the use of these projectiles is 840 pounds under Alternative 2 and 1,260 pounds under Alternative 3, which correspond to a volume of lead of less than 2 cubic feet annually. However, lead is nearly insoluble in water,

particularly at the nearly neutral pH levels that characterize the waters of north Tangier Sound (MDNR 2005a). While it is reasonable to assume some dissolution of lead could occur, such releases into the water column would be very small and would be rapidly dispersed and diluted.

Moreover, the results of water quality sampling by the Navy at the BIR support the conclusion that release of nonexplosive ordnance under Alternatives 2 or 3 would not adversely affect water or sediment quality in the bay. As discussed in Section 3.6, the Navy collected and analyzed water, soil, and sediment samples on and adjacent to the BIR in 2001. The samples were analyzed for explosive chemical concentrations and 17 metals, including lead. No explosive compounds were detected in any of the 29 samples collected. In addition, the study did not identify any water or sediment quality impacts at the BIR that could be attributed to its use for military training. Specifically in regard to lead, no concentrations of this metal were detected in any of the surface water, soil, or sediment samples at levels that exceeded human health or ecological screening values (Naval Facilities Engineering Command Atlantic Division 2002).

Impacts Resulting from Fixed- or Rotary-Wing Aircraft Mishaps. Aircraft overflights of the BIR associated with the proposed range operations would have no direct effect on surface water or sediments. However, should an aircraft mishap occur, fuel or hydraulic fluids could be released. The magnitude and duration of the spill would be controlled through rescue and spill response procedures, as outlined in NAS Patuxent River's Coast Guard and EPA-approved Facility Response Plan. Implementation of these procedures would contain any spill and minimize any potential water quality impacts on the bay resulting in no significant impacts.

4.6.1.2.2 Small Boat and Amphibious Assault Craft Operations

Range operations involving conventional watercraft are proposed to occur for a maximum of approximately 156 hours (7 days) per year under Alternative 2 and a maximum of 236 hours (10 days) per year under Alternative 3. Turbidity levels would increase during conventional boat operations as sediments become suspended in the water column; however, any increase in turbidity associated with these activities would be highly localized and should dissipate shortly after an operation ends. Furthermore, any increase in suspended sediments is expected to be within the natural, short-term variability of the background concentrations in this portion of the bay.

Amphibious assault landing craft, like the EFV, could operate two or three days each year, depending on the alternative selected. Unlike conventional watercraft, amphibious assault landing craft are propelled through the water by inboard engines or, as in the case of the EFV, two 23-inch-diameter high-speed waterjets. Since the EFV would likely be the largest amphibious assault landing craft that would operate in the BIR, this analysis focuses on the environmental impacts associated with EFV operations. The EFV would likely have no effect on

turbidity levels while transiting to the BIR in the relatively deep water of the bay (U.S. Navy 2000). In water depths of 15 to 20 feet when approaching the BIR, the EFV would reduce its speed, lower the suspension and tracks, and transfer engine power from the waterjets to its tracks. Shallow-water areas in the vicinity of the EFV would experience increased turbidity levels upon entry to and exit from shore. The increase in turbidity would be focused in the immediate vicinity of the landing area and would not cause long-term or significant water quality impacts due to the relatively low frequency of exercises (i.e., a maximum of six exercises per year under Alternative 2 and nine exercises per year under Alternative 3).

4.6.2 Groundwater

4.6.2.1 No-Action Alternative (Preferred Alternative)

Since the No-Action Alternative would involve only aircraft overflights and no ground impact operations, other than periodic target maintenance, there would be no effect on groundwater resources.

4.6.2.2 Alternatives 2 and 3

Based on recent water quality studies, no accumulation of metals or chemicals exist at the BIR that can be attributed to its use for range operations, and no metals are present in the water column or in sediments that would pose an unacceptable risk to human health or the environment (Naval Facilities Engineering Command Atlantic Division 2002). In addition, no wells would be installed at the BIR as part of the proposed action, and no activities would intersect the aquifer system. Consequently, the range operations proposed under Alternatives 2 and 3 would have no effect on groundwater resources.

4.7 Vegetation and Wetlands

4.7.1 Vegetation and Wetlands

4.7.1.1 No-Action Alternative (Preferred Alternative)

The No-Action Alternative would involve aircraft overflights; the only operations that would occur on the surface of the island would be related to the maintenance of targets. These targets would not require foundations or any digging into the soils. Therefore, the effect of target maintenance on vegetation and wetlands would be negligible.

4.7.1.2 Alternatives 2 and 3

4.7.1.2.1 Nonexplosive Air-to-Ground Ordnance Delivery

The proposed air-to-ground bombing operations could impact some wetland vegetation within the BIR. All upland vegetation is contained within the No Fire Area and, therefore, would not be impacted by ordnance releases. Since only nonexplosive ordnance would be used, the amount of wetland vegetation affected would be limited to the immediate Impact Area. Vegetation in the vicinity of the target sites that could be affected are black needlerush and saltwater cordgrass, with intermixed populations of saltgrass and salt meadow grass. The approximate maximum total of nonexplosive bombs, precision-guided munitions, and rockets that would be released at the BIR under Alternatives 2 and 3 would be approximately 1,150 and 1,720, respectively. Conservatively assuming that the average impact area associated with this nonexplosive ordnance would total 5 square feet, approximately 0.1 acre and 0.2 acre of wetland vegetation would be affected per year. However, any vegetation impacted as a result of the air-to-ground events would likely become reestablished after a short time; therefore, no significant long-term impact on wetland vegetation at the BIR would occur under Alternatives 2 or 3.

4.7.1.2.2 Small Boat and Amphibious Assault Craft Operations

It is conservatively estimated that each amphibious assault craft landing pad will require the placement of sand fill in an approximately 100-foot. x 100-foot. area comprising tidal wetland. Consequently, construction of the two landing pads would result in the permanent filling of an estimated 0.5-acre of estuarine emergent wetland. Additionally, the new 50-foot by 50-foot helicopter landing pad on Bloodsworth Island and the 20-foot by 20-foot storage shed on Adam Island would convert approximately 0.1 acre of estuarine emergent wetland habitat to impervious surface.

4.7.1.2.3 Special Warfare Operations

Special warfare training exercises involving ground troops could have the potential to cause localized loss of wetland vegetation on Adam Island. However, impacts from pedestrian traffic would not be significant given the localized and temporary nature of the disturbance and the fact that ground troop activity on Adam Island would be sporadic, occurring a maximum of 15 times per year under Alternative 2 and 23 times per year under Alternative 3. These training exercises would occur at various locations on the island; therefore, no permanent paths or trails would be established. Since no individual area would be affected on a continual basis, it is expected that wetland vegetation disturbed by pedestrian activities would quickly recover after cessation of the activities.

4.7.1.2.4 Installation of Infrastructure

Construction of the permanent targets, mobile target system, radar reflectors, WISS, and an area surveillance system could require the installation of up to 166 mounting poles in various locations adjacent to the Bloodsworth Island shoreline. All of this infrastructure would be installed in estuarine emergent wetlands comprised primarily of black needlerush and saltwater cordgrass. Impacts on wetlands and the associated vegetation would be limited to short-term, localized disturbances during construction activities when a small area (an approximately 4-foot-diameter hole) is excavated for the pole plant. As the new infrastructure would be placed near the shoreline, an offshore barge would be used to install the support poles. This would significantly minimize wetland impacts by avoiding the tracking of construction equipment across the island, which could result in rutting, soil compaction, and localized alteration of wetland hydrology.

Under the authority of Executive Order 11990, *Protection of Wetlands*, federal agencies are required to adopt a policy to avoid, to the extent practicable, long- and short-term adverse impacts associated with the destruction and modification of wetlands and to avoid the direct and indirect support of new construction in wetlands whenever there is a practicable alternative. In addition, mitigation requirements under USACE guidelines stress the policy of wetland avoidance, minimization, and compensation. Preliminary design estimates indicate that construction of the amphibious assault craft landing pads, helicopter pad, and storage shed could result in the permanent loss of up to 0.6 acre of estuarine emergent wetland for all activities conducted on the BIR. Because complete wetland avoidance is not feasible, a Clean Water Act Section 404 permit would be obtained from USACE. This permit is required for the discharge of dredged and fill materials into waters of the United States, including wetlands.

Appropriate construction mitigation techniques (e.g., erosion and sedimentation control) would be used to minimize impacts on wetlands adjacent to the amphibious assault craft landing pads, helicopter landing pads, and storage shed construction areas. Compensation may be required for the loss of 0.6 acre of tidal wetland. Compensation or mitigation can be accomplished through creation of new wetlands or enhancement, restoration, or preservation of existing wetlands. These activities would need to be incorporated into a wetland mitigation plan, which would be developed in consultation with USACE and MDE and approved by USACE via the Clean Water Act, Section 404 permit process. USACE does not have established mitigation ratios in terms of acre-for-acre replacement. Instead, they require that a functional analysis of the affected wetlands be conducted to determine appropriate mitigation. Mitigation is considered appropriate and acceptable if, based on an approved evaluation technique, determined functions and values for the proposed mitigation or replacement wetland are greater than or equal to those of the affected wetland area.

Installation of the matting for the helicopter pads would have minimal long-term effect on wetland because of its open architecture, which allows the flow of water and the growth of vegetation.

4.7.1.2.5 Loss of Wetland and Upland Vegetation from Fire

The use of flares and small arms fire (.50cal and above) poses a potential fire hazard. As properly functioning flares would burn for only a short time (less than 10 seconds) after ejection from an aircraft, the risk of fire would be minimal. At this rate, complete burnout of a flare would occur prior to impact when the release altitude is 1,500 feet AGL or above (USAF 1997). Most, if not all, flares would be released by fixed-wing aircraft at altitudes above 3,500 feet AGL. Past activities on the BIR using small caliber ammunition (.50cal and above) with and without tracers and grenades have been known to cause fires (U.S. Navy 1998). On some occasions, winds from the south swept the fire northward into the No Fire Area, including the Fin Creek Ridge area and the heron rookery.

To avoid the potential for fires that affect sensitive areas in the No Fire Area at the BIR, such as the remaining transitional upland area on Fin Creek Ridge, low-altitude release of flares and exercises involving small caliber ammunition (.50cal and above) with or without tracers would be prohibited during the dry season when strong south or southwest winds are present. Therefore, there would be no significant impact on wetlands and upland vegetation from fire.

4.7.2 Submerged Aquatic Vegetation

4.7.2.1 No-Action Alternative (Preferred Alternative)

Since the only land-based activities proposed under the No-Action Alternative would involve the periodic maintenance of land-based targets, there would be no effect on SAV.

4.7.2.2 Alternatives 2 and 3

Mapping of SAV conducted by VIMS in 2002 (see Figure 3-7) showed large concentrations of SAV surrounding the BIR between Pone, Adam, and Northeast Islands. Other large beds were located in Pone Cove, Northeast Cove, and along the eastern shore of Adam Island. However, preliminary survey data for 2004 (VIMS 2004) indicates that the bed located between Pone, Adam, and Northeast Islands may no longer be viable.

4.7.2.2.1 Air-to-Ground Ordnance Delivery

There is also a potential for impacts on SAV from the delivery of air-to-ground nonexplosive ordnance that misses designated impact areas. Although all air-to-ground targets are located onshore of Bloodsworth Island, the potential exists for inadvertent nonexplosive ordnance delivery into nearshore waters where SAV is located. If nonexplosive ordnance were to fall within an SAV bed, it would likely

cause a temporary increase in turbidity because of the resuspension of sediments. These sediments could then settle on top of the SAV, potentially burying plants. Such an event is considered to have a very low probability of occurrence and would have only a minor, highly localized effect given the nonexplosive nature of the ordnance being used and associated small impact area.

4.7.2.2.2 Submerged Aquatic Vegetation Impacts - Small Boat and Amphibious Assault Craft Operations

SAV Impacts from Entanglement in Boat Propellers. Boats generally avoid SAV beds as the grasses can become entangled in propellers. However, if operations inadvertently occur within existing SAV beds, the potential exists for direct removal of plants by the boat propellers. The proposed amphibious assault craft landing zones (see Figure 2-3) have been specifically sited to avoid impacts on previously mapped (2003) SAV concentration areas, as well as other smaller identified SAV beds. The western landing location can be accessed from the west, between Pone and Adam Islands, while the eastern landing location could be accessed from the south or east, between Bloodsworth and Northeast islands. Both approaches would avoid crossing known concentrations of SAV. As the densities and relative locations of the SAV beds vary from year to year, it may be necessary to adjust the size, locations, or access points of these landing areas in the future as updated data become available. With such adjustments, potential environmental impacts on SAV would not be significant.

Localized Turbidity Impacts. Localized increases in turbidity and sedimentation caused by wake, prop wash, and disturbance of the shoreline would occur under Alternatives 2 and 3. SAV are dependent on sunlight for survival. Increased turbidity levels and sedimentation would hinder the uptake of sunlight, and prolonged exposure to these conditions could result in the death of the plants. However, as discussed in section 4.6, any increase in turbidity associated with boat operations would be highly localized and should dissipate shortly after an operation ended. Operations of amphibious assault landing craft, particularly the EFV, would cause comparatively higher short-term increases in suspended sediments and turbidity; however, these increases would be focused in the immediate vicinity of the landing area and would not be expected to cause long-term or significant water quality impacts. Consequently, indirect impacts on SAV as a result of boat and amphibious assault landing craft maneuvers would be minor and highly localized and not significant.

4.8 Wildlife and Fisheries

4.8.1 Terrestrial Wildlife

4.8.1.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, the No Fire Area on the northern end of Bloodsworth Island would be maintained. The heron nesting platforms and habitat for upland birds species are located in the No Fire Zone; therefore, no impact to the heron rookeries and other upland bird species would occur under this alternative. In addition, the Navy would continue its management of the BIR's natural resources, so a beneficial impact to wildlife would result.

4.8.1.2 Alternatives 2 and 3

As discussed in Section 3.8, the BIR does not support a diverse or abundant population of mammal, reptile, or amphibian species because of the lack of upland habitat, the dominance of the needlerush marsh community, and the limited availability of freshwater. In contrast, significant numbers of avian species, including waterfowl, raptors, wading birds, and shorebirds, seasonally inhabit the BIR. Many studies have focused on the impact of aircraft noise on many of these avian species. A brief synopsis of relevant studies is provided in Appendix C.

The abundance, distribution, and composition of avian species present on the BIR varies significantly throughout the year. From approximately November to April, significant concentrations of migratory waterfowl inhabit the BIR. During much of the remainder of the year (May through October), most birds occupy the northern portion of Bloodsworth Island, where significant wading-bird nesting occurs. This nesting has been encouraged by the construction of nesting platforms by the Navy.

Based on the seasonal distribution and abundance of avian species at the BIR, the Navy proposes to continue and/or implement the following operational restrictions related to range operations under Alternatives 2 and 3 to minimize disturbances to avian populations and to ensure safe operating conditions for participating aircraft:

- Continued enforcement of the No Fire Area on the northern end of Bloodsworth Island

- Restrictions on range operations involving low-altitude fixed- and rotary-wing aircraft from November 15 to March 15 and in accordance with OPNAVINST 3710.7T and NASPAXRIVINST 3710.5T

- Restrictions on watercraft operations within 0.25 mile of the northern end of Bloodsworth Island between February 1 and August 15

- Continued observations of the recommendations contained in the North American Waterfowl Management Plan dated April 1991

4.8.1.2.1 Fixed- and Rotary-Wing Aircraft Operations

The Navy proposes to conduct operations involving overflights of the range by high-altitude, fixed-wing aircraft and low-altitude, rotary-wing aircraft outside of the No Fire Area during the migratory waterfowl overwintering period (roughly November to March). High-altitude aircraft overflights of the BIR at 3,500 feet AGL or greater would cause minimal, if any, disturbance to overwintering waterfowl.

Proposed low-altitude military overflights (less than 3,500 feet AGL) that may be conducted would not occur in or near the No Fire Area during the nesting season (approximately February 1 to August 15). Thus, such operations would not have a significant impact on the heron rookery or other avian nesting activities (e.g., ospreys) on the northern end of Bloodsworth Island. Even so, it is significant to note that the heron rookery in the No Fire Area historically thrived during the period when the BIR was used for ship-to-shore and air-to-ground bombardment, which formerly included explosive ordnance.

Range clearance activities using a rotary-wing aircraft flying at low altitudes could disturb overwintering waterfowl and the heron rookery by causing them to flush or otherwise needlessly expend energy. However, range clearance conducted using the procedures identified in Chapter 2 would result in no significant impacts on overwintering waterfowl.

4.8.1.2.2 Nonexplosive Air-to-Ground Ordnance Delivery

High-altitude fixed-wing aircraft would be allowed to conduct air-to-ground deliveries of nonexplosive ordnance at the BIR. As previously discussed, bomb deliveries would be conducted at subsonic airspeeds, and most bombs would be released at altitudes greater than 3,500 feet AGL (mainly above 10,000 feet AGL). Rotary-wing aircraft would also conduct air-to-ground deliveries of nonexplosive ordnance, but at lower altitudes (less than 3,500 feet AGL). Although waterfowl that may be present in the immediate vicinity of such activities would likely flush as the initial reaction to the noise disturbance, there would be ample similar habitat available to accommodate immediate resumption of loafing or feeding activities. No long-term physiological effects on waterfowl related to decreased feeding time or reduced energy reserves are expected as a result of any sporadic and short-duration flushing episodes. This conclusion is consistent with the results of various studies that evaluated the effects of military aircraft noise on waterfowl (Fleming et al 1996; Bateman et al. 1999).

Direct Contacts or Strikes. During training activities involving air-to-ground nonexplosive ordnance delivery and small arms fire, wildlife in the impact area of

bombs, rockets, or missiles, or in the small arms weapons line of fire, could become injured or killed if struck by nonexplosive ordnance. No animals would be targeted by weapons fire, and injuries to wildlife would be accidental. The probability of a direct strike is low, since the animal would need to be present in the strike zone of air-to-ground nonexplosive ordnance at the exact time of impact, or in the case of small arms firing, in the line of fire at the exact time of release.

Wildlife with the highest potential to be struck would likely include small mammals such as meadow voles, or invertebrates, such as hermit crabs, because of their lack of mobility, smaller home range, and high concentrations in small areas. Other wildlife, such as migratory waterfowl, will likely leave most operations areas prior to the initiation of small arms firing in response to the initial aircraft or watercraft noise, thus reducing the potential for these species to be struck. Overall, the mortality of a small number of animals that could potentially occur as a result of the proposed range operations would not adversely affect species population levels.

The lack of trees on the BIR significantly limits the amount of new wading bird and raptor nesting activity. As part of the proposed action, two target platforms and a mobile target system would be constructed on the eastern, western, and southern shorelines of Bloodsworth Island. Up to approximately 110 mounting poles could be required for this infrastructure. Given the lack of suitable natural nesting habitat, the potential exists that wading birds and raptors could use the new targets as artificial nesting sites. If this were to occur, the potential for direct strikes on these species would significantly increase. Therefore, the Navy intends to design the new infrastructure to discourage wading bird and raptor nesting activity.

Release of Nonexplosive Ordnance Constituents. Range operations would involve the release of nonexplosive ordnance onto the BIR. Most of the constituents of nonexplosive ordnance would not pose a risk to wildlife. However, white phosphorus has been found to be hazardous to waterfowl (Racine et al. 1992a/b/c, in Walsh, Collins, and Racine November 1995), and there fore, white phosphorus will not be used at the BIR. The potential impacts on wildlife caused by other chemicals present in the various types of nonexplosive ordnance that would be used at the BIR are discussed below.

LD50 - An abbreviation for the dose of a substance (expressed in milligrams per kilogram of body weight of the test animal) that is lethal to 50 percent of the group of test animals. The smaller the LD50 value the more toxic the substance. For example, an LD50 between 0 and 200 milligrams per kilogram for a rat is considered toxic.

Impacts Resulting from the Release of Missiles, Bombs, and Rockets. Various metals are used in munitions components. Lead is found in primers, and zinc, lead, antimony, copper, manganese, and iron are found in shell casings and various projectile components. The primary route of exposure of wildlife to nonexplosive ordnance-related contaminants is through ingestion. Previous testing of waters and soils at the BIR has shown that there are no elevated concentrations of common contaminants associated with munitions deployment at the BIR.

As discussed in section 4.6.1, the signal cartridges that would be used with practice bombs contain various concentrations of red phosphorus and titanium tetrachloride. Red phosphorus is relatively nontoxic to animals (Uhrmacher et al. 1985), with an acute oral toxicity LD50 of 15,000 milligrams per kilogram for laboratory rats (Hörold 2000). However, red phosphorus is likely to contain trace amounts (0.02 percent) of white phosphorus as an impurity and unreacted white phosphorus pellets are toxic to waterfowl if ingested (Racine et al. 1992a/b/c, in Walsh, Collins, and Racine November 1995).

According to the Navy's Ordnance Environmental Support Office, a MK-4 signal cartridge contains 10 grams of red phosphorus, of which about 0.002 grams might comprise white phosphorus impurities. Assuming that about 300-400 of the signal cartridges identified in Table 2-4 were expended on the BIR during annual bombing operations, waterfowl residing on the BIR would potentially be exposed to about 7 grams of white phosphorus. This small amount of white phosphorus spread over the impact areas would not pose a significant risk to waterfowl.

Toxicity data on the effects of unreacted titanium tetrachloride on birds and mammals was not available. However, because the compound is a liquid that reacts rapidly when exposed to air or moisture, residues of the unreacted compound would not be expected to accumulate on the BIR.

Impacts from the Release of Flares and Illumination Rounds. The primary constituent of flares and illumination rounds is magnesium, which is nontoxic and occurs naturally in soils. Therefore, wildlife would not be affected by the use of flares or illumination rounds at the BIR.

Impacts from Release of Chaff. Chaff is comprised of nontoxic fibers that would be spread over a wide area on the BIR and adjacent waters; therefore, the use of chaff at the BIR would have no effect on wildlife.

Impacts from the Use of Small Arms Ammunition. Most of the ammunition expended during operations involving small arms fire is comprised of steel with small amounts of aluminum and copper. Steel practice bullets may release small amounts of iron, aluminum, and copper into the sediments and tidal waters on the BIR as bullets corrode. All three elements are widespread in the natural environment, although elevated levels can cause toxic reactions in exposed plants and animals. Any elevation of metals in soils would be restricted to a small zone around the bullet. Any release to the water column would be very quickly diluted. Thus, use of steel bullets would not adversely affect wildlife inhabiting the BIR.

As previously discussed, the projectiles for 5.56mm and 7.62mm small arms ammunition have lead cores. Wildlife would have to ingest the projectile to be exposed. Past problems of lead poisoning in waterfowl, for example, have been associated with shotgun pellets embedded in the skin or ingested by waterfowl. Shotgun pellets are much smaller than the munitions that will be used in the proposed range operations. Also, the pellets are ground up by the bird's crop,

releasing smaller particles of lead that are more easily absorbed by the bird's tissues. For waterfowl or other animals to ingest nonexplosive ordnance containing lead, the materials would need to be of a small enough size that they are indistinguishable from the animal's normal food items, and the animal would need to have the type of digestive system that includes a crop or similar structure (U.S. Navy December 1998).

Ingestion of Nonexplosive Ordnance and Used Target Materials. In addition to the permanent targets that would be installed on the BIR, the Navy will occasionally place discarded vehicles (oil and gas removed), plastic tanks, and other equipment on the BIR to provide tactical targets for aerial bombardment. Once destroyed, the remnants of these targets are collected and disposed of by range personnel. Therefore, the potential for wildlife to ingest used target materials would be minimal.

4.8.1.2.3 Small Boat and Amphibious Assault Craft Operations

All aircraft, boats, and amphibious assault landing craft used during range operations conducted during the overwintering period would be required to make a "deep-water" approach to the BIR's coastline to focus the noise exposure in one section of the range. This would significantly reduce the number of waterfowl exposed to noise disturbances and prevent repetitive flushing episodes that could potentially occur if large portions of the BIR were circumnavigated by aircraft, boats, or amphibious assault landing craft.

Although waterfowl that may be present in the immediate vicinity of such activities would likely flush as the initial reaction to the noise disturbance, there would be ample similar habitat available to accommodate immediate resumption of loafing or feeding activities. No long-term physiological effects on waterfowl related to decreased feeding time or reduced energy reserves would be expected as a result of any sporadic and short-duration flushing episodes. This conclusion is consistent with the results of various studies that evaluated the effects of military aircraft noise on waterfowl (Fleming et al 1996; Bateman et al. 1999).

4.8.2 Marine Mammals

As stated in Chapter 3 of this EA, marine mammals species may be seasonally present in Chesapeake Bay, but these species are only present in very low densities. In the decade spanning 1995 and 2004, 272 marine mammal strandings and sightings were reported within 30 miles of the BIR. This equates to an average presence of 27 animals per year over a possible 500 square mile area or 0.054 animals per square mile.

4.8.2.1 No-Action Alternative (Preferred Alternative)

Since the only land-based activities proposed under the No-Action Alternative would involve the periodic maintenance of land-based targets, there would be no

effect on marine mammals. Implementation of this alternative would not result in reasonably foreseeable "takes" of a marine mammal species by harassment or injury or mortality as defined under the MMPA. Therefore, neither consultation with NMFS under ESA, nor application for takings under MMPA, is required for the No-Action Alternative.

4.8.2.2 Alternatives 2 and 3

Range operations under Alternatives 2 and 3 could potentially contribute to the following impacts to marine mammals:

4.8.2.2.1 Nonexplosive Air-to-Ground Ordnance Delivery

The potential for nonexplosive ordnance to directly strike and injure marine mammals is extremely low because (1) all of the targets will be located onshore and the potential for large articles (i.e., bombs, rockets, missiles) entering the open bay waters is minimal; and (2) the velocity of dropped ordnance decreases considerably on entry into the water, thereby decreasing the likelihood of significant injury to submerged species. In addition, only nonexplosive ordnance would be used on the BIR, thereby eliminating possible impacts from underwater concussive force.

4.8.2.2.2 Small Boat and Amphibious Assault Craft Operations

Potential for Collision. The potential also exists for boats involved in the proposed range operations conducted at the BIR to strike marine mammals. Given their small size and slow speeds, the likelihood of a vessel striking an animal would be no greater than that for a recreational vessel. However, these craft are equipped with vision enhancement systems, such as night vision goggles, forward-looking infrared (FLIR) and other similar systems to assist in locating obstructions in the water. In addition, personnel on board vehicles are trained to remain vigilant of potential obstructions along their route, which would include identifying the presence of marine mammals, thereby reducing the potential for a collision to occur.

Since the EFV would likely be the largest amphibious assault craft to operate in the BIR, this analysis focuses on the environmental impacts associated with EFV operations. To enhance the ability to detect potential obstacles in its route, the EFV is equipped with a sighting system that includes a FLIR sensor module and display, daylight optics, and an Eye-Safe Laser Range Finder module (U.S. Navy October 2002). This type of instrumentation allows the operator to detect, identify, classify, and avoid obstacles during day, night, and reduced weather conditions. Using this system, EFV operators would, in reduced visibility or darkness, be able to differentiate another vessel, a marine animal, or a partially submerged log from the surrounding water. As a result, the vehicle operators would be able to safely maneuver to avoid obstacles and marine animals, and if necessary, immediately halt the test operation. The sighting system and the design of the EFV, which has no protruding strut, shaft, propeller, or rudder that

could strike a marine mammal or sea turtle (U.S. Navy October 2002), make it highly unlikely that a collision causing direct temporary or permanent impact to a marine animal would occur.

Underwater Acoustic Impacts. The marine biota at BIR, regardless of the alternative selected, would be subjected to underwater noise during the operation of the boats, watercraft, and amphibious assault landing craft. The source of the most significant underwater noise would be operations conducted using the EFV. The underwater sounds that would be generated by the propulsion machinery of EFV, all of which are from its various operational modes, are presented below in Table 4-6 (U.S. Navy October 2002). **Note that the EFV has no sonar capability.**

Table 4-6 Source Level by Operational Mode for the EFV

Operational Mode	Source Level[a, b]
High-speed mode (25 knots), using jets	180 dB re 1µPa-m
Transition mode (9 knots), using tracks and jets	185 dB re 1µPa-m
Transition mode idle (5 knots), using jets only	170 dB re 1µPa-m

Source: U.S. Navy October 2002.

[a] Sound pressure measurements are expressed as X dB re 1 µPa-m, which represents the theoretical SPL within 3 feet (1 m) of the source, often referred to as the source level. The reference distance of 3 feet (1 m) is included so that a measured or modeled level at a given distance can be compared to the source level itself.

[b] The EFV engine operates at up to 3,300 rpm and is not a significant source of low frequency sounds.

For comparison, the sound levels of other vessels that regularly navigate Chesapeake Bay -- large commercial tankers, freighters, and container vessels -- can be as loud or louder than the EFV, ranging from 170 to 190 dB re 1µPa-m (Richardson et al. 1995). Approximately 11 of ships of these types transit the bay daily (see Section 4.15). Other smaller vessels also commonly operate on the bay, including commercial fishing and crabbing boats and recreational watercraft. These vessels can each produce underwater sounds of about 150 dB re 1µPa-m (Richardson et al.1995).

Upon launch, the EFV begins maneuvering in the idle mode, using jets only. As transition mode is entered, the power (and noise level) ramps up in intensity. Once in high-speed mode, which occurs in a matter of seconds, underwater sounds would attenuate rapidly because of scattering caused by the hull and stern wake of the EFV, as well as by cavitation from the jet pumps. For example, at a range of only 330 feet from the EFV, sound levels would diminish to between 124 to 151 dB re 1µPa (U.S. Navy October 2002).

Despite the intensity of the underwater noise that would be generated by the EFV under either Alternative 2 or 3, the impact to marine resources would not be significant for the following reasons:

- Only an extremely low number of marine mammals and sea turtles would be exposed to the underwater sound generated by amphibious assault landing craft, even during the summer season in the bay (see section 3.9).

- Generated underwater sounds would substantially attenuate with distance.

- Ambient noise levels (e.g., engine and propeller noise of ships transiting the bay) would potentially mask EFV sounds.

- Underwater sound generated by amphibious assault landing craft (including the EFV) would be transitory in nature.

Regarding the response to sound by marine mammals and sea turtles, the sounds generated by the vessel would be sufficient to warn the animals of its presence and approach. It is possible that some animals may become evasive as the sound of approaching vessels increases, although such a reaction would be short-lived and would not be significant.
Based on the extremely low densities of marine mammals in the middle Chesapeake Bay, the potential for impacts to marine mammals related to direct strikes, vehicle collisions, and underwater acoustics, implementation of either Alternative 2 or Alternative 3 would not be significant. Furthermore, implementation of either alternative would not result in the reasonably foreseeable "takes" of a marine mammal species by harassment or injury or mortality as defined under the MMPA. Therefore, neither consultation with NMFS under ESA nor application for takings under MMPA is required.

4.8.3 Fisheries

4.8.3.1 No-Action Alternative (Preferred Alternative)

Since the only land-based activities proposed under the No-Action Alternative would involve the periodic maintenance of land-based targets, there would be no effect on fisheries.

4.8.3.2 Alternatives 2 and 3

Range operations under Alternatives 2 and 3 could potentially contribute to the following impacts to fisheries:

4.8.3.2.1 Nonexplosive Air-to-Ground Ordnance Delivery

Direct Contacts or Strikes. Release of air-to-ground nonexplosive ordnance into the waters surrounding the BIR would occur infrequently since all targets would be located inland of the shoreline. If nonexplosive ordnance were accidentally released into the surrounding waters, or fall within any of the tidal creeks on the BIR, the potential would exist for a direct strike hazard to fish. However, such an occurrence is unlikely since the velocity of the ordnance would decrease considerably upon entry into the water. Mobile species, such as fish and crabs, would be able to move quickly to avoid being struck by the falling ordnance. Nonexplosive ordnance in the water that is not recovered may provide additional hard substrate to which bottom-dwelling organisms may attach.

Release of Fuel Associated with Aircraft Mishaps. Aircraft overflights of the BIR associated with the proposed range operations would have no direct effect on fisheries. However, if an aircraft mishap occurred, fuel or hydraulic fluids could be released. The magnitude and duration of the spill would be controlled through rescue and spill response procedures, as outlined in NAS Patuxent River's EPA-approved Emergency Spill Control and Countermeasures Plan. Implementation of these procedures would allow quick containment of any spill and minimize any toxic hazards to aquatic species in the bay.

Release of Nonexplosive Ordnance Constituents. The proposed range operations would involve the release of nonexplosive ordnance into tidal waters on the BIR and into the adjacent open water of the bay. Potential impacts on fisheries from these activities are discussed below.

Signal Cartridges. Impacts on fish from use of signal cartridges that fall into water resources would be the same as previously described for terrestrial species.

Impacts from Release of Flares. The use of flares at the BIR would also have no adverse effect on fisheries. As described in section 4.6, impacts from flares on water resources would only be of potential concern in small water bodies subject to substantial, repeated flare use and which support organisms sensitive to these chemicals (USAF 1997). The primary material in flares, magnesium, is a naturally occurring, widespread element in surface waters, soils and sediments. Given the large volume of water in which any releases would occur, no significant concentrations of magnesium are expected to occur.

Impacts from Release of Chaff. Similar to the use of flares, release of chaff at the BIR would not adversely affect fisheries. The only adverse effects from release of chaff would only occur in small, confined water bodies that receive extremely high concentrations of chaff (USAF 1997). Since chaff released at the BIR under the proposed operations would disperse over a wide area into an unconfined marine environment, no significant concentration of the chaff material is expected to occur.

A study of the effects of chaff was conducted by Block and Schiff (1977, in USAF 1997) for the Naval Research Laboratory. The results of this study found that tested species of finfish, mussels, and blue crab from Chesapeake Bay remained unaffected even when chaff concentrations reached exposure levels 100 to 1,000 times that of a single chaff system test. Although some polychaete worms and oysters indicated possible effects in the first phase of the tests, the second phase of the study showed no effects on polychaetes indigenous to the bay and only minimal effects on oyster larvae.

Impacts from the Use of Small Arms Ammunition. Steel practice bullets may release small amounts of iron, aluminum, and copper into the sediments and the overlying water column as bullets corrode. Elevated levels of these naturally

occurring elements can cause toxic reactions in exposed animals. Any occurrence of elevated levels of these metals in sediments would be restricted to a small zone around the bullet, and release to the overlying water column would be very quickly diluted. In general, the size of these munitions is too large for aquatic species to ingest. Therefore, no adverse impacts on fisheries in and around the BIR are expected.

The projectiles for 5.56mm and 7.62mm gun ammunition have lead cores; however, no significant releases of lead into the water through dissolution are expected because of the neutral pH of bay waters and sediments as discussed in detail in section 4.6. In addition, the opportunities for ingestion of a lead core in the water would be limited to the time it spends in the water column during its descent to the sediment below. Based on the unlikelihood of ingestion and/or absorption of lead by aquatic species, no impacts on fisheries are expected.

4.8.4 Essential Fish Habitat

4.8.4.1 No-Action Alternative (Preferred Alternative)

Since the No-Action Alternative would only involve target maintenance, which includes replacement and/or relocation of targets on the BIR, there would be no effect on EFH.

4.8.4.2 Alternatives 2 and 3

The waters of the middle portion of Chesapeake Bay have been identified as potential EFH for several species, including windowpane flounder, bluefish, summer flounder, king mackerel, Spanish mackerel, cobia, and red drum. However, the habitats designated as EFH for king and Spanish mackerel do not occur in the vicinity of the BIR; therefore, there would be no impacts on EFH for these species.

Bluefish are pelagic species and are not generally associated with bottom habitats. Potential impacts on the water column from implementation of Alternative 2 or 3 would be limited to increased turbidity related to prop wash or wakes from boats. As the effects of these disturbances would be short-term and localized, and since bluefish would likely move to other areas within the BIR with less turbidity, bluefish EFH would not be adversely affected by implementation of the proposed action.

Proposed range operations at the BIR would have the potential to impact sediments surrounding the BIR, that are EFH for windowpane, red drum, and summer flounder. These sediments support bottom-dwelling communities of organisms that are important food resources for EFH-managed species. The temporary disturbance caused by increased turbidity and resuspension of sediments may disrupt the availability of the bottom-dwelling organisms as a food

source by EFH managed species during the period immediately following the disturbance.

Potential impacts to the EFH would involve limited resuspension of sediments and the subsequent settling of the suspended sediments as a result of prop wash, boat wakes, and the impact of nonexplosive air-to-ground ordnance into the waters and on the tidal marshes of the BIR. However, these communities of bottom-dwelling organisms should quickly recover once the disturbance has been dissipated. Temporary or minimal disturbances are not considered to result in adverse effects on EFH when such disturbances: (1) are limited in duration; (2) allow the particular environment to recover without measurable impact and (3) do not cause a significant change in ecological function.

The proposed operations would also have the potential to affect the SAV beds present in the waters surrounding the BIR. SAV beds have been designated as EFH for cobia, red drum, and summer flounder. In addition, these areas are considered HAPC for the juvenile summer flounder and all life stages of the red drum. In general, the proposed operations at the BIR would avoid disturbances of SAV beds. Any impacts would likely be incidental in nature and related to localized turbidity increases and sedimentation. Such impacts would be considered minimal and would not adversely affect EFH.

Based on the above analysis, the Navy has determined that implementation of either Alternative 2 or Alternative 3 would only cause temporary or minimal impacts on EFH that would be immeasurable. Such impacts would not adversely affect EFH. Therefore, consultation with NOAA Fisheries is not required.

4.9 Threatened and Endangered Species

4.9.1 No-Action Alternative (Preferred Alternative)

4.9.1.1 Federally Listed Species

As discussed in section 3.9, federally listed threatened and endangered species potentially occurring in the vicinity of the BIR include the shortnose sturgeon, bald eagle, and several species of sea turtle and marine mammals. Current range operations conducted at the BIR involve aircraft overflights only and periodic maintenance of land-based targets. These types of range operations would have no effect on the federally listed threatened and endangered species that occur at the BIR.

4.9.1.2 Other Species of Concern

As stated above, current range operations conducted at the BIR involve aircraft overflights only and periodic maintenance of land-based targets. These types of range operations would have no effect on other species of concern.

4.9.2 Alternatives 2 and 3

4.9.2.1 Federally Listed Species

4.9.2.1.1 Shortnose Sturgeon

Potential impacts on shortnose sturgeon from the proposed range operations activities would be related to debris ingestion and direct physical impact. Adult sturgeon feeding in the immediate vicinity of the BIR could potentially ingest new brass shell casings. In clear-water conditions, the shiny metallic surface of a newly discharged shell casing and its movement in the water currents may trigger a food source reaction. Once ingested, the casing could become lodged in the digestive system of the fish, which could interfere with food consumption and digestion. However, the probability of such an event occurring is considered remote, especially given the low number of shortnose sturgeon known to inhabit the bay, most of which have been identified north of the BIR in the northern portion of the bay. Moreover, the discharged casing will remain in a shiny condition for only a short period, further reducing the potential for one to be ingested by a shortnose sturgeon.

The potential for a direct strike to occur from delivery of air-to-ground nonexplosive ordnance is similarly low given the species' distribution in the vicinity of the BIR and the absence of water-based targets. In addition, the velocity of the dropped ordnance decreases considerably on entry into the water, and most mobile species (e.g., fish) are able to move quickly enough to avoid being crushed or buried.

Based on the minimal potential for impacts related to debris ingestion and direct physical strikes, implementation of either Alternative 2 or Alternative 3 would have no effect on the shortnose sturgeon.

4.9.2.1.2 Bald Eagle

As discussed in section 3.9, coordination with the MDNR has indicated a pair of bald eagles were known to be nesting on the edge of the No Fire Area on the BIR in 2002 (Therres 2005). Previous nesting by bald eagles has also been known to occur on the northern tip of Holland Island, approximately 0.5 mile from the southern end of Adam Island. The last recorded activity at that nest was in 1994. A survey conducted by the Navy in 2005 showed no indication of nesting activity in the area. Therefore, implementation of either Alternative 2 or 3 would have no effect on the bald eagle.

4.9.2.1.3 Impacts on Threatened and Endangered Species - Marine Mammals and Sea Turtles

Federally listed threatened and endangered marine mammal and sea turtle species that may occur in the waters of Chesapeake Bay, mostly in the summer months, include the fin whale, humpback whale, northern right whale, West Indian manatee, loggerhead sea turtle, Kemp's ridley sea turtle, green sea turtle, leatherback sea turtle, and Atlantic hawksbill turtle. In general, the seasonal and transient nature of these species, combined with their low densities in the vicinity of the BIR, would significantly reduce the potential for any adverse impacts on these species to occur during the proposed range operations. Any impacts that could potentially occur would be related to habitat alteration and direct physical impacts. The potential for these impacts to occur are evaluated below.

Habitat Alteration. Disturbance of sediment from boat operations or nonexplosive ordnance releases into the water were considered for effects on listed species. Increased turbidity and decreased water quality caused by disturbed sediments may preclude the use of certain habitats available at the BIR or reduce the suitability of habitats for prey species. In general, increased turbidity is expected to be a short-term, localized condition. Background turbidity levels are already highly variable based on precipitation, tides, and season. Also, the level of disturbance would vary based on composition of the sediments. Sand is more easily disturbed than mud; however, it also settles out of the water column more quickly. As discussed in section 4.6, water and sediment quality would not be adversely affected by the proposed action. Therefore, any of the listed species transiting the waters adjacent to the BIR would not be exposed to elevated levels of contaminants or other substances.

Some of the listed sea turtle and marine mammal species, such as the Kemp's ridley and green sea turtles and West Indian manatee, spend significant amounts of time foraging in SAV. SAV concentrations within the boundaries of the BIR, not to mention Chesapeake Bay as a whole, have decreased in recent years, limiting the BIR's attraction to these species. Despite this, as discussed in section 4.7, impacts on SAV from the proposed range operations, if they occur, would be minor and highly localized. Therefore, no effects to any of these species related to the potential for loss of foraging habitat due to implementation of Alternatives 2 or 3 are expected.

Direct Contacts or Strikes. The potential for nonexplosive ordnance to directly strike and injure or kill any of the listed sea turtles or marine mammals is extremely low because (1) all of the targets will be located onshore and the potential for large articles (i.e., bombs, rockets, missiles) entering the open bay waters is minimal; and (2) the velocity of dropped ordnance decreases considerably on entry into the water, thereby decreasing the likelihood of significant injury to submerged species. In addition, only nonexplosive ordnance would be used on the BIR, thereby eliminating possible impacts from underwater concussive force.

The potential also exists for boats and amphibious assault landing craft to strike sea turtles or marine mammals. The likelihood of a vessel striking an animal would be no greater than that for a recreational vessel, except during night operations. However, these craft are equipped with vision enhancement systems, such as night vision goggles, FLIR and other similar systems to assist in locating obstructions in the water. In addition, personnel on board vehicles are trained to remain vigilant of potential obstructions along their route, which would include identifying the presence of marine mammals, thereby reducing the potential for a collision to occur.

Underwater Acoustics. Underwater acoustic impacts on threatened and endangered marine mammals and sea turtles would be the same as described for marine mammals in section 4.8. The operation of amphibious assault landing craft at the BIR would have no effect on marine mammals or sea turtles.

Summary. Based on the above factors, implementation of either Alternative 2 or Alternative 3 would have no effect on the federally listed sea turtle and marine mammal species occurring in the bay.

4.9.2.2 Other Species of Concern

As discussed in section 3.9, the state-listed peregrine falcon has historically nested on a tower on Adam Island. The nest was successfully relocated in 1998, and no further nesting has been identified within the boundaries of the BIR. Furthermore, the tower was removed in the late summer/fall of 1997. In the event that future peregrine nesting activity is observed within the designated impact areas of the BIR, the Navy will consult with MDNR to identify suitable relocation options in order to avoid impacts from range operations.

The state-listed seaside knotweed, slender sea-purslane, and swamp dock have all recently been identified on the BIR, generally in association with the shoreline and overwash zones of the beaches around Bloodsworth and Pone islands. Based on surveys conducted in 2003, the largest concentration of state-listed plant species occurs along the beach south of Okahanikan Point on Bloodsworth Island. No permanent facilities or other activities are planned for this area.

However, both seaside knotweed and slender sea-purslane do occur within the amphibious assault craft landing zone on Pone Island (see Figure 2-3). Additionally, two acres of land encompassing this landing zone have been identified as seaside knotweed habitat. The Navy would consider the locations of the seaside knotweed and slender sea-purslane plants during the siting and design of the amphibious assault craft landing pad on Pone Island and, where practicable, will implement procedures to avoid impacts to these species during construction activities.

4.10 Cultural Resources

4.10.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, the airspace overlying the BIR would continue to be used for range operations. Maintenance of targets will not occur in areas that are either listed in or eligible for listing in the NRHP. Therefore, the No Action Alternative would have no effect on cultural resources present on the BIR.

4.10.2 Alternatives 2 and 3

As discussed in section 3.10, the BIR contains three historic sites (18D079, 18D080, and 18D081) that are either eligible or contributing elements to an historic district, and one site (18D0407) that has not been evaluated for eligibility for listing in the NRHP. Each of these sites is within the boundaries of the existing No Fire Area and consequently is outside of the area of potential effect associated with the proposed range operations.

Proposed infrastructure improvements within the No Fire Area could include the installation of radar reflectors, an area surveillance system, a WISS, and a helicopter landing pad. This infrastructure primarily involves installation of numerous mounting poles concentrated in various sections of the No Fire Area, and would be sited along the shoreline. Therefore, infrastructure improvements within or adjacent to the historic sites would be avoided. As a result, the Navy has determined that implementation of the proposed action under either Alternative 2 or Alternative 3 would have no adverse effect on the proposed historic district or the eligibility of any historic site for listing in the NRHP.

Based on the above analysis, there would be no significant impact on historic or cultural resources with implementation of Alternatives 2 or 3.

4.11 Noise

4.11.1 No-Action Alternative (Preferred Alternative)

The No-Action Alternative would continue the Navy's voluntary suspension of all impact operations on the BIR; hence, the existing noise environment would remain the same. Noise levels within and surrounding the BIR would be less than 50 dB, except along the east side of the Chesapeake Test Range, where the MTRs approach the BIR. The Patuxent River Complex EIS addressed aircraft-related noise impacts due to the Navy's use of the MTRs.

In 2001, NAS Patuxent River established a noise disturbance hotline and aircraft noise monitoring system around Chesapeake Bay for the purpose of monitoring aircraft noise and responding to aircraft related noise complaints in the Patuxent River Complex. This hotline averaged about 80 noise complaints per year during

the period from 2000 through 2004. The majority of the complaints registered were from citizens living near NAS Patuxent River, in St Mary's County, Smith Island, Calvert County or from the Northern Neck of Virginia. Noise complaints from Maryland's Eastern Shore have averaged about 10 noise complaints per year. Some of these complaints are caused by NAS Patuxent River aircraft performing RDT&E testing at subsonic and supersonic speeds. The supersonic testing in the vicinity of BIR is conducted above 30,000 feet in order to minimize the impact of supersonic operations to the local community. A more complete description of noise impacts related to RDT&E operations in the vicinity of BIR is included in the 1998 Patuxent River EIS. In addition, several of those complaints are attributable to low-level air traffic along the MTRs rather than to test flights from NAS Patuxent River. It is standard operating procedure for Air Operations specialists at NAS Patuxent River to make every effort to resolve the source of an aircraft noise complaint, even when the complaint may be misdirected, by contacting the appropriate agency.

Therefore, no significant noise impacts would result from the implementation of the No Action Alternative

4.11.2 Alternatives 2 and 3

Under Alternatives 2 and 3, noise would be generated during operations of fixed- and rotary-wing aircraft and small boats and amphibious assault craft, and during the firing of small arms and other weapons. Most air-to-ground events at the BIR would occur at or above 10,000 feet AGL. However, some rotary- and fixed-winged aircraft would operate from the surface to 3,500 feet AGL. In addition, conventional shallow-draft boats under 50 feet in length would operate at speeds up to 35 knots and the EFV would operate along the sandy beaches on the western and southern ends of Bloodsworth Island.

4.11.2.1 Fixed-Wing Aircraft Noise Impacts

The FAA, the Navy, and other federal agencies universally identify the DNL 65 dBA contour as a threshold level above which human exposure to aircraft noise may cause a significant impact. In fact, the FAA recently reaffirmed the use of the 65 DNL as a valid criterion for noise impact that correlates well with community response to aircraft noise (69 FR 33780). However, selection of the DNL 65 dB factor for assessing the significance of aircraft noise impacts does not mean that no one will become annoyed by aircraft noise below that sound level. While annoyance is never zero, noise impacts that result in 45 DNL or less are low enough to be considered negligible. In addition, the 65 DNL is useful to recognize as a level that, when not exceeded, results in a noise environment that is normally compatible with all types of land uses, including noise-sensitive land uses such as residential development, houses of worship, schools, medical facilities, and outdoor recreational activities.

In 1998, the Navy completed detailed noise modeling for all aircraft operations conducted within the Patuxent River Complex (U.S. Navy December 1998) for three alternative levels of operations. The analysis addressed subsonic high-altitude air-to-ground nonexplosive ordnance delivery and strafing, and subsonic low-altitude strafing and rocket firing. The noise exposure analysis resulted in the development of L_{dnmr} contours for all aircraft activities, including those conducted in R-4002, which overlies the BIR. It is important to note that the level of aircraft operations evaluated for Operational Workload Alternative I are the same as proposed for Alternatives 2 and 3 in this EA.

Figure 4-3 shows modeled L_{dnmr} noise contours, 45 dB and greater, for all subsonic flight operations that would be conducted in the Patuxent River Complex under Alternative 2 and 3 (which equates to Operational Workload Alternative 1 in the 1998 Patuxent River Complex EIS). As can be seen, overall aircraft noise levels in the vicinity of the BIR from all aircraft operations conducted in the Patuxent River Complex would range from a value of about 45 L_{dnmr} to values of greater than 50 L_{dnmr} where two MTRs (VR 1711 and VR 1712) enter the east side of the complex. These noise levels are well below the 65 dB DNL guideline recommended by the DoD and FAA as the measurable threshold for significant noise impacts.

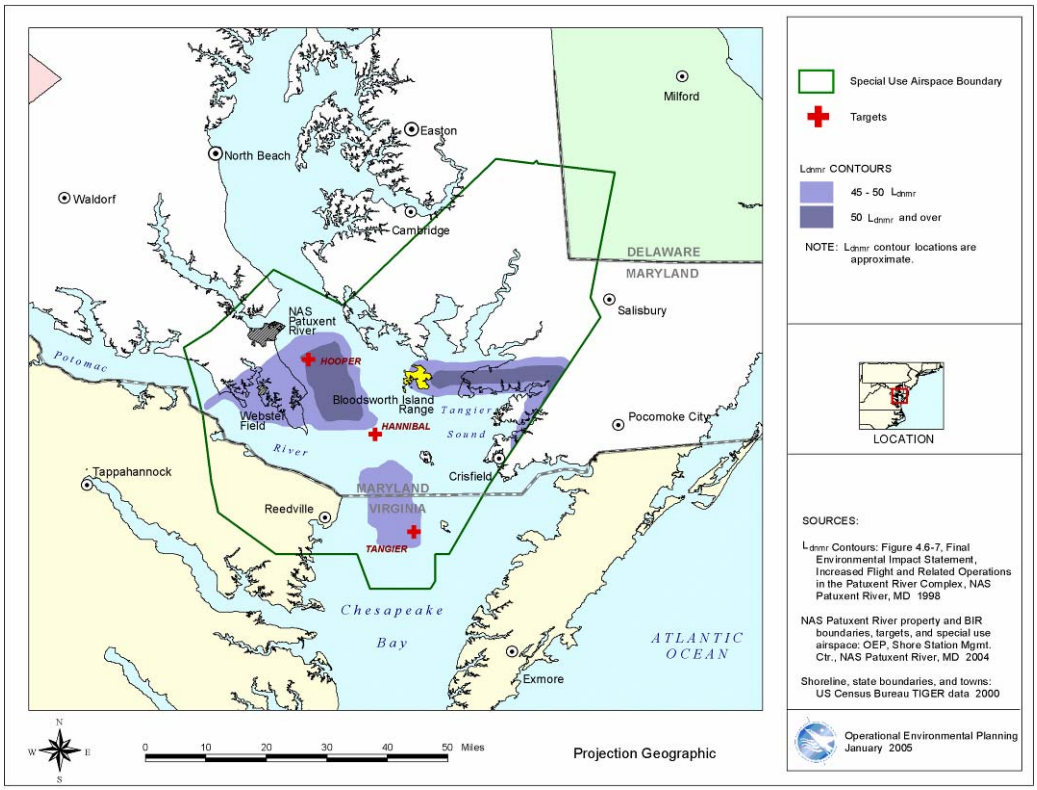

Figure 4-3 Noise Contours for Aircraft Overflights

Noise exposure values for the nearest sensitive receptor locations (Figure 4-4) are shown in Table 4-7. At the Karen E. Noonan Environmental Education Center at

Bishops Head, just north of the BIR, total noise exposure was calculated at 45 dB, again well below the FAA/DoD 65 dB DNL guideline for compatibility with residential uses. The average outdoor single-event maximum A-weighted noise level at this same location is shown as <50 dB in Table 4-7, indicating that speech interference impacts would not be significant. Noise exposure levels at Elliott Island, Maryland, another sensitive receptor in the general vicinity of the BIR, are similar to those identified for the Noonan Environmental Education Center.

When all of these modeled values are taken into account, noise impacts to sensitive receptors from aircraft operations conducted under Alternatives 1 or 2 would be less than the 65 dB DNL threshold of compatibility. Thus, aircraft noise generated with implementation of either alternative would not result in a significant impact on the existing noise environment.

Table 4-7 Noise Impacts on Sensitive Receptors from Fixed-Wing Aircraft Operations

Exposure Parameter	Sensitive Receptor	
	Bishop Head, MD	Elliott Island, MD
Total Noise Exposure Workload Alternative I (DNL) dB[1]	45	<45
percent Sentence Intelligibility		
Average Outdoor Single Event Max A-Weighted Noise Level (dB)[2]	<50	56
percent for Windows Open Closed	 100 100	 100 100
Maximum percent Awakenings		
Average Outdoor Nighttime Single Event Sound Exposure Level (dB)[3]	N/A	62
percent for Windows Open Closed	 0 0	 1 0

Source: U.S. Navy December 1998

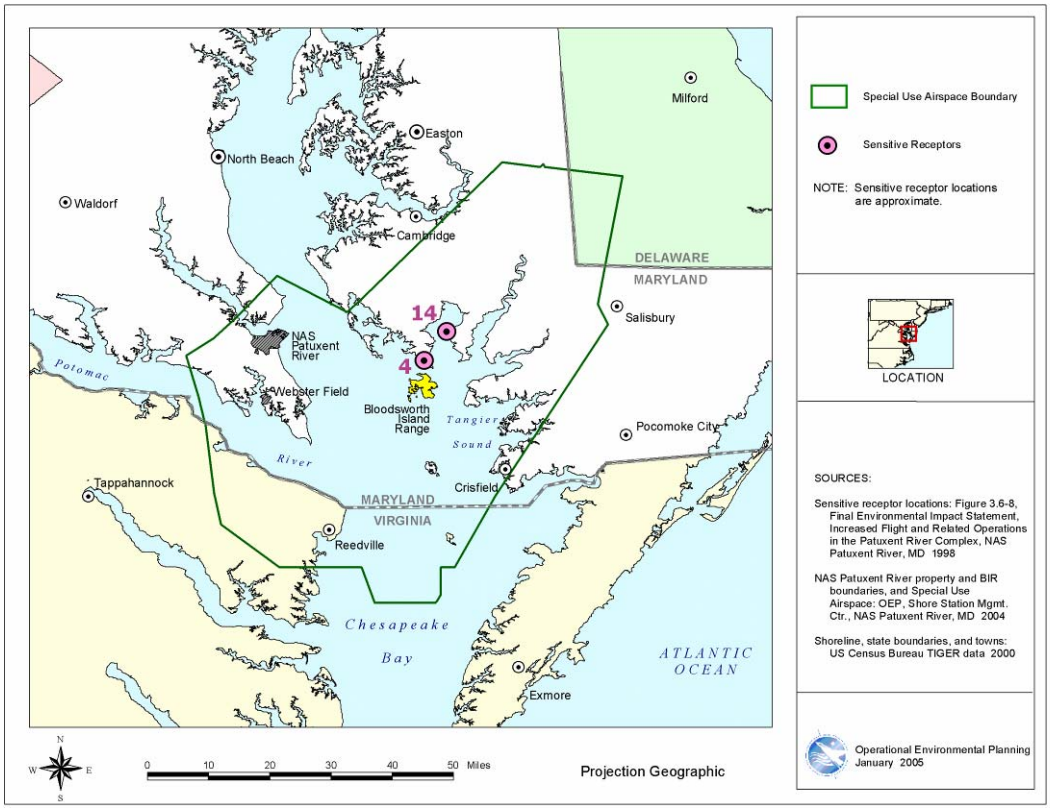

Figure 4-4 Locations of Nearest Sensitive Receptors

4.11.2.2 Rotary-Wing Noise Impacts

Noise generated by rotary-wing aircraft would be most noticeable to persons on shore as range operations are conducted. During many of these operations, helicopters would remain stationary over the BIR at altitudes of less than 10 to 100 feet. The Air Force has identified representative sound exposure levels for a CH-53 that would be produced at the point of generation out to several distances (USAF June 2004). At a distance of 1,000 feet the sound exposure level of a CH-53 is about 92.2 dBA (based on 100 percent RPM at 59°F, 70 percent relative humidity). At a distance of 5,000 feet, the sound exposure level drops to 76.4 dBA, which drops further to 63 dBA at 16,000 feet. It should be noted that during hot weather, helicopters require more energy to stay aloft, and produce more noise as a result, but humidity may have a dampening effect on sound. Cold weather may cause sound to travel farther than it would during warm weather. However, any impacts associated with helicopter operations are expected to be minimal or insignificant since the nearest sensitive receptor, the Karen E. Noonan Environmental Education Center located at Bishops Head Point, is approximately 2.5 miles (13,200 feet) north of the BIR and any associated noise impacts would be reduced to levels below the 65 dB DNL guideline recommended by the DoD and FAA.

4.11.2.3 Small Boat and Amphibious Assault Craft Noise Impacts

The watercraft operations that would be conducted at and around the BIR would include the use of small boats under 50 feet in length (the Patrol Boat Light [PBL], the River Patrol Boat [PBR], the Special Operations Craft Riverine [SOC-R]), and the EFV. Noise impacts from the operation of a PBL, PBR, or SOC-R would generate single event noise levels of between 70 to 101 dBA measured at a distance of 82 feet from a boat, as the boat passes at speeds ranging from 15 to 20 knots. These noise levels would be similar to noise level experienced from other recreational craft and not cause a significant noise impact.

At a distance of 100 feet and while moving, the EFV has an average airborne sound exposure level (SEL) of 84 dBA while in the water and 90 dBA while on land. These noise levels decrease to 72 dBA while the EFV is in idle mode (U.S. Navy October 2002). The USMC has evaluated sound levels associated with EFV amphibious operations at Marine Corps Base Pendelton. The one-hour equivalent noise level at a distance of 3,000 feet from the operation was estimated to be 45 dBA (USMC 2003). This low noise level within 0.6mile of the amphibious assault craft indicates that activities at the closest noise sensitive receptor to the BIR would not be affected by the EFV operations. (The underwater acoustic impacts of EFV operations are discussed in more detail in section 4.8 of this EA.)

4.11.2.4 Small Arms Fire

Impulsive noise generated by small arms firing is fundamentally different from continuous noise sources (e.g., noise generated by fixed-wing aircraft). Thus, the noise threshold criteria for impulsive noise are different from those for continuous noise. Permanent damage to unprotected ears due to continuous noise occurs at approximately 85 dBA (A-weighted decibel) based on an eight-hour-per-day exposure, while the threshold for permanent damage to unprotected ears due to impulsive noise is approximately 140 dBP based on 100 exposures per day (Pater, 1976).

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) provides guidelines for evaluating the impact of peak noise levels generated during range operations (Table 4-8). Although never officially adopted, the Army has used these criteria for many years. In 1996, USACHPPM conducted a study to correlate annoyance with measured dBP (US Army National Guard Bureau, 1996) and concluded that:

- dBP criteria are useful for noise complaint management and investigations.
- dBP provides a good estimate of the perceived vibration of typical residential construction.

Table 4-8 Impulse Noise Guidelines

Sound Level(dBP)	Risk of Complaints	Action
< 115	Low	Fire all programs
115 – 130	Moderate	Fire important tests; postpone noncritical testing, if feasible
130 - 140	High, and possibility of damage	Only extremely important tests should be fired
> 140	Threshold for permanent physiological damage to unprotected ears - High risk of physiological and structural damage claims	Postpone all explosive operations

Source: USACHPPM, May 2001.

Table 4-9 presents the peak sound levels in dBP in varying distances from the source (i.e., at the muzzle) for the various types of firearms that would be employed on the BIR. The most significant noise sources would be the large-caliber weapons, e.g., 25mm cannon, which generate a peak sound level of between 112 and 122 dBP at 1,000 meters, and the MK-19 grenade launcher, which generates a peak sound level of 114dBP at 1,000 meters.

The distance between the location where these firearms would be discharged and noise-sensitive areas in Bishops Head and Deal Island exceeds 5,000 meters and thus the peak sound levels would be expected to fall below the 115 dBP noise complaint threshold. Based on the relative distance of the nearest noise-sensitive receptors to the north and east of the BIR, and the fact that only 15 training events would occur per year, it was determined that no significant adverse noise impacts are anticipated as a result of the special warfare training operations.

The noise impacts from weapons firing for Alternative 3 would be the same as described for Alternative 2 even though the number of training events would increase from 15 to 23.

Table 4-9 Peak Sound Levels from Small Arms Fire

Noise Source	Distance (meters)	Peak Sound Level (dBP) Azimuth=0°	Azimuth=90°	Azimuth=180°
Small-caliber ammunition				
M-16 (5.56mm) Rifles	1,000 5,000	84 64	77 57	70 50
M-14 (7.62mm) Rifles	1,000 5,000	89-104 72-84	76-81 64-79	74-89 62-77
M-60 (7.62mm) Machine guns	1,000 5,000	88 68	80 61	73 54
MP-5 (9mm) Submachine guns	1,000 5,000	94 74	87 67	79 60

Noise Source	Distance (meters)	Peak Sound Level (dBP) Azimuth=0°	Azimuth=90°	Azimuth=180°
.50cal Machine guns	1,000 5,000	94 74	87 67	79 60
9mm Pistols	1,000	74-89	67-82	74-89
Large-caliber ammunition		Azimuth = 0 (degrees)		
25mm Cannon	1,000 5,000	112-122 68-97		
MK19 (40mm) Grenade launcher	1,000 5,000	114 94		

Sources: 1) Stewart November 16, 2004.
2) National Guard Bureau April 1996

Notes:
1. Azimuth = 0 - firing in the direction of the receptor; Azimuth = 90 - firing in a direction perpendicular to the receptor; Azimuth = 180 - firing in a direction opposite to the receptor
2. No estimate of peak sound level was available for the MP-5 (9mm) submachine gun, so the peak noise level used was estimated from the data for the 5.56mm squad automatic weapons and the 7.65mm machine gun.

4.12 Air Quality

All air emissions for the proposed activities would occur in areas (Maryland Eastern Shore and St. Mary's County Air Quality Control Regions) that are in attainment for all criteria pollutants. Therefore, as discussed in Chapter 3, the General Conformity Rule does not apply. Furthermore, regional air quality impacts would be considered significant only if any increase caused, or contributed to, a violation of national or state ambient air quality standards. For the purpose of this evaluation, it was assumed that increases in emissions that are below Conformity Rule *de minimis* levels would not result in an impact on air quality in the region.

Various infrastructure improvements could be needed to support the range operations proposed under Alternatives 2 and 3. Construction of these improvements would result in an increase in criteria pollutants from construction equipment and particulate emissions (mostly as dust) from surface disturbance. However, given the logistical difficulty of transporting construction equipment to and operating it on the water-based BIR, infrastructure improvements would generally be executed with a minimum of heavy machinery (i.e., equipment with an internal combustion). In addition, any construction activities would take place over a period of several years, as needed. As a result, activities to install infrastructure improvements at the BIR would be a negligible and temporary source of air emissions. Some equipment, such as the area surveillance system, would require sources of power, which would primarily be photovoltaic solar panels. Portable diesel generators would be made available to provide backup power. The backup power sources would produce negligible air emissions, and the photovoltaic solar panels would produce no air emissions.

To calculate the likelihood of air quality impacts from proposed range operations, aircraft and watercraft emission rates were determined based on published emission factors and projected operational data provided by the Navy. Emissions from watercraft were estimated using emission factors from Energy and Environmental Analysis, EPA420-00-002, *Analysis of Commercial Marine Vessels Emission and Fuel Consumption Data, Final Report* (February 2000). These emission factors were developed for watercraft with an average power capability of 1,106 horsepower, which is conservative for the watercraft used for the proposed exercises.

To estimate emissions from helicopters, emissions factors from the U.S. Navy's Aircraft Environmental Support Office (AESO) Memorandum Report No 9934B, *Aircraft Emission Estimates: H-3 Mission Operations Using JP-5* (January 2001) were used. After review of emission factors for all helicopters that could be used in the proposed exercises, it was determined that the emissions from the H-3 for Mountain SAR training represented the most conservative emissions total calculated for a helicopter operation that is published by AESO. Therefore, the use of this emissions total provided a conservative estimate of emissions likely to be generated by helicopter use during the proposed range operations.

The following components of the proposed range operations were considered in assessing potential air quality impacts:

- Most fixed-wing aircraft overflights would continue to occur above 3,500 feet AGL, and therefore, would not be a pertinent source of ground-level emissions in the analysis. This is because altitudes greater than 3,000 feet are above the mixing zone (i.e., that layer of the atmosphere where the atmosphere is completely mixed, which extends from the earth's surface up to altitudes of a few thousand feet). Emissions released above the mixing zone have no measurable ground-level effects because they become too widely dispersed before reaching ground level. In the summer, the mixing zone generally is at a higher altitude for a given time of day than in winter. USEPA (April 1999) recommends using a mixing height of 3,000 feet in assessing the effects of aircraft emissions. This 3,000-foot mixing height is meant to approximate summertime conditions.

- Similarly, most of the firing of nonexplosive air-to-ground ordnance would also occur above 3,500 feet AGL and thus would not be a pertinent source of ground-level emissions. The exception would be rotary-wing aircraft gun firing (strafing), which may occur as low as 2,000 feet AGL. However, since strafing is anticipated to be an infrequent activity (less than 100 hours per year), its contribution to ground-level air emissions would be negligible.

- SAR/CSAR exercises and other exercises involving rotary-wing aircraft would generally involve aircraft flight at low altitudes (<3,500 feet AGL) and are evaluated in this analysis.

- Small boat operations would be conducted at the BIR by the Naval Surface Warfare Center (NSWC), FBI, Department of Homeland Security (U.S. Coast Guard and U.S. Customs), and possibly other federal agencies. During boat maneuver events, the watercraft would operate at speeds up to 35 knots. These operations would use, on average, two boats per operation. Amphibious assault landing craft (e.g., the EFV) may also be used, but these would generally remain at the shoreline or proceed a very short distance inland following the landing. Therefore, emissions from these vehicles are considered negligible.

- Many operations at the BIR would involve the firing of small arms. Air emissions can be released during the firing of small arms weapons; however, as discussed in the Patuxent River Complex EIS (U.S. Navy December 1998), emissions due to nonexplosive ordnance release and gunfire around and at the target areas would be negligible.

Air quality emissions associated with implementation of the No-Action Alternative and Alternatives 2 and 3 are discussed below.

4.12.1 No-Action Alternative (Preferred Alternative)

Under the No-Action Alternative, aircraft would continue to overfly the BIR. The emissions associated with the No-Action Alternative from aircraft overflights and boats or helicopters used to transport personnel were assessed in the Patuxent River Complex EIS (U.S. Navy December 1998). Total emissions were found to be well below the *de minimis* thresholds and would have a negligible effect on air quality.

4.12.2 Alternative 2

Estimated air emissions from range operations proposed for the BIR under Alternative 2 are listed in Table 4-10. As can be seen, total emissions are well below the *de minimis* thresholds established under the General Conformity Rule; therefore, implementation of Alternative 2 would not result in a significant impact on local or regional air quality. Since the area is in attainment for all criteria pollutants, a Record of Non-Applicability (RONA) would not be required for this action.

Table 4-10 Air Emissions from Operations under Alternative 2

Operations	No. of Operations[a]	Emissions (lbs/operation)					Emissions (TPY)				
		PM	NO_x	SO_2	CO	HC	PM	NO_x	SO_2	CO	HC
Small Boats and Amphibious Assault Craft											
Boat maneuvers	6										
Boat emissions	6	0.83	33.3	5.27	3.71	0.37	0.01	0.20	0.03	0.02	0.00
Platform/integration test and training	18										
Boat emissions	18	0.83	33.3	5.27	3.71	0.37	0.02	0.60	0.10	0.07	0.01
Amphibious assault craft landing[b]	6										
Boat emissions	6	0.83	33.3	5.27	3.71	0.37	0.01	0.20	0.03	0.02	0.00
Rotary-wing emissions	6	3.00	8.27	0.68	16.19	1.35	0.02	0.05	0.00	0.10	0.01
SAR/CSAR	15										
Boat emissions	15	0.83	33.3	5.27	3.71	0.37	0.01	0.50	0.08	0.06	0.01
Rotary-wing emissions	15	3.00	8.27	0.68	16.2	1.35	0.05	0.12	0.01	0.24	0.02
Helicopter Operations	20										
Rotary-wing emissions	20	3.00	8.27	0.68	16.19	1.35	0.06	0.17	0.01	0.32	0.03
Special Warfare Operations	15										
Boat emissions	15	0.83	33.3	5.27	3.71	0.37	0.01	0.50	0.08	0.06	0.01
Total Emissions (TPY)							**0.19**	**2.34**	**0.34**	**0.89**	**0.08**

[a] The average number of vehicles used in applicable operations was 2.
[b] Amphibious Assault Craft emissions are negligible.

4.12.3 Alternative 3

Estimated air emissions from range operations conducted at the BIR under Alternative 3 are listed in Table 4-11. The total emissions are well below the *de minimis* thresholds established under the General Conformity Rule; therefore, implementation of Alternative 3 would not result in a significant impact on local or regional air quality. Since the area is in attainment for all criteria pollutants, a RONA would not be required for this action.

Table 4-11 Air Emissions from Operations under Alternative 3

Operations	No. of Operations[a]	Emissions (lbs/operation)					Emissions (TPY)				
		PM	NO_x	SO_2	CO	HC	PM	NO_x	SO_2	CO	HC
Small Boats and Amphibious Assault Craft											
Boat maneuvers	10										
Boat emissions	10	0.83	33.3	5.27	3.71	0.37	0.01	0.33	0.05	0.04	0.00
Platform/integration test and training	30										
Boat emissions	30	0.83	33.3	5.27	3.71	0.37	0.03	1.00	0.16	0.11	0.01
Amphibious assault craft landing[b]	10										
Boat emissions	10	0.83	33.3	5.27	3.71	0.37	0.01	0.33	0.05	0.04	0.00
Rotary-wing emissions	10	3.00	8.3	0.68	16.2	1.35	0.03	0.08	0.01	0.16	0.01
SAR/CSAR	25										
Boat emissions	25	0.83	33.3	5.27	3.71	0.37	0.02	0.83	0.13	0.09	0.61
Rotary-wing emissions	25	3.00	8.27	0.68	16.2	1.35	0.08	0.21	0.02	0.41	0.03
Helicopter Operations	25										
Rotary-wing emissions	25	3.00	8.27	0.68	16.2	1.35	0.08	0.21	0.02	0.41	0.03
Special Warfare Operations	10										
Boat emissions	10	0.83	33.3	5.27	3.71	0.37	0.01	0.33	0.05	0.04	0.00
Total Emissions (TPY)							**0.25**	**3.33**	**0.49**	**1.29**	**0.11**

[a] The average number of vehicles used in applicable operations was 2.
[b] Amphibious Assault Craft emissions are negligible.

4.13 Ordnance, Hazardous Materials Management, Radio-Frequency Sources, and Directed Energy Systems

4.13.1 No-Action Alternative (Preferred Alternative)

4.13.1.1 Ordnance and Hazardous Materials Management

The No-Action Alternative involves aircraft overflights and no ground impact operations involving the release of nonexplosive ordnance, as well as the maintenance of existing land-based targets. Since no ordnance would be dropped on the BIR and targets would be drained of oil and other fluids before placement on the BIR, there would be no effects related to hazardous materials. Ordnance-related debris, including UXO from past missions, would remain on the BIR. However, debris associated with target maintenance would be removed.

Current Department of the Navy policy does not require routine clearance of UXO and ordnance-related debris on active ranges. Since the BIR is an active range, a formal range clearance plan is unnecessary. However, in recognition of the inherent dangers associated with UXO, the NAVAIR Range Department strives to minimize this danger through the following UXO range clearance operations at the BIR.

Maintenance activities at the BIR will be coordinated through the NAS Patuxent River Facilities Support Public Works Department. The Facilities Support Department will ensure that the Explosives Safety Officer is part of the planning process for maintenance activities at the BIR to ensure that EOD personnel are involved during earth-disturbing activities, removal of unknown debris, or other situations that are deemed hazardous. NAS Patuxent River Instruction 8010.1A will be adhered to at all times when UXO could be a hazard to hunters and recreational boaters who frequent the shoreline around the BIR. NAS Patuxent River has identified specific locations (stake sites) where permitted hunters may tie or anchor boats.

In addition, aerial surveys to identify UXO in areas where access by boats is possible but prohibited have been performed in the past and would continue to be performed in the future around the perimeter of the BIR as conditions warrant. In addition, personnel on Air Operations Department SAR helicopters will search the shorelines at the BIR during routine training missions to monitor the status of "No Trespassing" signs and look for visible unexploded ordnance. The NAVAIR Range Department would also check for visible UXO when range clearance boats operate in the area.

Disposal of UXO or suspected UXO will be performed in strict adherence with Navy EOD policy and the military munitions rule. As discussed in section 3.13, military munitions are not considered a solid waste for regulatory purposes when they are used for their intended purpose, even if the intended purpose results in the deposition of munitions on land. If munitions are collected and moved or transported off site as part of scrap metal and UXO clearance operations, the Navy would be responsible for the disposal of these items as solid or hazardous wastes as required under Subtitles C and D, as appropriate, of the Resource Conservation and Recovery Act.

4.13.1.2 Radio-Frequency Sources

Under the No-Action Alternative, there are no RF energy sources associated with the ground-based targets at the BIR. There would be no impacts related to exposure to RF energy with implementation of this alternative.

4.13.1.3 Directed Energy Systems

Directed energy systems would continue to be employed during range operations conducted in the Patuxent River Complex under the No Action Alternative. All appropriate safety measures would be adhered to during these operations in order to ensure that the public and military personnel are protected from exposure to these systems. Therefore, there would be no significant impacts associated with implementation of this alternative.

4.13.2 Alternatives 2 and 3

4.13.2.1 Ordnance and Hazardous Materials Management

Range operations proposed under Alternatives 2 and 3 would result in the accumulation of nonexplosive ordnance and related debris on the BIR, although none of this accumulated debris would be categorized as UXO. This is because only nonexplosive ordnance would be used. Debris that may remain on the BIR would include items from present day missions, such as flare chutes and structures, chaff, or brass casings that cannot be retrieved.

As discussed in section 3.6, recent testing indicates that the historic use of the BIR for range operations, which included release of explosive ordnance, has not resulted in the contamination of, or cause adverse impacts on, surface water, sediments, or soils at the range (Naval Facilities Engineering Command Atlantic Division 2002). Based on these findings, and the impact analysis for water and sediment quality in section 4.6, release of nonexplosive ordnance at the BIR under either Alternative 2 or Alternative 3 would have no significant impact related to hazardous materials.

4.13.2.2 Radio-Frequency Sources

Under Alternatives 2 and 3, portable EW emitters would be temporarily placed and used at the BIR. The proposed portable EW emitters would primarily consist of aircraft threat simulation radar. These EW emitters would emit RF energy while in operation; emissions cease when the emitter is turned off. The RF energy generated is the same type as that emitted by cell phones, hand-held radios, walkie-talkies, commercial radio, and television stations (U.S. Navy January 2000).

To protect the health and safety of personnel in proximity to RF energy, the Navy manages the operation of systems like EW emitters under its HERP program. HERP is defined in terms of power density or watts of power flowing through a given area. For an HERP condition to exist, personnel would have to be in proximity of an emitting antenna directing the power into a concentrated area. However, this HERP zone is not considered as construction exclusion zones for habitable facilities but as zones where a heightened awareness of the potential hazard should exist. The NAVAIR Range Department would adhere to Navy HERP regulations and procedures concerning RF hazards to protect Navy personnel and the public during operation of the portable EW emitters. In addition, frequency management would be coordinated by the NAVAIR Range Department so that these emitters would not create interference with other federal or civilian transmitters or receivers. Therefore, there would be no significant impacts associated with operation of the portable EW emitters under either Alternative 2 or 3.

4.13.2.3 Directed Energy Systems

The use of directed energy systems would continue to be used during range operations conducted on the BIR. Use of such systems would be limited to those targets that have been surveyed and specifically approved for such use. If new or additional targets were needed, the target and target area would be surveyed and assessed before approval to ensure that no potential hazards exist that could create safety risks.

4.14 Transportation

4.14.1 No-Action Alternative (Preferred Alternative)

Since the No Action Alternative involves aircraft overflights and limited vessel trips to the BIR for the purpose of target maintenance, there would be no effect on transportation.

4.14.2 Alternatives 2 and 3

The range operations proposed under Alternatives 2 and 3 would have no impact on transportation facilities on the Eastern Shore of Maryland. In addition, the proposed activities would have no impact on commercial shipping activities on Chesapeake Bay, since commercial shipping lanes are located approximately 3 miles west of the western boundary of the surface danger zone. Cumulative impacts on commercial shipping traffic are discussed further in section 4.15.

4.15 Cumulative Impacts

Cumulative impacts have been defined by the CEQ in 40 CFR 1508.7 as:

> *…impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.*

Accordingly, a cumulative impacts analysis must identify and define the scope of other actions and their interrelationship with the proposed action or its alternatives if there is an overlap in space and time. Cumulative effects are most likely to occur when a proposed action is related to actions that could occur in the same or overlapping geographic location or at the same or a similar time. The following questions were considered in identifying the potential for cumulative impacts in this EA:

- Would the proposed action affect or interact with the same resources that have been or would be affected by past, present, or reasonably foreseeable

actions? If so, would the proposed action affect or be affected by impacts of the other action?

- If an interrelationship exists between the proposed actions and other past, present, or reasonably foreseeable actions, are there any potentially significant impacts not identified when the proposed action is considered alone?

4.15.1 Scope of the Cumulative Impact Analysis

For the purposes of this analysis, public documents prepared by federal, state, and local government agencies were the primary sources of information for identifying reasonably foreseeable future actions (past and present actions have been considered in the environmental baseline presented in chapter 3). Consequently, the focus of this cumulative impact analysis is on the following:

- Existing commercial shipping traffic in the main stem of Chesapeake Bay and its compatibility with proposed action
- Expansion of the Dominion Cove Point Liquefied Natural Gas (LNG) Facility, Cove Point, Maryland
- Proposed U.S. Army Corps of Engineers Restoration Project at Barren Island, Dorchester County, Maryland
- Proposed expansion of Naval Surface Warfare Center, Carderock Division's Combatant Craft Department test operations in the Patuxent River Complex
- Other Future RDT&E Activities Conducted by the NAVAIR Range Department

All of these proposed actions would result in increased use of the surface waters of Chesapeake Bay.

4.15.2 Cumulative Impact Analysis

4.15.2.1 Commercial Shipping Traffic in the Main Stem of Chesapeake Bay

The Port of Baltimore is one of the top 20 ports in the U.S., handling more than 38.8 million short tons of cargo in 2002 (U.S. Army Corps of Engineers 2003). Commercial vessels, which include cargo ships, cargo and tanker barges, tugboats, and deep-draft ocean-going vessels, arrive at and depart from the Port of Baltimore via the Chesapeake and Delaware Canal or Chesapeake Bay. The number of vessels transiting the bay in 2002 totaled about 11 per day, or about

4,000 vessels per year. This represented a 4 percent decrease in use of the shipping lanes since 1998.

Chesapeake Bay shipping channels traverse the troughs of the deepest waters of Chesapeake Bay, which span the center of the bay at depths of 50 feet or greater. The BIR is well removed from the commercial shipping lanes, with the designated Surface Danger Zone boundary about 8 nautical miles to the east. As mentioned previously in this EA, the BIR is located in relatively shallow waters (12 to 20 feet), which is not conducive to shipping operations. Implementation of the proposed action under either Alternative 2 or Alternative 3 would increase the use of the waters of Chesapeake Bay for military use; however, commercial shipping operations in Chesapeake Bay would not be significantly affected because of the location of the BIR and the fact that the smaller military vessels could avoid the larger vessels while making transits to and from the range. The cumulative increase in the use of the bay's surface waters as a result of the proposed action would not result in a significant cumulative effect.

4.15.2.2 Expansion of the Dominion Cove Point LNG Facility, Cove Point, Maryland

Dominion Cove Point LNG, LP, is located on the western shore of Chesapeake Bay at Cove Point in Calvert County, Maryland. It is the nation's largest LNG import facility, with on-site storage capacity of 7.8 billion cubic feet of natural gas. The facility began operations in the 1970s under a different owner. The current owner acquired the facility in 2002 and began receiving LNG tankers in the summer of 2003. Current plans are to expand the facility by 2008, increasing storage capacity from the current 7.8 billion cubic feet to 14.6 billion cubic feet and increasing output capacity from 1 billion cubic feet per day to 1.8 billion cubic feet per day. The Federal Energy Regulatory Commission is currently preparing an Environmental Impact Statement evaluating this proposed expansion.

Cove Point is about 13 nautical miles to the northwest of the BIR. LNG tankers would use the established shipping lanes previously discussed in delivering LNG to the facility from an offshore platform. By 2008, the number of LNG tankers using the shipping lanes to deliver LNG to Dominion Cove Point LNG will increase over existing conditions. Given that the facility and Chesapeake Bay's commercial shipping lanes are both well removed from BIR, proposed range operations at the BIR would not interfere with operations of the LNG facility. Moreover, if the Navy will be, or soon will be, initiating an exercise, commercial vessels within the range hazard pattern, when in "established steamer lanes" (i.e., the shipping channel), are not required to halt and wait for the exercise to be completed. Instead, they are to "proceed on their normal course through the area with all practicable speed" as noted in 33 CFR 334.210(6). The Navy may also contact commercial vessels to advise them of an imminent exercises. This requirement would keep loaded LNG tankers bound for Cove Point clear of any exercises occurring in or near the BIR. The cumulative increase in the use of the

bay's surface waters as a result of the proposed action would not result in a significant cumulative effect.

4.15.2.3 Proposed U.S. Army Corps of Engineers Restoration Project at Barren Island

The proposed restoration project would involve Barren Island, an island west of Hooper Island and about 13 nautical miles northwest of the BIR. The scope of work would be similar to that currently underway at Poplar Island, which is east of Tilghman Island off Talbot County, Maryland. At Poplar Island, the U.S. Army Corps of Engineers is using materials dredged from the approaches to Baltimore harbor to create 1,110 acres of upland and wetland habitat. When the project is completed, Poplar Island will become a wildlife sanctuary. The current schedule for completion of the project is 2024. Seasonal barge traffic, earth-moving equipment, and other heavy construction equipment are involved. Barren Island is well to the north of the BIR Surface Danger Zone. As a result, proposed range operations at the BIR would not interfere with operations/construction activities at this island. The cumulative increase in the use of the bay's surface waters as a result of the proposed action would not result in a significant cumulative effect.

4.15.2.4 Proposed Expansion of Naval Surface Warfare Center, Carderock Division's Combatant Craft Department Test Operations in the Patuxent River Complex

In 2003, NSWC, Carderock Division, Combatant Craft Department proposed to expand its existing test operations at the Patuxent River Complex. The testing proposed would involve conducting a variety of tests to evaluate signature characteristics of watercraft, marine communication and surveillance products, maneuverability of watercraft, vessel immobilization devices, watercraft-mounted weapon systems, and boat-launched missile firing. Alternatives would involve variation in testing tempo and range from 305 to 325 days per year. Testing would occur within the surface water boundaries of the Patuxent River Complex. As with the other projects considered in this cumulative impact analysis, there would be a net increase in the use of the bay's surface waters. The proposed Combatant Craft Department testing would be consistent with current military uses of the Patuxent River Complex and not interfere with proposed operations at the BIR. In fact, some of the proposed tests could be accommodated at the BIR, minimizing the increase in use of the bay. As a result, cumulative effects would not be significant.

4.15.2.5 Other Future RDT&E Activities Conducted by the NAVAIR Range Department

The NAVAIR Range Department will continue to conduct aircraft-related RDT&E activities within the Patuxent River Complex, which includes the land, water, and airspace comprising the Chesapeake Test Range. The use of the

Chesapeake Test Range has been highly variable in the past, a direct result of the number and status of the RDT&E programs being undertaken by the Navy at NAS Patuxent River during any single year. As previously stated, operational workloads have been heaviest during development of aircraft platforms and times of international conflict. The potential environmental impacts of future test and evaluation activities are comprehensively addressed in the Patuxent River Complex EIS.

4.16 Summary of Impacts

Implementation of the Preferred Alternative, as described and assessed in this EA, would have no significant impacts on the quality of human health and the environment.

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A Determination of Consistency with Maryland's Coastal Zone Management Program

APPENDIX A
Determination of Consistency with Maryland Coastal Resources Management Program (as taken from the February 2005 Draft EA for Operations at the BIR)

A.1 Introduction and Statement of Consistency

The CZMA of 1972 (16 U.S.C. Section 1451 et seq., as amended) provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs in coastal zones. Section 307 of the CZMA stipulates that where a federal project initiates reasonably foreseeable effects on any coastal use or resource (land or water use or natural resource), the action must be consistent to the maximum extent practicable with the enforceable policies of the affected state's federally-approved coastal management plan.

Maryland has developed and implemented a federally-approved Coastal Resources Management Program (established in 1978), which describes current coastal legislation and enforceable policies. The key components of this program depend on federal laws, such as Section 404 of the Clean Water Act of 1977, and state laws and authorities, including the Chesapeake Coastal Bay Critical Area Program (established in 1984), the Tidal Wetlands Act of 1970, the Non-Tidal Wetlands Protection Act of 1989, and the state's authority under Section 401 of the Clean Water Act of 1977.

The Department of the Navy (the Navy) is proposing to conduct military operations at the BIR, Maryland to accommodate RDT&E and training needs. The proposed action has been evaluated for consistency with the Maryland Coastal Resources Management Program and the results of that evaluation are documented in this Coastal Consistency Determination. Based on this evaluation, the Department of the Navy has determined that the proposed action will be consistent the maximum extent practicable with the relevant enforceable policies of the federally-approved Maryland Coastal Resources Management Program.

A.2 Description of the Proposed Action and Alternatives

The BIR is located within Dorchester County, Maryland, in the middle section of Chesapeake Bay. It range is comprised of four islands with a combined land area of 6,013 acres: Adam, Bloodsworth, Northeast, and Pone. Bloodsworth Island is the largest at 5,361 acres. A fifth island, Great Cove, was formerly part of the range but is now completely submerged. A Surface Danger Zone, which is activated during military operations, surrounds the islands and covers a total area of about 16,430 acres (26 square miles) of surface water.

The proposed action would allow the Navy to perform the following military operations over 12 months per year (day or night):

- Non-impact operations that support Navy RDT&E, including aviation-related tests that primarily use the Special Use Airspace overlying the range but not the surface impact areas on Bloodsworth or Pone islands. These operations are currently conducted on the range and would continue to be conducted.

- Previously authorized test and training operations involving nonexplosive ordnance for air-to-ground impact operations on Bloodsworth and Pone islands.

- Compatible test and training operations at the BIR that involve small boat platforms, amphibious craft, rotary- and fixed-wing aircraft, small arms (training and operational rounds), and ground forces.

- Compatible RDT&E operations proposed by other Navy commands, other military services, and federal agencies as authorized by the NAVAIR Range Department.

The proposed action also involves the construction and installation of the following infrastructure improvements on BIR to support the authorized military operations:

- **Target upgrades**, including the installation of relocatable targets, platforms for permanent targets, a mobile target system, and radar reflectors.

- **Instrumentation upgrades**, including a weapons impact scoring system, an area surveillance system, and portable electronic warfare emitters.

- **Other improvements**, including the installation of an upgrade to an existing helicopter pad, and construction of a new helicopter pad and a storage structure. Also, landing areas for amphibious assault and other small craft would be established.

A.3 Identification of Reasonably Foreseeable Effects and Consistency with Relevant Enforceable Policies of the State CZMP

Compliance with relevant state and federal regulatory programs to the maximum extent practicable constitutes federal consistency with the enforceable policies of the Maryland Coastal Resources Management Program. A total of 14 permits/approvals comprise the Maryland Coastal Resources Management Program enforceable policies:

- Air Quality Permit.
- Aquaculture Permit.

- Chesapeake and Atlantic Coastal Bays Critical Area Approval.
- Controlled Hazardous Substances Facility Permit.
- Erosion and Sediment Control and Stormwater Management Plan.
- Nontidal Wetlands and Waterways Permit.
- Oil and Gas Exploration and Production.
- Oil Operations Permit.
- Refuse Disposal Permit.
- Tidal Wetlands License or Permit.
- Water Appropriation and Use Permit.
- Water Quality Certification.
- Water Discharge Permit.
- Wetlands Mitigation Plan.

A.3.1 No-Action Alternative

Under the No-Action Alternative, activities affecting the land area on the BIR, which is part of the regulated coastal zone, would be limited to the occasional placement of a simulated tactical target on the range. The use of a tactical target would provide realism in sensor testing; no ordnance would be delivered at the target. Placement of the target is so infrequent and environmentally benign that there would be no effect on the coastal zone. Consequently, the Navy has determined that the No-Action Alternative would be consistent to the maximum extent practicable with the applicable, enforceable policies of the Maryland Coastal Resources Management Program (see Table A-1).

Table A-1 Enforceable Policies of the Maryland Coastal Resources Management Program, No-Action Alternative

Permit/Approval	Circumstance	Applicability to Project
Air Quality Permit	Proposal to construct and operate an activity that discharges emissions to the outside air.	Not Applicable
Aquaculture Permit	Proposal to engage in aquaculture or related activities.	Not Applicable
Chesapeake and Atlantic Coastal Bays Critical Area Approval	Proposal to conduct various activities within the Chesapeake and Atlantic Coastal Bays Critical Area.	Not Applicable
Controlled Hazardous Substances Facility Permit	Proposal to treat, store, or dispose of hazardous waste.	Not Applicable
Erosion and Sediment Control and Stormwater Management Plan	Proposal by state or federal agencies for construction that disturbs 5,000 square feet or more of land or results in 100 cubic yards or more of earth movement.	Not Applicable
Nontidal Wetlands and Waterways Permit	Proposal for work in a nontidal stream, 100-year floodplain, or nontidal wetland, including a 25-foot buffer.	Not Applicable
Oil and Gas Exploration and Production	Proposal to drill and operate a gas or oil well.	Not Applicable
Oil Operations Permit	Proposal to store more than 10,000 gallons of oil in aboveground tanks, transport oil, or operate oil transfer facilities.	Not Applicable

Table A-1 Enforceable Policies of the Maryland Coastal Resources Management Program, No-Action Alternative

Permit/Approval	Circumstance	Applicability to Project
Refuse Disposal Permit	Proposal to install, alter, or extend a refuse disposal system.	Not Applicable
Tidal Wetlands License or Permit	Proposal for any work that may change a tidal wetland.	Not Applicable
Water Appropriation and Use Permit	Proposal to appropriate or use any of the state's surface and/or underground waters.	Not Applicable
Water Quality Certification	Proposal to place fill or discharge pollutants in waters of the U.S. (including adjacent wetlands).	Not Applicable
Water Discharge Permit	Proposal to dispose of wastewater into the state's groundwater or surface waters.	Not Applicable
Wetlands Mitigation Plan	Accompanies Tidal Wetlands Permit.	Not Applicable

A.3.2 Alternatives 1 and 2

Five of the 14 permit/approvals comprising the Maryland Coastal Resources Management Program enforceable policies pertain to the proposed military activities at the BIR as proposed under Alternatives 1 and 2 (see Table A-2). These enforceable policies concern the Chesapeake and Atlantic Coastal Bays Critical Areas, Air Quality, Tidal Wetlands, Water Quality Certification, and Wetlands Mitigation.

- **Air Quality.** Implementation of either Alternative 1 or Alternative 2 would result in some air emissions from aircraft and watercraft operations, weapons firing, and the construction of range infrastructure. However, the Navy has determined that all emissions would be well below the *de minimis* thresholds established under the CAA General Conformity Rule. Therefore, the proposed action would have no significant impacts on local or regional air quality. Therefore, Alternative 1 and 2 would be consistent with Maryland's air pollution control policy.

- **Chesapeake and Atlantic Coastal Bays Critical Areas.** According to the Critical Areas Act, all land within 1,000 feet of tidal waters or adjacent tidal wetlands are considered Critical Areas. Habitats of threatened and endangered species and species in need of conservation are designated as Habitat Protection Areas (HPAs) under the act. The heron rookery on the northern end of Bloodsworth Island is considered an HPA. Implementation of either Alternative 1 or Alternative 2 would involve the construction of some permanent infrastructure within this HPA. In addition, some military operations would be conducted on portions of the island; however, no military operations would be conducted in the No Fire Zone. The effect of installing new infrastructure on existing vegetation and conducting military operations on the BIR would result in less than 0.2 acre of new impervious surfaces in the Critical Area. Impacts on the heron rookery will be avoided by continued enforcement of the No Fire Area in the northern end of Bloodsworth Island.

Consequently, the proposed action would be consistent with the requirements of Maryland's Critical Areas Act.

- **Tidal Wetlands.** Implementation of either Alternative 1 or Alternative 2 would include construction of an approximately 50-foot by 50-foot landing pad on Adam Island, which would convert approximately 0.1 acre of tidal marsh to impervious surface. Accordingly, the Navy will obtain a Section 404 permit from the USACE prior to completing this work. Completion of the USACE permitting process will represent compliance with the tidal wetlands enforceable policy of the Maryland Coastal Resources Management Program.

- **Water Quality Certification.** A Section 401 Water Quality Certification will be obtained from the MDE for impacts on tidal wetlands concurrent with the federal Section 404 permitting process described above. Consequently, the proposed action would be consistent with the water quality certification enforceable policy of the Maryland Coastal Resources Management Program.

- **Wetlands Mitigation.** Depending on agency requirements, wetlands mitigation may be required for the conversion of 0.1 acre of tidal marsh to impervious surface. The exact mitigation measures (e.g., wetlands enhancement, replacement, etc.) will be determined through the USACE and MDE wetlands permitting processes. Completion of the agency permitting processes will represent consistency with the wetlands mitigation enforceable policy of the Maryland Coastal Resources Management Program.

The Navy has determined that the proposed action would be undertaken in a manner consistent to the maximum extent practicable with the applicable, enforceable policies of the Maryland Coastal Resources Management Program.

Table A-2 Enforceable Policies of the Maryland Coastal Resources Management Program, Alternatives 1 and 2

Permit/Approval	Circumstance	Applicability to Project
Air Quality Permit	Proposal to construct and operate an activity that discharges emissions to the outside air	Consistent
Aquaculture Permit	Proposal to engage in aquaculture or related activities	Not Applicable
Chesapeake and Atlantic Coastal Bays Critical Area Approval	Proposal to conduct various activities within the Chesapeake and Atlantic Coastal Bays Critical Area	Consistent
Controlled Hazardous Substances Facility Permit	Proposal to treat, store, or dispose of hazardous waste	Not Applicable
Erosion and Sediment Control and Stormwater Management Plan	Proposal by a state or federal agency for construction that disturbs 5,000 square feet or more of land or results in 100 cubic yards or more of earth movement	Not Applicable
Nontidal Wetlands and Waterways Permit	Proposal for work in a nontidal stream, 100-year floodplain, or nontidal wetland, including a 25-foot buffer	Not Applicable
Oil and Gas Exploration and Production	Proposal to drill and operate a gas or oil well	Not Applicable

Table A-2 Enforceable Policies of the Maryland Coastal Resources Management Program, Alternatives 1 and 2

Permit/Approval	Circumstance	Applicability to Project
Oil Operations Permit	Proposal to store more than 10,000 gallons of oil in aboveground tanks, transport oil, or operate oil transfer facilities	Not Applicable
Refuse Disposal Permit	Proposal to install, alter, or extend a refuse disposal system	Not Applicable
Tidal Wetlands License or Permit	Proposal for any work that may change a tidal wetland	Consistent
Water Appropriation and Use Permit	Proposal to appropriate or use any of the State's surface and/or underground waters	Not Applicable
Water Quality Certification	Proposal to place fill or discharge pollutants in waters of the U.S. (including adjacent wetlands)	Consistent
Water Discharge Permit	Proposal to dispose of wastewater into the state's groundwater or surface waters	Not Applicable
Wetlands Mitigation Plan	Accompanies Tidal Wetlands Permit	Consistent

Source: MDNR 2004.

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Pursuant to Section 102(2) of the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality Regulations (40 CFR Parts 1500-1508), the Department of the Navy has prepared a Draft Environmental Assessment (EA) for Operations at the Bloodsworth Island Range (BIR). The Draft EA identifies and evaluates the potential environmental effects of conducting military operations at the BIR to accommodate research, development, test, and evaluation (RDT&E) and training needs.

The Navy will conduct a thirty-day public review period from March 1 through March 31, 2005 which includes three public information exchanges to be held at the following locations from 3:30pm-8:00pm:

March 14, 2005, Deal Island School 23275 Lola Wheatley Rd. Deal Island, MD
March 15, 2005, Holiday Inn Express 2715 Ocean Gateway Cambridge, MD
March 16, 2005, Lakes & Straits VFC 2103 Farm Creek Rd. Wingate, MD

For the convenience of the public, copies of the Draft EA will be available for review after March 1, 2005 at the Wicomico Free Library, the Somerset County Library (including Ewell and Deal Island Branches), Corbin Memorial Library, and Dorchester County Central Library.

Enclosed with this letter are six copies of the Draft EA. Your assistance in distributing the Draft EA to the appropriate agencies for review and comment is greatly appreciated. If you need any further information or have any questions, please contact Kelly Burdick, Naval Air Warfare Center Public Affairs, 301-757-6909, or via e-mail at kelly.burdick@navy.mil.

Sincerely,

Michael L. Johnston
Associate, Atlantic Test Range

Encl: Draft EA for Operations at the Bloodsworth Island Range, Maryland (6)

23013 Cedar Point Road • Patuxent River, MD 20670

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

June 9, 2005

Ms. Mary Q. Hammerer
Naval Air Warfare Center Aircraft Division
NAVAIR Ranges Sustainability Office (Bldg. 505)
22473 Millstone Road
Patuxent River, MD 20670-1154

Dear Ms. Hammerer:

I am responding to the Navy's request for the State's concurrence with the Federal Consistency determination, pursuant to Section 307 of the Federal Coastal Zone Management Act of 1972, as amended (CZMA), presented in Appendix A of the "Draft Environmental Assessment (EA), Operations at the Bloodsworth Island Range, Maryland", dated February, 2005. In addition to the No-Action Alternative, the EA evaluates two action alternatives which would expand the use of the Bloodsworth Island Range (BIR) to 12 months per year (day or night) and allow the Navy to perform various military operations above and beyond those presently conducted (No Action Alternative), including the use of surface impact areas.

Since initiating the EA, the Navy continued to evaluate its mission needs with respect to aircraft research, development, test, and evaluation operations. Based on this continued evaluation and comments received on the EA, the Navy has determined that it is in its best interest to concentrate on range operations that use the restricted airspace overlying the BIR and not expand the use of the BIR for surface activities. Accordingly, the Navy is selecting the No Action Alternative as the preferred alternative.

Based on the information which has been provided to the Maryland Department of the Environment, the State of Maryland concurs with the Navy's determination that the selection of the No Action Alternative is consistent with the State's federally-approved Coastal Zone Management Program, as required by Section 307 of the CZMA. If you have any questions, please contact me at (410) 537-3763.

Sincerely,

Elder A. Ghigiarelli, Jr.
Deputy Administrator
Federal Consistency Coordinator
Wetlands and Waterways Program

EAGJr:cma

cc: Chin-Zen L. Plotner, Office of Counsel, NAVAIR
Adam Snyder, OAG, MDE
Gary Setzer, Administrator, W&WP, MDE

B Distribution List

Distribution List
Final Environmental Assessment
Operations at the Bloodsworth Island Range, Maryland

Federal Elected Officials	
The Honorable Steny H. Hoyer U.S. House of Representatives 1705 Longworth House Office Building Washington, D.C. 20515	The Honorable Wayne Gilchrist 2245 Rayburn House Office Building Washington, D.C. 20515
The Honorable Barbara Mikulski 709 Hart Senate Office Building Washington, DC 20510	The Honorable Paul Sarbanes 309 Hart Senate Office Building Washington, DC 20510
State and Federal Agencies and Non-Profit Groups	
State Clearinghouse and Plan Review Unit Maryland Office of Planning 301 West Preston Street, Room 1104 Baltimore, MD 21201-2365 Attn: Mrs. Linda Janey	U S Department of the Interior Fish and Wildlife Service Chesapeake Bay Field Office 177 Admiral Cochrane Drive Annapolis, MD 21401 Attn: John P. Wolfin
U S Environmental Protection Agency Region III 1650 Arch Street Philadelphia, PA 19103-2029 Attn: William Hoffman	Maryland Department of Natural Resources Tawes State Office Building 580 Taylor Avenue Annapolis, MD 21401 Attn: Ray C. Dintaman
Chesapeake Bay Foundation Philip Merrill Environmental Center Herndon Avenue Annapolis, MD 21403 Attn: Beth L. McGee	U S Department of Commerce NOAA Coastal Resource Coordinator 1650 Arch Street Philadelphia. PA 19103-2029 Attn: Peter T. Knight
Coastal Conservation Association Maryland 101 Ridgely Avenue, Suite 12A Annapolis, MD 21401 Attn: Donald W. Silliman	Maryland Department of the Environment Wetlands and Waterways Program 1800 Washington Boulevard, Suite 430 Baltimore, MD 21230-1780 Attn: Elder Ghigiarelli, Jr.

Libraries	
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St. Mary's County Library Lexington Park Branch 21677 FDR Boulevard Lexington Park, MD 20653	
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The Honorable William V. Nichols Dorchester County Council, 2nd District P.O. Box 26 Cambridge, MD 21613	The Honorable Thomas F. McKay President, St. Mary's County Commissioners Governmental Center PO Box 653 Leonardtown, MD 20650
The Honorable Dr. Thomas A. Flowers Dorchester County Council, 3rd District P.O. Box 26 Cambridge, MD 21613	John Wolflin, Field Supervisor USFWS Chesapeake Bay Field Office 177 Admiral Cochrane Drive Annapolis, MD 21401
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The Honorable C. Samuel Boston President Somerset County Board of County Commissioners P. O. Box 37 Princess Anne, MD 21853 - 0037	Maryland Watermen's Association 1805A Virginia Street Annapolis, MD 21401
The Honorable Anthony S. Sarbanes At Large/President Wicomico County Council 1108 Granbys Run Salisbury, MD 21801	Ben Parks Dorchester County Watermen's Association 311 Nathan Avenue Cambridge, MD 21613
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Chesapeake Wildlife Heritage P.O. Box 1745 Easton, MD 21601	Robert T. Brown St. Mary's County Watermen's Association 20844 Olen Mattingly Road Avenue, MD 20609
Southern Maryland Audubon Society PO Box 181 Bryans Road, MD 20616	Buddy Evans Smith Island Watermen's Association 20978 Caleb Jones Road Ewell, MD 21824
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John Gill Martin NWR 2145 Key Wallace Drive Cambridge, MD 21613	

C Noise Impacts on Wildlife

Table C-1 Synopses of Relevant Wildlife Impact Noise Studies

Waterfowl
▪ Fleming et al. (1996) investigated the effects of aircraft activities on waterfowl at Marine Corps Piney Island Bombing Range in North Carolina. The study was completed over six years and evaluated numerous aspects of waterfowl behavior and physiology in a high noise environment. Fleming et al. found that only a small proportion of wild ducks (less than 3 percent) displayed a reaction to aircraft overflights, and ducks were observed feeding in bays and ponds directly in the flight approach path. In fact, the highest numbers of waterfowl observed in the bays under the primary approach and exits occurred during the weekdays when aircraft use of the training range was highest. The results of the study showed that wintering waterfowl behavior and physiological conditions are not significantly impacted by their use of high noise areas.
▪ Lamp (1989) reported that some waterfowl species were sensitive to military overflights, with snow geese exhibiting adverse responses (e.g., alert calling, altered posture, flight) 59 percent of the time. Other species that displayed sensitivity to military jet overflights that occur at the BIR include northern pintail, American widgeon, and green-winged teal.
▪ Bateman et al. (1999) studied the behavior of migratory waterfowl in response to low-level military jet overflights occurring in military airspace in Labrador, Canada. The study involved scan sampling to record the behavior of moulting and staging waterfowl at Snegamook Lake before, during, and after jet overflights. Peak populations of waterfowl included 29,467 black ducks and 54,909 Canada geese. All flights occurred directly over the lake, and over 50 percent of the flights occurred at or below 250 feet AGL. Waterfowl were present during 110 (about 86 percent) of the aircraft events studied. An observable change in behavior in response to jets was recorded in only two incidences. There were few significant differences in the proportions of black ducks and Canada geese exhibiting selected behaviors before and after disturbance by jet overflights. The infrequent response of black ducks and Canada geese to jet overflights in this study suggests that the jets are not perceived as a threat (possibly due to a lack of visual cues) or the birds become habituated to the noise. The results of the study suggest that the current low-level jet-training program on the Quebec-Labrador peninsula has had negligible effects on behavior of moulting and staging waterfowl.
Raptors
▪ Several studies have evaluated the effects of aircraft, military training, and blasting on raptors. Raptor responses to noise and disturbance in these studies have varied. Most impacts reported appeared to be minor and temporary (Lamp 1989) and, where evaluated, did not noticeably affect reproduction.
▪ A two-year study was conducted on the effects of low-level jet aircraft flights on cliff-nesting raptors (Ellis et al. 1991). Nests of eight raptor species (including prairie falcon and peregrine falcon nests, red-tailed hawk, Cooper's hawk, and golden eagle) were subjected to almost 1,000 overflights by military jets. Overflight noise levels in the study ranged from 82 to 114 A-weighted decibel (dB[A]). All significant responses (i.e., cowering, calling, fleeing, interruption of incubation or feeding of young) were observed when jets passed within 500 feet (152 meters) of the nest; adults showed alarm when jets operated within 984 feet (300 meters). Jet aircraft were generally ignored when more than 1,642 feet (500 meters) from the nests. Moreover, although 20 of 22 nests fledged young after being disturbed, 21 of those were reoccupied during the second year. The results of this study indicate that low-level jet overflights do not have long-term adverse impacts on nesting raptors. However, it is important to note that, except for nestlings, all of the birds in the study had previously been subjected to moderate levels of low-altitude overflights). In addition, nests were exposed to an average of 11 overflights during the first year of the study (with a maximum of 32) and an average of 38 overflights (maximum 229) during the second year. It is not known whether higher numbers of low-level overflights would cause more severe responses, particularly in birds that had not previously been subjected to moderate levels of low-altitude overflights.

Table C-1 Synopses of Relevant Wildlife Impact Noise Studies

Wading Birds
▪ The USFWS (1995) has reported that a great blue heron colony on the Winona District of the Upper Mississippi Wildlife and Fish Refuge was almost entirely abandoned shortly after low-level military flights were conducted at or below 1,000 feet (305 meters) AGL, indicating that rookeries of colonial waterbirds can be extremely sensitive to a significant source of disturbance.
▪ In contrast to the above study, Grubb (1978) presented the results of a field study conducted to address the general subject of the effects of increased noise levels on nesting herons and decibel levels that nesting herons will tolerate. When a small plane flew over the rookery at elevations ranging from 150 to 800 feet (46 to 244 meters) AGL, there was no response from the nesting birds to either the increased noise levels or the presence of the aircraft. However, the fact that these herons were residing in an urbanized environment may have resulted in their habituation to noise disturbance.
▪ Kushlan (1979) studied behavioral responses of wading birds to helicopter overflights and compared them to responses to light, fixed-wing overflights as low as 197 feet (60 meters) AGL. The study found that any bird that left its nest returned within five minutes, and in 92 percent of the 192 observations, birds either showed no reaction or merely looked up. No serious consequences, such as egg loss or nest abandonment, were observed.
▪ Black et al. (1984) studied the effect of low-altitude (500 feet [152 meter] AGL), high-speed (420 knots indicated airspeed), military F-16 jet overflights on establishment, size, and reproductive success of wading bird colonies. They found no demonstrated effect of military activity on colony establishment or size on a statewide basis, and turnover rates (colonies changing use each year) were within 2 percent when military and nonmilitary areas were compared. Breeding wading birds exhibited either no response or looked up and changed position due to sound levels ranging from 55 to 100 dBA, and no productivity limiting responses were observed. Reproductive activity, including such factors as nest success, nestling survival, nestling mortality, and nesting chronology was independent of F-16 overflights but related to ecological factors such as colony location, characteristics, and climatology.
Shorebirds
▪ Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but they did flush in response to more localized intrusions (e.g., humans and dogs on the beach).
▪ Burger (1981) studied the effects of noise from the John F. Kennedy International Airport in New York on herring gulls that nested less than 0.63 mile (1 kilometer) from the airport. Noise levels over the nesting colony were 85 to 100 dBA on approach and 94 to 105 dBA on takeoff. No effects of subsonic aircraft on nesting were noted, although some birds flushed when supersonic aircraft flew overhead and, when they returned, they engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when subsonic aircraft flew overhead. Up to 208 of the loafing gulls flew off when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock.
▪ The affect on wildlife of noise generated by small arms fire has not been as extensively studied as the affects of aircraft overflights. In a recent study conducted cooperatively between the DoD and the USFWS, Pater et al. (1999) assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise. The project findings showed that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level, which ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). In addition, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success. Red-cockaded woodpeckers did not flush when artillery simulators were more than 400 feet (122 meters) away and SEL noise levels were 70 dBA.