ENVIRONMENTAL ASSESSMENT FOR RESEARCH, DEVELOPMENT, TESTING, AND EVALUATION AT NAVAL SURFACE WARFARE CENTER

CARDEROCK DIVISION

ACOUSTIC RESEARCH DETACHMENT

BAYVIEW, IDAHO

BONNER AND KOOTENAI COUNTY

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Carderock Division
Acoustic Research Detachment
33964 N. Main Avenue
Bayview, ID 83803-9750

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ENVIRONMENTAL ASSESSMENT FOR RESEARCH, DEVELOPMENT, TESTING, AND EVALUATION AT NAVAL SURFACE WARFARE CENTER

Lead Agency: United States Department of the Navy
Title of the Proposed Action: Research, Development, Testing, and Evaluation at Naval Surface Warfare Center.
Designation: Environmental Assessment

Abstract

The United States Department of the Navy (Navy) prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code § 4321 et seq.); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [C.F.R.] §§ 1500 et seq.); Navy Procedures for Implementing NEPA (32 C.F.R. § 775); and Chief of Naval Operations Instruction 5090.1D, Environmental Readiness Program. The Navy identified its need to support and conduct current, emerging, and future testing activities at the Naval Surface Warfare Center, Carderock Division Acoustic Research Detachment (ARD) at Lake Pend Oreille in Bayview, Idaho (ARD Bayview). ARD Bayview, test facilities, and remote sites are located on the southern arm of the freshwater lake. Three alternatives are analyzed in this EA:

- The No Action Alternative represents baseline testing activities as defined by existing Navy environmental planning documents, including the *Environmental Assessment for the Intermediate Scale Measurement System, David Taylor Research Center* and *Final Environmental Impact Statement for Capital Improvements Plan at the Naval Surface Warfare Center Carderock Division*. The baseline testing activities also include other testing events that historically occur in the Study Area and have been subject to previous analysis pursuant to NEPA.
- Alternative 1 includes the testing activities addressed in the No Action Alternative, plus additional testing activities including passive and active underwater electromagnetic measurements, and infrared measurements as necessary to support current and planned Department of the Navy testing requirements.
- Alternative 2 (Preferred Alternative) includes all elements of Alternative 1 plus laser testing, shallow water testing, and other testing (portable tracking devices, manned and unmanned vehicles, other sensors and equipment) as necessary to support current and planned Department of the Navy testing requirements.

In this EA, the Navy analyzes potential environmental impacts that result or could result from activities under the No Action Alternative, Alternative 1, and Alternative 2. Resource areas that will be addressed include, but are not limited to, water quality, air quality, noise, biological resources, socioeconomic resources, American Indian traditional resources, and public health and safety.

Prepared by: United States Department of the Navy

Point of Contact: Anna Whalen, Environmental Planner
Naval Facilities Engineering Command, Northwest, EV21.AW
1101 Tautog Circle, Silverdale, WA 98315 | (360) 396-0927

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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The United States (U.S.) Department of the Navy (Navy) prepared this Environmental Assessment (EA) to assess the potential environmental impacts associated with current research, development, testing, and evaluation (RDT&E) activities, and future mission requirements for testing at the Naval Surface Warfare Center, Carderock Division Acoustic Research Detachment (ARD) at Lake Pend Oreille in Bayview, Idaho (hereinafter referred to as "ARD Bayview"). The U.S. Navy prepared this EA in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] § 4321 et seq.); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [C.F.R.] §§ 1500 et seq.); Navy Procedures for Implementing NEPA (32 C.F.R. § 775); and Chief of Naval Operations Instruction 5090.1D, Environmental Readiness Program.

ES.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to continue providing RDT&E in submarine and surface ship design. Small-scale and large-scale model testing has been proven to reduce costs and risks related to development of new technology. In this regard, ARD Bayview furthers the military's execution of its roles and responsibilities under Title 10 of the U.S.C. The need for the Proposed Action is to sustain mission fulfillment in the primary testing areas of underwater acoustics, vehicle hydrodynamics, radiated and onboard noise acquisition and analysis, and hull sensor recording and analysis.

ES.3 SCOPE AND CONTENT OF THE ENVIRONMENTAL ASSESSMENT

In this EA, the Navy assesses RDT&E activities conducted at ARD Bayview and within Lake Pend Oreille that could potentially impact the human and natural environment. The range of alternatives includes the No Action Alternative and two Action Alternatives. In this EA, the Navy analyzes direct, indirect, cumulative, short-term, long-term, irreversible, and irretrievable impacts. This EA also considers environmental protection measures implemented as part of the testing activities for assessing environmental consequences. Chapter 3 (Affected Environment and Environmental Consequences) provides information on resources evaluated in this EA.

Resources evaluated in detail included water quality, air quality, noise, biological resources (fish and birds), socioeconomics, and public health and safety.

ES.3.1 NATIONAL ENVIRONMENTAL POLICY ACT

The NEPA process begins when an agency identifies a requirement for informed decision-making and prepares a proposed action. If the environmental impacts are uncertain, then an EA is initiated for developing the scope of issues related to the Proposed Action. The next step involves coordination with agencies and stakeholders to the extent practicable in development of a draft EA to assess potential impacts of the Proposed Action and alternatives on the environment. The EA process concludes with either a Finding of No Significant Impact (FONSI) or a determination to proceed to preparation of an Environmental Impact Statement (EIS). When the FONSI and final EA are complete and made available to the public, the Navy decision-maker will issue a Notice of Availability.

ES.3.2 ENDANGERED SPECIES ACT

The Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 et seq.) established protection over and conservation of threatened and endangered species and the ecosystems upon which they depend. An "endangered" species is a species in danger of extinction throughout all or a significant portion of its range. A "threatened" species is one that is likely to become endangered within the near future throughout all or in a significant portion of its range. The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) jointly administer the ESA and are also responsible for the listing of species (designating a species as either threatened or endangered). The ESA allows the designation of geographic areas as critical habitat for threatened or endangered species. Section 7(a)(2) requires each federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action "may affect" a listed species, that agency is required to consult with NMFS or USFWS, depending on which service has jurisdiction over the species (50 C.F.R. 402.14(a)). Under the terms of Section 7(b)(4) and Section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the act provided that such taking complies with the terms and conditions of an Incidental Take Statement. The ESA applies to certain fish evaluated in this EA.

This EA analyzes potential effects to species listed under the ESA. In accordance with ESA requirements, the Navy will complete consultation under Section 7 of the ESA with USFWS on the potential that implementation of the Proposed Action may affect listed species. With regard to USFWS jurisdiction, upon concluding Section 7 consultation, the Navy will implement protective measures identified by the Services in a BO or other consultation document.

ES.3.3 OTHER ENVIRONMENTAL REQUIREMENTS CONSIDERED

The Navy must comply with all applicable federal environmental laws, regulations, and Executive Orders (EOs), including, but not limited to, those listed below. Further information can be found in Chapter 3 (Affected Environment and Environmental Consequences) and Chapter 5 (Other Considerations).

- American Indian Religious Freedom Act
- Bald and Golden Eagle Protection Act (BGEPA)
- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Endangered Species Act (ESA)
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*
- EO 13045, *Environmental Health and Safety Risks to Children*
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*
- Fish and Wildlife Coordination Act
- Migratory Bird Treaty Act (MBTA)
- National Historic Preservation Act
- Sikes Act

ES.4 PUBLIC INVOLVEMENT

Under NEPA, federal agencies are required to examine the environmental effects of their proposed actions within U.S. territories. An EIS is a detailed public document that provides an assessment of the potential effects that a major federal action might have on the human environment. The Navy undertakes environmental planning for major Navy actions occurring throughout the world in accordance with all applicable laws, regulations, and EOs.

The first step in the NEPA process for an EIS is to prepare a Notice of Intent (NOI) to develop an EIS. The Navy published an NOI in the Federal Register (FR) (77 FR 11497) and several newspapers on 27 February 2012. In addition, Notice of Intent/Notice of Scoping Meeting Letters were distributed to more than 790 federal, state, and local elected officials, Native American Tribes, and government agencies. The Notice of Intent provided an overview of the proposed action and the scope of the EIS, and initiated the scoping process.

ES.4.1 DRAFT ENVIRONMENTAL ASSESSMENT

This Draft EA has been prepared to assess potential impacts of the proposed action and alternatives on the environment. A Notice of Availability was published in the Federal Register and notices were placed in local and regional newspapers announcing the availability of the Draft EA. This Draft EA is being circulated for review and comment for 30 days, and a public meeting will be held in Bayview, Idaho.

ES.4.2 FINAL ENVIRONMENTAL ASSESSMENT/FINDING OF NO SIGNIFICANT IMPACT

The Final EA (scheduled for completion in spring 2015) will address all public comments received on the Draft EA. Responses to public comments may include correction of data, clarifications of and modifications to analytical approaches, and inclusion of new or additional data or analyses. Finally, the decision-maker will issue a FONSI after the Final EA is made available to the public.

ES.5 PROPOSED ACTION AND ALTERNATIVES

In this EA, the Navy assesses RDT&E activities conducted at ARD Bayview and within Lake Pend Oreille that could potentially impact the human and natural environment. The range of alternatives includes the No Action Alternative and two Action Alternatives. In this EA, the Navy analyzes direct, indirect, cumulative, short-term, long-term, irreversible, and irretrievable impacts. This EA also considers environmental protection measures implemented as part of the testing activities for assessing environmental consequences. Chapter 3 (Affected Environment and Environmental Consequences) provides information on resources evaluated in this EA.

Three alternatives are analyzed in this EA:

- The No Action Alternative represents baseline testing activities as defined by existing Navy environmental planning documents, including the *Environmental Assessment for the Intermediate Scale Measurement System, David Taylor Research Center* and *Final Environmental Impact Statement for Capital Improvements Plan at the Naval Surface Warfare Center Carderock Division*. The baseline testing activities also include other testing events that historically occur in the Study Area and have been subject to previous analysis pursuant to NEPA.

- Alternative 1 includes the testing activities addressed in the No Action Alternative, plus additional testing activities including passive and active underwater electromagnetic measurements, and infrared measurements as necessary to support current and planned Department of the Navy testing requirements.
- Alternative 2 (Preferred Alternative) includes all elements of Alternative 1 plus laser testing, shallow water testing, and other testing (portable tracking devices, manned and unmanned vehicles, other sensors and equipment) as necessary to support current and planned Department of the Navy testing requirements.

ES.6 SUMMARY OF ENVIRONMENTAL EFFECTS

Environmental effects which might result from the implementation of the Navy's Proposed Action or alternatives have been analyzed in this EA. Resources evaluated in detail included water quality, air quality, noise, biological resources (fish and birds), socioeconomics, and public health and safety. The Navy's analysis includes an evaluation of effects on each resource based on the stressors to that resource. The term stressor refers to an agent, condition, or other stimulus that causes stress to an organism or alters physical, socioeconomic, or cultural resources. The effects on these resources are summarized in Table ES-1. This table provides a comparison of the environmental impacts of the No Action Alternative, Alternative 1, and Alternative 2.

Table ES-1: Summary Comparison of Alternatives and Effects

Resource or Issue	Alternatives		
	No Action Alternative	**Alternative 1**	**Alternative 2 (Preferred Alternative)**
Water Quality	Short-term, localized impacts to water quality as a result of turbidity from sediment disturbance. Baseline conditions for water quality would not change and testing activities would not lead to a violation of state or federal water quality standards or guidelines. No significant impact (Section 3.1.2.1).	Slight increase in surface vessel use and testing activities. Baseline conditions for water quality would not change and testing activities would not lead to a violation of state or federal water quality standards or guidelines. No significant impact (Section 3.1.2.2).	Slight increase in surface vessel use and implementation of shallow water testing. Baseline conditions for water quality would not change and testing activities would not lead to a violation of state or federal water quality standards or guidelines. No significant impact (Section 3.1.2.3).
Air Quality	Emissions associated with testing activities (surface vessels, vehicles, generators) would have no significant impact on regional air quality (Section 3.2.2.1).	Slight increase in emissions associated with testing activities. No significant impact (Section 3.2.2.2).	Slight increase in emissions associated with testing activities. No significant impact (Section 3.2.2.3).
In-Air Noise	Surface support vessels and towing vessels would emit airborne noise. Maintenance activities would be intermittent, far from the shoreline, and in enclosed spaces. Negligible impacts to sensitive receptors. No significant impact (Section 3.3.2.1).	Airborne noises associated with testing activities would be intermittent and localized. Effects on sensitive human receptors would be negligible. No significant impact (Section 3.3.2.2).	Airborne noises associated with testing activities would be intermittent and localized. Effects on sensitive human receptors would be negligible. No significant impact (Section 3.3.2.3).

Table ES-1: Summary Comparison of Alternatives and Effects (continued)

Resource or Issue	Alternatives		
	No Action Alternative	Alternative 1	Alternative 2 (Preferred Alternative)
Fish (continued)			
Underwater Noise	The creation of non-impulse active sound sources for testing activities would have no significant impact on fish (Section 3.4.2.3.1).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.5).
Sedimentation and Turbidity	Suspended sediments and increased turbidity associated with testing activities would have no significant impact on fish (Section 3.4.2.3.2).	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.5).
Electromagnetic Measurements	Electromagnetic measurements would not occur. No effect.	Electromagnetic fields associated with Alternative 1 activities will have no significant impacts on fish (Section 3.4.2.4).	Electromagnetic fields associated with Alternative 2 activities will have no significant impacts on fish (Section 3.4.2.5).
Threatened and Endangered Species – Bull Trout			
Underwater Noise	Vessel noise associated with activities may affect, but is not likely to adversely affect the ESA-listed bull trout and is not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout (Section 3.4.2.3.1).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.5).
Sedimentation and Turbidity	Suspended sediments and increased turbidity associated with testing activities may affect, but are not likely to adversely affect the ESA-listed bull trout and are not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout (Section 3.4.2.3.2).	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.5).
Electromagnetic Measurements	Electromagnetic measurements would not occur. No effect.	Use of electromagnetic devices associated with activities under Alternative 1 may affect, but is not likely to adversely affect the ESA-listed bull trout and is not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout (Section 3.2.2.4).	Use of electromagnetic devices associated with activities under Alternative 2 may affect, but is not likely to adversely affect the ESA-listed bull trout and is not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout (Section 3.2.2.4).

Table ES-1: Summary Comparison of Alternatives and Effects (continued)

Resource or Issue	Alternatives		
	No Action Alternative	**Alternative 1**	**Alternative 2 (Preferred Alternative)**
Socioeconomics	The nature of project activities would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions (Section 3.5.2.1).	The nature of project activities under Alternative 1 would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions (Section 3.5.2.2).	The nature of project activities under Alternative 2 would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions (Section 3.5.2.3).
American Indian Traditional Resources	No significant impacts to American Indian traditional resources would occur due to testing activities. In accordance with Section 106 of the National Historic Preservation Act, there would be no effect on cultural resources (Section 3.6.7.1).	No significant impacts to American Indian traditional resources would occur due to testing activities. In accordance with Section 106 of the National Historic Preservation Act, there would be no effect on cultural resources (Section 3.6.7.2).	No significant impacts to American Indian traditional resources would occur due to testing activities. In accordance with Section 106 of the National Historic Preservation Act, there would be no effect on cultural resources (Section 3.6.7.2).
Public Health and Safety	There would be negligible impacts from noise associated with vessel use or maintenance activities. With implementation of Navy standard operating procedures, there would be no impact on public health and safety from activities using underwater energy or from a direct physical interaction during testing activities. (Section 3.7.2.1).	The negligible impacts from noise of vessels and maintenance activities would be the same as presented for the No Action Alternative. With implementation of Navy standard operating procedures, there would be no impact on public health and safety from activities using underwater energy or from a direct physical interaction during testing activities (Section 3.7.2.2).	The negligible impacts from noise of vessels and maintenance activities would be the same as presented for the No Action Alternative. High-energy laser equipment would be implemented in accordance with Naval procedures. With implementation of Navy standard operating procedures, there would be no impact on public health and safety from activities using underwater energy or from a direct physical interaction during testing activities (Section 3.7.2.3).

ES.7 CUMULATIVE IMPACTS

For the cumulative impacts analysis, the Affected Environment sections in Chapter 3 of this EA adequately describe the aggregate effects of past actions on each environmental resource to be analyzed. The potential contributions of present and reasonably foreseeable future projects are incorporated into the cumulative impacts analysis by (1) listing major individual projects in the Region of Influence (ROI) of the Proposed Action that could have additive or synergistic effects on environmental resources in combination with those of the Proposed Action, and (2) considering general trends in human activities and environmental conditions in the ROI.

Noise and biological resources are the primary resources of concern for cumulative impacts analysis. Humans and biological species occurring in the Study Area may be impacted by multiple ongoing and future actions. However, the impact on humans and other biological species of the Navy's proposed activities is small (see Summary of Impacts in Table ES-1 above). The No Action Alternative, Alternative 1, or Alternative 2 would contribute to cumulative impacts, but the relative contribution would be small compared to other actions. Because of the negligible impacts of the proposed action on sediments water quality, air quality, noise, biological resources (fish and birds), socioeconomics, and public health and safety, cumulative impacts would likewise be negligible. The No Action Alternative, Alternative 1, or Alternative 2 would also make an incremental contribution to greenhouse gas emissions, representing approximately 0.000000187 percent, 0.0000001904 percent, and 0.0000001923 percent of U.S. 2010 greenhouse gas emissions, respectively.

ES.8 STANDARD OPERATING PROCEDURES

The Navy currently employs standard operating procedures (SOPs) to provide for the safety of personnel and equipment, including ships and aircraft, as well as the success of the testing activities. In many cases there are incidental environmental, socioeconomic, and cultural benefits resulting from SOPs. SOPs serve the primary purpose of providing for safety and mission success, and are implemented regardless of their secondary benefits. Because of their importance for maintaining safety and mission success, SOPs have been considered as part of the Proposed Action under each alternative, and therefore are included in the environmental analyses for each resource.

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µg/L	microgram(s) per liter
µm	micrometer
µPa	micropascal
ac.	acre(s)
ADNL	A-weighted DNL
ARD	Acoustic Research Detachment
AUV	Autonomous Underwater Vehicle
BA	Biological Assessment
BGEPA	Bald and Golden Eagle Protection Act
CAA	Clean Air Act
CATEX	Category Exclusion
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
cm	centimeter
CO	carbon monoxide
CO_2	carbon dioxide
CW	continuous waveform
CWA	Clean Water Act
dB	decibel(s)
dBA	decibel(s), A-weighted
DNL	Day Night Average Sound Level
DoD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	electromagnetic
EO	Executive Order
FONSI	Finding of No Significant Impact
FR	Federal Register
ft.	foot/feet
$ft.^2$	square foot/feet
ha	hectare(s)
hm^3	cubic hectometers
Hz	Hertz
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Fish and Game
INRMP	Integrated Natural Resources Management Plan
ISMS	Intermediate Scale Measurement System
kg	kilogram(s)
kHz	kilohertz
km	kilometer(s)
km^2	square kilometer(s)
Ldn	Day Night Average Sound Level
L_{eq}	Equivalent Noise Level
LSV	large scale vehicle
m	meter(s)
m^2	square meter(s)
mi.	mile(s)
$mi.^2$	square mile(s)
MBTA	Migratory Bird Treaty Act
ms	millisecond(s)
n/a	not applicable
NAAQS	National Ambient Air Quality Standards
Navy	United States Department of the Navy
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOI	Notice of Intent
NRC	National Resource Council
NSWCCD	Naval Surface Warfare Center, Carderock Division
O_3	ozone
OPNAV	Office of the Chief of Naval Operations
OPNAVINST	Office of the Chief of Naval Operations Instruction
OUTPOST	Operations Utility Power and Signal Transmitter
Pb	lead
PCE	primary constituent element
PM	particulate matter
$PM_{2.5}$	fine particulate matter less than or equal to 2.5 micrometers in diameter
PM_{10}	suspended particulate matter less than or equal to 10 micrometers in diameter
PSD	Prevention of Significant Deteriorations
PTS	permanent threshold shift
RDT&E	Research, Development, Testing and Evaluation
re	referenced to
RN	radiated noise
ROI	Region of Influence
SO_2	sulfur dioxide
SO_x	sulfur oxides
sonar	sound navigation and ranging
SOP	Standard Operating Procedure

TTS	temporary threshold shift
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compounds

1 PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

The United States (U.S.) Department of the Navy (Navy) proposes to continue current research, development, testing, and evaluation (RDT&E) activities, and conduct future mission requirements for testing at the Naval Surface Warfare Center, Carderock Division (NSWCCD) Acoustic Research Detachment (ARD) at Lake Pend Oreille in Bayview, Idaho (hereinafter referred to as "ARD Bayview" [Figure 1-1]). This Environmental Assessment (EA) has been prepared by the Navy in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] §4321 et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (Title 40 Code of Federal Regulations [C.F.R.] §1500–1508), Navy Procedures for Implementing NEPA (32 C.F.R. 775), and Chief of Naval Operations Instruction (OPNAVINST) 5090.1D, Environmental Readiness Program.

This EA analyzes the potential impacts of actions associated with signatures (acoustic and non-acoustic) research. In 1991, the Navy completed an EA to install an underwater system for the exploration of new technologies associated with the acoustic detection of underwater objects (U.S. Department of the Navy 1991). Development of the Intermediate Scale Measurement System (ISMS) at ARD Bayview provided an expanded measurement system for conducting new in-water research and development. In 1996, the Navy completed an Environmental Impact Statement (EIS) to implement a capital improvements plan for general development at ARD Bayview (U.S. Department of the Navy 1996a). Implementation of the plan in subsequent years consolidated dispersed facilities and operational capabilities and brought together related functions for increased efficiency. This EA focuses on current RDT&E activities and future mission requirements for testing.

ARD Bayview is under the area of responsibility of Naval Station Everett, Everett, Washington, and is a detachment of the NSWCCD, a research division of Naval Sea Systems Command. ARD Bayview has been involved in RDT&E of submarine signature technologies for over 60 years.

1.2 LOCATION AND DESCRIPTION OF ACOUSTIC RESEARCH DETACHMENT BAYVIEW

ARD Bayview supports RDT&E of submarine and surface ship components and systems prior to full-scale installation. This avoids expensive and time-intensive testing on full-scale vessels in uncontrolled ocean environments. The mission at ARD Bayview is to (1) provide unique large scale models for RDT&E and associated facilities in support of RDT&E for fleet stealth technologies, (2) support the test and evaluation of mature fleet technologies prior to fleet implementation in an effort to verify system performance and mitigate risk to full scale implementation, and (3) support underwater acoustic testing using the unique acoustic qualities of Lake Pend Oreille and available facilities.

ARD Bayview is located at the southern end of Lake Pend Oreille in Bayview, Idaho. Lake Pend Oreille (Figure 1-1) is located in Bonner and Kootenai Counties of northern Idaho. It is the largest lake in Idaho and measures 43.2 miles (mi.) (69.5 kilometers [km]) long and 6.25 mi. (10.1 km) wide, with a total shoreline of approximately 200 mi. (322 km). ARD Bayview, test facilities, and remote sites are located on the southern arm of the freshwater lake, which contains the majority of the lake's volume in a large, deep basin with water depths up to 1,150 feet (ft.) (350.5 meters [m]) (Figure 1-2). The shoreline along the southern arm of the lake is steep and rocky, and falls sharply into the deeper waters of the lake. The adjacent land is largely undeveloped and primarily managed by the U.S. Forest Service. Private and commercial properties are located in the residential communities of Bayview, at the south end of Lake Pend Oreille, and Sandpoint, located near the north end of the lake (Figure 1-2).

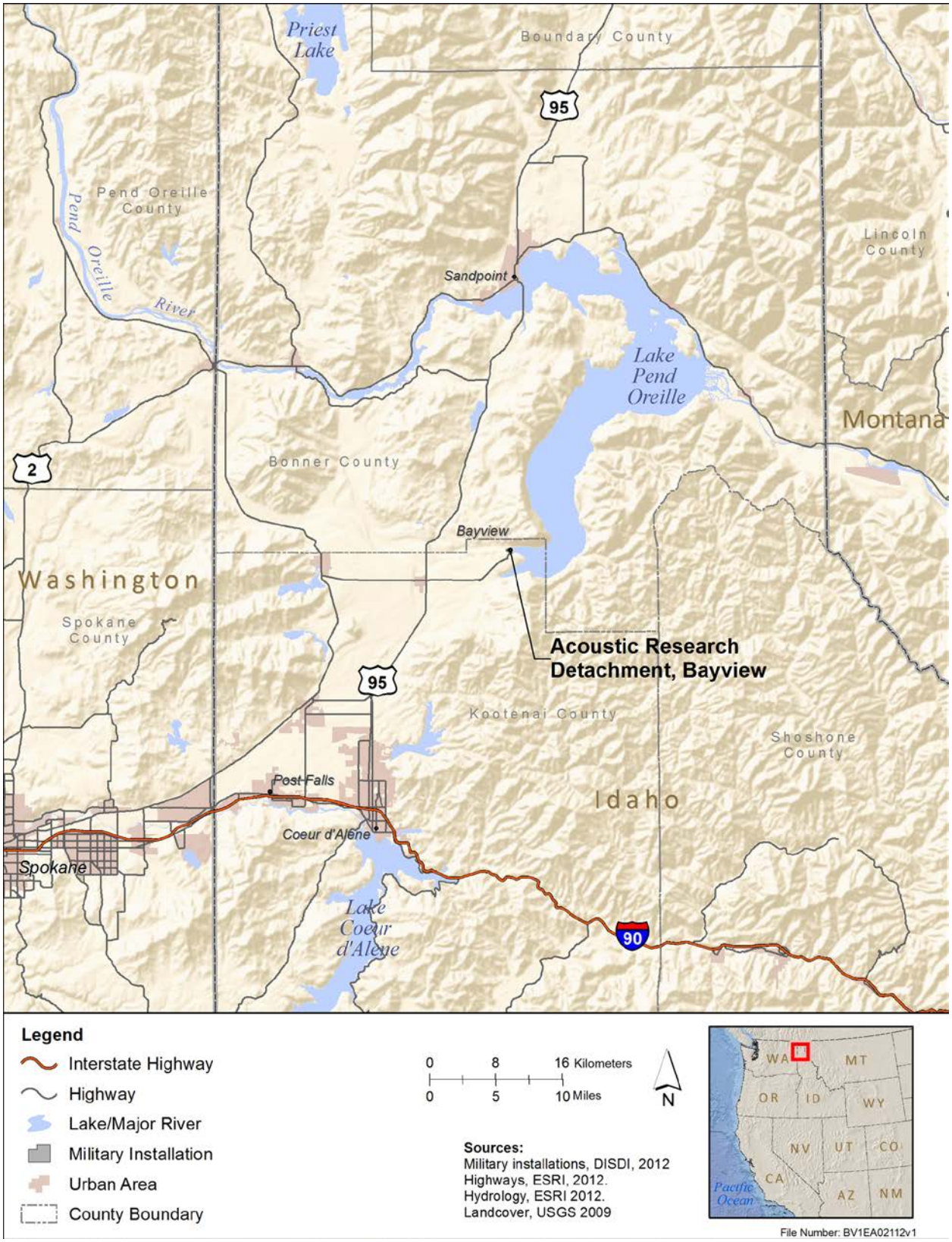


Figure 1-1: Regional Map of the Naval Surface Warfare Center, Carderock Division, Acoustic Research Detachment at Lake Pend Oreille in Bayview, Idaho

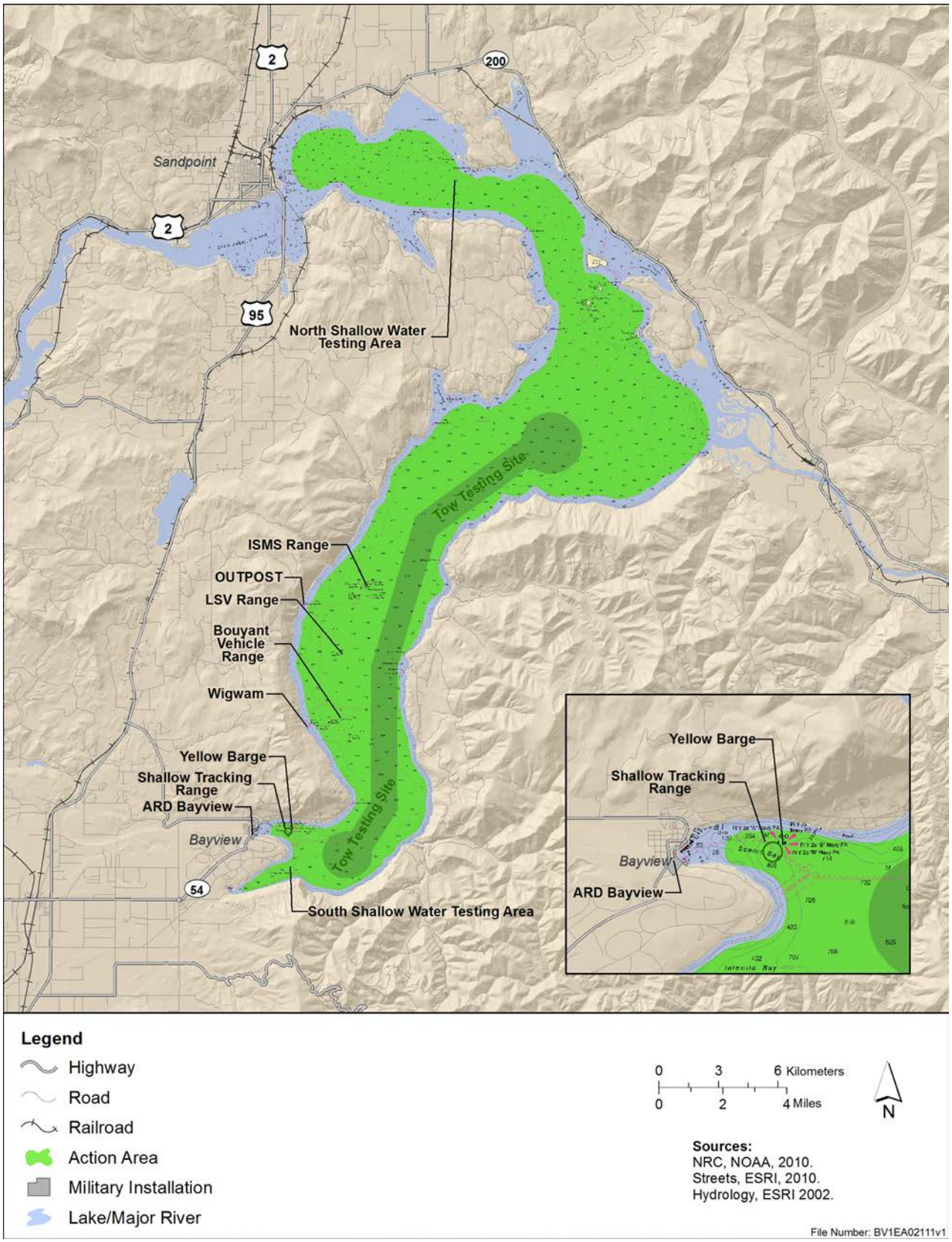


Figure 1-2: Action Area, Remote Support Facilities, and Test Sites

Conditions in Lake Pend Oreille are ideal to support ARD Bayview's research mission. Lake Pend Oreille is one of the world's quietest bodies of water, with 26 square miles (mi.^{2}) (67.3 square kilometers [km^2]) of current-free water. The flat mud bottom of Lake Pend Oreille minimizes noise reflection, and the consistent year-round water temperature enhances ARD Bayview's ability to acquire repeatable scientific test results.

ARD Bayview (see Figure 1-3) covers 38 acres (ac.) (15.4 hectares [ha]), mostly within the town of Bayview, Idaho. At the southern end of Lake Pend Oreille, ARD Bayview owns approximately 22 ac. (8.9 ha) on the shore of Lake Pend Oreille and manages approximately 16 ac. (6.5 ha) of lake bottom. This site contains the model shop buildings; piers; boathouses; several floating barges; and administrative, security, storage, and parking facilities.

Figure 1-3: ARD Bayview Shore Facilities

To fulfill its mission, the ARD Bayview maintains two remote support facilities on the shoreline of Lake Pend Oreille and five test sites in the lake (see Figure 1-2). Three underwater testing facilities, a static test barge, and a tow testing site are located in the southern half of Lake Pend Oreille.

The ARD Bayview remote support facilities, Operations Utility Power and Signal Transmitter (OUTPOST) and Wigwam, are essential to the acoustic testing conducted at the remote sites. These facilities occur on approximately 1 ac. of U.S. Forest Service land and are used through special use permits.

1.3 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to continue providing RDT&E in submarine and surface ship design. Small-scale and large-scale model testing has been proven to reduce costs and risks related to development of new technology. In this regard, ARD Bayview furthers the military's execution of its roles and responsibilities under Title 10 of the U.S.C. The need for the Proposed Action is to sustain mission fulfillment in the primary testing areas of underwater acoustics, vehicle hydrodynamics, radiated and onboard noise acquisition and analysis, and hull sensor recording and analysis.

The current mission activities include:

- Structural acoustic measurements of vessels from 10 to 110 ft. (3.05 to 33.53 m) in length using the ISMS
- Large scale vehicle (LSV) submarine (all current and future platforms) testing in propulsion development, advanced submarine structures, submarine flow noise reduction, and other submarine stealth and cost reduction initiatives
- Surface vessel signature testing
- Submarine flow and structure borne noise testing using buoyantly propelled submarine models
- Testing towed arrays and underwater signature systems
- Other testing for other Navy commands, universities, and private industries

In addition to maintaining current capabilities, RDT&E models will be modified in the future to support the Navy's Ohio Replacement Submarine Program. As part of the Proposed Action, existing facility modifications, expanded measurement capabilities, and increases in tempo of activities may be required to accommodate the associated components, systems, and size of Ohio Class submarine models.

1.4 Scope of the Environmental Analysis

In this EA, the Navy assesses RDT&E activities conducted at ARD Bayview and within Lake Pend Oreille that could potentially impact the human and natural environment. The range of alternatives includes the No Action Alternative and two Action Alternatives. In this EA, the Navy analyzes direct, indirect, cumulative, short-term, long-term, irreversible, and irretrievable impacts. This EA also considers environmental protection measures implemented as part of the testing activities for assessing environmental consequences. Chapter 3 (Affected Environment and Environmental Consequences) provides information on resources evaluated in this EA.

Resources evaluated in detail included water quality, air quality, noise, biological resources (fish and birds), socioeconomics, and public health and safety.

1.4.1 Data Sources and Best Available Data

The Navy used the best available data and information to compile the environmental baseline and environmental consequences evaluated in Chapter 3. In accordance with NEPA and the Administrative Procedure Act of 1946 (5 U.S.C. §§551–559), best available data accepted by the appropriate regulatory and scientific communities were used in the analyses of potential impacts on resources.

Literature searches of journals, books, periodicals, bulletins, and other technical reports were conducted in preparation of this EA. Searches included general queries in the resource areas evaluated to document the environmental baseline and specific queries for analysis of environmental consequences. A wide range of primary literature was used in preparing this EA from federal agencies such as the U.S.

Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (USEPA), state agencies, and nonprofit and nongovernment organizations. Internet searches were conducted, and websites were evaluated for credibility of the source, quality of the information, and relevance of the content to ensure use of the best available information in this document.

1.5 ENVIRONMENTAL PLANNING PROCESS

Federal agencies are required to examine the environmental impacts of their proposed actions within the U.S. and its territories. In accordance with CEQ regulations found at 40 C.F.R. §1500 et seq., an EA is a concise public document that briefly serves to: (1) provide sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact (FONSI), (2) aid an agency's compliance with NEPA when no EIS is necessary, and (3) facilitate preparation of an EIS when one is necessary. In addition, an EA shall include brief discussions of: (1) purpose of and need for the Proposed Action, (2) alternatives as required by Section 102(2)(E) of NEPA, (3) environmental impacts of the Proposed Action and alternatives, and (4) listing of agencies and persons consulted. The Navy undertakes environmental planning for major Navy actions occurring throughout the world in accordance with applicable laws, regulations, and executive orders (EOs).

1.5.1 NATIONAL ENVIRONMENTAL POLICY ACT REQUIREMENTS

The NEPA process begins when an agency identifies a requirement for informed decision-making and prepares a proposed action. If the environmental impacts are uncertain, then an EA is initiated for developing the scope of issues related to the Proposed Action. The next step involves coordination with agencies and stakeholders to the extent practicable in development of a draft EA to assess potential impacts of the Proposed Action and alternatives on the environment. The EA process concludes with either a FONSI or a determination to proceed to preparation of an EIS. When the FONSI and final EA are complete and made available to the public, the Navy decision-maker will issue a Notice of Availability.

1.5.2 ADDITIONAL REGULATORY CONSIDERATIONS

The Navy must comply with all applicable federal environmental laws, regulations, and EOs, including, but not limited to, those listed below. Further information can be found in Chapter 3 (Affected Environment and Environmental Consequences) and Chapter 5 (Other Considerations).

- American Indian Religious Freedom Act
- Bald and Golden Eagle Protection Act (BGEPA)
- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Endangered Species Act (ESA)
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*
- EO 13045, *Environmental Health and Safety Risks to Children*
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*
- Fish and Wildlife Coordination Act
- Migratory Bird Treaty Act (MBTA)
- National Historic Preservation Act (NHPA)
- Sikes Act

1.5.3 AGENCY COORDINATION

The Navy is the action proponent and the lead agency for preparation of the EA. The Navy is coordinating with the U.S. Forest Service on renewing land use agreements for the remote support facilities, USFWS for preparation of a biological assessment (BA) in support of the EA, Idaho Department of Lands as an interested party, Idaho Department of Environmental Quality (IDEQ) for water quality, U.S. Army Corps of Engineers (USACE) for lake activities, Idaho Fish and Game (IDFG) to facilitate their fisheries research activities, and Farragut State Park as the neighboring land owner.

1.6 RELATED ENVIRONMENTAL DOCUMENTS

In accordance with CEQ regulations for implementing NEPA, the following relevant material to the Proposed Action is being incorporated by reference, with the intent of reducing the size of the document. The following documents relate to the proposed operational testing activities and may be referenced in this EA, as appropriate:

- *Acoustic Research Detachment Underwater Sound Guidelines,* Naval Surface Warfare Center, Carderock Division, Acoustic Research Detachment (U.S. Department of the Navy 1996b)
- *Final Biological Assessment for P-207 Pier and Boathouses Replacement at the Naval Surface Warfare Center Carderock Division Acoustic Research Detachment Bayview* (U.S. Department of the Navy 2009b)
- *Architectural Inventory and Evaluation of Acoustic Research Detachment Bayview* (U.S. Department of the Navy 2010b)
- *Integrated Natural Resources Management Plan, Acoustic Research Detachment Bayview* (U.S. Department of the Navy 2010a)
- *Environmental Assessment for the Intermediate Scale Measurement System, David Taylor Research Center, Acoustic Research Detachment, Lake Pend Oreille, Idaho* (U.S. Department of the Navy,1991)
- *Effects of Underwater Sound Simulating the Intermediate Scale Measurement System on Fish and Zooplankton of Lake Pend Oreille, Idaho* (Office of Naval Research 1994)
- *Final Environmental Impact Statement for Capital Improvements Plan at the Naval Surface Warfare Center Carderock Division, Acoustic Research Detachment Bayview, Idaho* (U.S. Department of the Navy 1996a)
- *Record of Categorical Exclusion for Laser Generated Underwater Sound and Laser Detection of Underwater Sound at the Naval Surface Warfare Center Lake Pend Oreille Test Facility in Bayview, Idaho* (U.S. Department of the Navy 2012)

1.7 PUBLIC INVOLVEMENT

Regulations of the CEQ (40 C.F.R. 1506.6) direct federal agencies to involve the public in preparing and implementing their NEPA procedures. The Navy will solicit public comments and hold a public meeting. Comments received will be considered in preparing the Final EA.

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This chapter is divided into two major subsections: Section 2.1 (Description of the Proposed Action) provides a detailed description of the Proposed Action, and Section 2.2 (Selection Criteria) describes alternatives to the Proposed Action.

2.1 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is to continue existing activities, and expand existing RDT&E activities at the NSWCCD facility at Lake Pend Oreille in Bayview, Idaho. ARD Bayview is defined by the Navy as a research facility and as such, conducts no training. The Proposed Action consists of:

- RDT&E, fleet support, and in-service engineering for surface and undersea vehicle hull, mechanical and electrical systems, and propulsors
- Logistics research and development
- Support to the maritime administration and the maritime industry

ARD Bayview currently supports in-water testing approximately 100–150 days per year. Under Alternative 2 (Preferred Alternative), this may increase to approximately 150–200 days per year. The testing facilities are used 80 percent of the available days per year and 20 percent of the available nighttime capacity. Approximately 21 percent of testing days each year are lost due to maintenance downtime, recreational boating activities, and weather. Approximately 2 percent of night testing activities are lost due to weather. Possible increases in tempo of activities (number of testing days per year) would require an additional static test barge to support testing activities.

The main facility at ARD Bayview provides engineering and operational support for testing activities. Multifiber cables deployed along the bottom of Lake Pend Oreille provide the major communication link between ARD Bayview, the remote shore facilities, and the underwater test facilities. ARD Bayview capabilities include:

- Around-the-clock remote onshore data collection capability via underwater fiber-optic link
- High accuracy, multiple vehicle tracking with a precise location measurement system (less than 1 centimeter [cm] accuracy)
- Measurements for buoyant, suspended, free running undersea, and surface vessels
- Static model handling and attitude control (depth, roll, pitch, and heading)
- 200-ton shore lift capabilities
- Multiple deep water mooring locations
- Running autonomous underwater vehicle operations in a precision tracking range
- Full control of the testing vehicle and its support systems
- Ability to fully reconfigure models

2.1.1 ACTIVITIES AT REMOTE FACILITIES AND TEST SITES

To fulfill its mission, the ARD Bayview main facility maintains two remote support facilities on the shoreline of Lake Pend Oreille and five test sites in the lake (see Figure 1-2). Test activities consist of in-lake testing and model resources available at ARD Bayview for short-term tests and evaluations in support of other Navy programs. Prior to acceptance of any special test, an environmental evaluation is conducted to determine impacts to the lake to ensure the project is in compliance with existing environmental statutes and implementing regulations and meets applicable Navy guidelines and

policies. These special tests are typically associated with evaluation of acoustic or hydrodynamic characteristics. On occasion ARD Bayview has been tasked to measure other signature characteristics. In general, testing typically involves re-configuring one of ARD Bayview's models or test barges and deploying/mooring it on the appropriate test site. In some instances, when supporting testing for other Navy commands, universities, and private industries, the organization conducting the test brings its own test article and uses one of the existing test facilities as the test platform. In other cases, such as deploying test instruments from an aircraft, watercraft, etc., the Navy provides the necessary technical and logistic support to conduct special test activities. The analysis in this EA includes an evaluation of these non-Navy tests in addition to the Navy RDT&E activities.

Pierside testing at ARD Bayview consists of small-scale tracking evaluations, pre-deployment, in-water checks, and short research tests conducted pierside or within an enclosed barge. These tests are normally shorter, limited-power versions of on-lake testing.

Intermediate Scale Measurement System (ISMS). The ISMS is designed to support scientific examination of the structural acoustic responses of submarine models and other static underwater vehicles. During model deployment and test site maintenance, the Experiment Support Platform is towed from its berth at ARD to the ISMS site and moored to four buoys anchored at the ISMS range. A test model is then connected to the target model handling system and pulled down to the center of the measurement area by a cable connected to a winch at the OUTPOST shore facility. The facility tests static models for how effectively they reradiate sound from an external source and how much sound is radiated from onboard machinery. ISMS in-water equipment is the most extensive of its type in the world. The center of the operating area has a haul down anchor connected to a shore winch for positioning test vessels from the surface. This is a mechanical device that is only operated during short periods of initial test outfitting and positioning. Surrounding the test vessel are one or two arrays of passive sensors (depending on test objectives), which measure acoustic energy from the test vessel. One end of the ISMS in-water facility contains an active array that produces mid-frequency acoustic energy focused on the test vessel. All components are connected to a building on shore and then 14 miles back to the Range Operations Center in Bayview. Like the LSV facility, the ISMS requires periodic maintenance and upgrades of in-water equipment.

Large Scale Vehicle (LSV). The LSV testing facility precisely tracks vehicles to evaluate propeller noise, structural acoustics and hull structural vibration, and maneuvering and powering. All components of the test site are totally submerged except for a pontoon mooring platform secured by anchors and wire rope anchor lines. Test site components include sound receivers (hydrophones) connected by electrical cable. The Large Scale Vehicle #1 (LSV-1, Kokanee) is an 88 ft. (26.8 m), battery-powered, 1/4-scale model of the SEAWOLF Class submarine. LSV-2, Cutthroat, is a 111 ft. (33.8m) model of the Virginia Class. The LSVs are used for testing various aspects of submarine silencing. As self-propelled, unmanned, underwater vehicles, the LSVs are ideal platforms for testing alternative propulsion technologies, performing hull response evaluations, and other research such as non-acoustic detection. The in-water portion of the LSV Measurement Facility consists of an approximately 3000 x 6000 yard operating area with two vertical line arrays of passive sensors, six bottom-mounted high-frequency active tracking transducers, and a mooring platform serving as a termination point for the in-water equipment. All devices are permanently located near the center of the deep water channel of Lake Pend Oreille. Periodic maintenance and upgrades of in-water equipment includes removal and re-installation of anchors, cables, and sensors.

Static Test Barge. The static test barge (also called the Yellow Barge) is used for small-scale target strength testing, large model structural acoustic testing, radiated noise measurements, and transducer calibrations. Heated lab space houses instrumentation, including computer-controlled data acquisition. The barge also features overhead lifting and material handling equipment. Several scaled models are available for use at the static test barge site.

Buoyant Vehicle Range. The test site is primarily used for flow noise evaluation and structural acoustic measurements. The facility tests bow area flow noise to determine the optimal shape, material, coating, mounting scheme, and bow design. The Buoyant Vehicle Range supports hydro-acoustic testing using a variety of models. The test site includes a shore support facility, Wigwam, located on the western edge of the lake on public lands managed by the U.S. Forest Service. Buoyant models are towed to the site, rigged for testing, and hauled to the bottom of the lake by cables connected to winches at the Wigwam site. Most of the components of the test site are submerged, except for a mooring float secured in place by anchors and wire rope mooring lines, and two floats secured to the haul-down cables that travel with the cables as they are hauled in and pulled out. The model is released, and being propelled by buoyancy, "pops-up" to the surface. Measurements of model performance are taken while the model is accelerating toward the lake surface.

SEAJET or the Advanced Electric Ship Demonstrator is a 133 ft. (40.5 m) manned surface test model used for signature measurements. It operates in conjunction with other test facilities or independently. SEAJET is powered by a diesel-electric power train that can operate in a standard or quiet (battery) mode.

Chinook Tow Vessel. A 60 ft. long large tow capacity, high-speed vessel outfitted for towing long cables of towed sound navigation and ranging (sonar) sensors. Chinook operates throughout the lake.

Tow Testing. Testing and development of towed arrays is accomplished at the tow testing site, which consists of a 13 mi. (21 km) straight stretch of unobstructed water with maneuvering zones, 1.5 mi. (2.4 km) in diameter at each end of the test site. Various types of towed sensors/arrays are towed with the CHINOOK, a 60 ft. (18.3 m) vessel capable of towing at a speed of 20 knots. These tests typically occur within the tow testing site depicted in Figure 1-2; however, the testing may occasionally occur through the entire Study Area.

Wigwam. This remote shoreline site is located on U.S. Forest Service-owned land; however, in 1959, they issued a 99-year special use permit to the Navy. The Navy maintains the outlying facility operated under the special use permit. The facility consists of three buildings, an electrical substation, and a pier. Wigwam is accessible only by boat by way of a 16 ft. x 161 ft. (4.9 m x 49 m) pier. The pier is made of natural wood timbers on a steel frame. The pier also includes a 21 ft. x 22 ft. (6 m x 7 m) extension positioned to the south. Models are tugged into proper position during tests through the use of winches. Although three winch systems are available, only one winch system is currently utilized, and cables from this single winch system run from the facility into the lake. This support facility is essential for acoustic testing.

OUTPOST. The site is owned and permitted by the U.S. Forest Service and, under a special use permit, operated by the Navy. The special use permit was established in 1991 and is valid through 2020. As with Wigwam, the Navy maintains the OUTPOST facility operated under the special use permit. This remote shoreline facility serves as the shore support for the ISMS hauldowns and the acoustic systems. A 3,000-square-foot (ft.^{2}) (914-square-meter [m^2]) building houses an electronics room and a mechanical room

for the hauldown winch system. A winch is used to properly position static models during testing on the ISMS range. Winch operations require a 50 $ft.^2$ operations area with an unobstructed view of the ISMS and the winches. A 30 $ft.^2$ (9.14 m^2) utility building is located outside the larger building to provide space for the emergency power generator and its 500-gallon fuel supply.

The OUTPOST is accessible only by boat by way of a 10 ft. x 100 ft. (3 m x 30 m) pier. The pier is made of natural wood timbers on a steel frame. Power and telephone service are provided by underwater cables from Wigwam and the main facility, respectively. This facility is essential for supporting acoustic testing at the ISMS and LSV ranges.

2.2 SELECTION CRITERIA

Alternatives to the Proposed Action must be considered in accordance with NEPA and CEQ regulations for implementing NEPA. In accordance with CEQ regulations found at 40 C.F.R. §1502.14, each alternative must be feasible, reasonable, and reasonably foreseeable. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint. The Navy has developed criteria for assessing whether a possible alternative meets the purpose of and need for the Proposed Action. Any alternative considered for future analysis should support or employ the following:

1. Acoustically quiet testing environment, utilizing existing infrastructure (Static Test Barge and shore-based infrastructure)
2. Ability to conduct year-round, in-water tests
3. Testing on non-Navy systems and platforms, to include other federal agencies, state and local entities, and private industries

2.3 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

2.3.1 ALTERNATIVE SITE

Use of an alternative site was considered for continuing ARD Bayview's RDT&E activities. However, use of an alternative site was eliminated from subsequent consideration because it failed to adequately meet several of the selection criteria. It would be unreasonable to relocate to an alternative site and attempt to reproduce the technical facilities and environmental conditions required for conducting precise acoustic research. A summary in support of continuing use of the ARD Bayview site is provided below.

Stealth is the defining characteristic of ship and submarine design. ARD Bayview plays a major role in supporting ongoing U.S. Navy RDT&E in underwater acoustics. The focus of these efforts is the use of large-scale models simulating characteristics of current and future Navy submarines. ARD Bayview provides the Navy's only capability to cost effectively test and evaluate new active and passive acoustic signature-reduction technologies on large-scale models; develop and evaluate advances in submarine silencing technology; and test for impacts to sonar, RN, and target strength reduction. Performing acoustic experiments on large-scale models is many times less costly than performing the same tests on actual submarines, while providing results that accurately predict full-scale performance and cost.

Lake Pend Oreille's depth, exceptionally low ambient noise, large and unobstructed operating areas, isothermal temperature profile, and still water are a unique combination of attributes essential for current and future progress in the development of submarine silencing technology. No other U.S. facility exists with this unique combination. The near ideal environment of Lake Pend Oreille provides for excellent data quality, and provides opportunities to make significant advancements in submarine

stealth and structural acoustics. The opportunity for scientists and engineers to improve their numerical models and design tools based on such precise real-world data is unprecedented. The end result is more efficient design evolutions, expeditious implementation of new technologies, and ultimately, a quiet fleet and maintenance of the U.S. Navy's position as the world leader in submarine stealth. The Navy must maintain use of this site as long as it envisions the need for quiet submarines.

The consolidated facilities and operational capabilities of related functions provide for increased efficiency of RDT&E activities. This includes increased model storage, preparation, and testing capability; project management, engineering, machining, and fabrication functions; and security and administrative support. Additionally, ARD Bayview provides the ability to concurrently prepare and test up to five models.

2.3.2 Alternative Testing Site on Lake Bottom

The Navy considered the development of a new permanent testing site on the bottom of Lake Pend Oreille. The current location of the testing site within the lake is considered to be the optimum location for ongoing activities. In addition, development of a new permanent testing location could result in adverse impacts to natural resources through disturbance and degradation or loss of habitat for native species such as the federally endangered bull trout (*Salvelinus confluentus*). This alternative was considered to be unnecessary given the current location is sufficient for existing and future proposed testing activities. Therefore, this alternative was dismissed from further consideration.

2.3.3 Explosive Testing Activities

The Navy also considered testing explosives at ARD Bayview as part of the Proposed Action. Explosive testing was dismissed from further consideration due to the recreational use of the lake and the risk to natural resources. Explosive testing was considered to be incompatible with the recreational use of the lake. In addition, the entire lake is federally designated critical habitat for the endangered bull trout. Explosive testing would result in damage to critical habitat, and impulsive noise impacts on bull trout and its prey were considered unacceptable. Given the potential for high-level adverse impacts, and the presence of other Naval facilities where this testing can be conducted, the use of ARD Bayview for explosive testing was dismissed from further consideration.

2.4 Alternatives Considered

As required by NEPA, alternatives to the Proposed Action must be considered. However, only those alternatives determined to be reasonable relative to their ability to fulfill the purpose of and need for the Proposed Action are analyzed in this EA. Three alternatives to the Proposed Action were carried forward for analysis in this EA: No Action Alternative, Additional Testing Alternative (Alternative 1), and Expanded Additional Testing Alternative (Alternative 2 [Preferred Alternative]). The proposed activities are described in Table 2.4-1 and quantified under each alternative in Table 2.4-2. The acoustic source levels are described in Table 2.4-3 and in-water noise guidelines in Table 2.4-4.

2.4.1 No Action Alternative

In accordance with 32 C.F.R. §65, the No Action Alternative is included in the EA as a benchmark to compare the magnitude of environmental effects of the action alternatives. The No Action Alternative is defined for this EA as no change from current RDT&E activities (i.e., current activities would continue such that no action is equal to no change in the status quo).

The No Action Alternative would limit the activities that may occur at ARD Bayview to those listed in the *Environmental Assessment for the Intermediate Scale Measurement System, David Taylor Research Center* (U.S. Department of the Navy 1991) and *Final Environmental Impact Statement for Capital Improvements Plan at the Naval Surface Warfare Center Carderock Division* (U.S. Department of the Navy 1996a). Activities include passive, active, and structural acoustics; hydrodynamic and tracking tests; towed arrays; radar testing; sensor calibration; radar operations; radio communications; maintenance; and hazardous materials management (testing activities 1 through 8 and support activities 12 through 15 identified in Table 2.4-1).

2.4.2 ALTERNATIVE 1: ADDITIONAL TESTING ALTERNATIVE

The Additional Testing Alternative would consist of the No Action Alternative plus additional testing activities including passive and active underwater electromagnetic measurements, and infrared (heat energy) measurements (activities 1 through 15 identified in Table 2.4-1).

2.4.3 ALTERNATIVE 2 (PREFERRED ALTERNATIVE): EXPANDED ADDITIONAL TESTING ALTERNATIVE

The Expanded Additional Testing Alternative (Preferred Alternative) consists of all activities that would occur under Alternative 1, Additional Testing Alternative, plus laser testing (Table 2.4-1 and Figure 2-1), shallow water testing, and other testing (activities 1 through 18 identified in Table 2.4-1).

Table 2.4-1: Testing Activity Descriptions

Test Activity	Summary Name	Description and Activity	Location within Testing Area
Current Activities			
1	Passive Acoustic	In these tests, noise from a surfaced or submerged vessel or other test shape moving through the water is recorded by arrays of passive sensors (no active acoustic energy emitted). The energy entering the environment is only from the physical movement of the model. Since the nature of development is to reduce the noise, energy from the moving vessels is extremely low and the vessels operate in close proximity to the measurement sensors. The arrays of passive sensors are either fixed or, at times, temporarily placed in the lake.	Static Barge, LSV, ISMS, Buoyant Vehicle
2	Structural Acoustic	Single or multiple *active* sound sources (transducers) provide acoustic energy, which excites a vessel or test structure. This enables study of how the structure responds and develops the science and engineering to further reduce energy entering the water. *Active* sources are placed at fixed permanent or temporary floating or moored positions. *Passive* sensors in various locations on and around the vessel detect the resulting energy. With these tests, a vessel, model, or test structure may be excited with an acoustic source or mechanical shaker, and the resulting energy entering the water is recorded from passive sensors on or near the vessel.	ISMS, Buoyant Vehicle, Static Test Barge

Table 2.4-1: Testing Activity Descriptions (continued)

Test Activity	Summary Name	Description and Activity	Location within Testing Area
Current Activities			
3	Self Noise, Flow Noise	These tests use a buoyantly propelled model to determine the noise created by flow past the hull and appendages. Models are winched to the bottom of the lake and released to record onboard noise due to flow.	Buoyant Vehicle Range
4	Hydrodynamic	Hydrodynamic tests evaluate how a vessel moves through the water. These are typically self-propelled models moving at various speeds and turns with onboard sensors measuring the motion through the maneuvers. Hydrodynamic tests may be conducted alone or in conjunction with other signature measurements.	LSV and entire Lake
5	Tracking	Tracking tests use higher-frequency short bursts of acoustic energy to accurately determine the position of fixed or moving objects, usually underwater. Portable and fixed tracking facilities are in use for tracking objects from 2 ft. (0.6 m) to over 100 ft. (30.5 m) long.	LSV, ISMS, Buoyant Vehicle, Static Barge
6	Towing Arrays	The sea-going Navy uses long cables with attached passive sensors called towed arrays. The ARD assists in evaluating these arrays by towing them in the lake at various speeds and depths to determine performance while moving through the water.	Entire Lake
7	Radar Testing	Infrequent test operations use portable advanced radar ashore or on a mobile platform (barge or in rare cases an aircraft) to evaluate signature characteristics of a vessel or other test structure.	LSV, ISMS, Entire Lake
8	Sensor Calibration	(Using active sources) Precision acoustic sources (*active*) operated at short ranges on fixed platforms are used to calibrate sensors for use in other Navy applications.	Static Barge
Activities Common to All Alternatives			
12	Radar Operations	Commercially available radar is used by larger operating boats and vessels for safe navigation during poor visibility and at night.	Entire Lake
13	Radio Communications	ARD Bayview uses radio frequency communication systems for voice and data transmission as part of operational safety, maintenance, and test vehicle systems.	Entire Lake
14	Maintenance	Anchors, cables, and buoys are placed and removed and shore facilities inspected and repaired throughout the year. Boats and barges are moved around the lake in support of these activities.	Entire Lake
15	Hazardous Material, Hazardous Waste Process or Residue	Some research and testing involves the use of materials requiring special handling, waste stream, or pollution prevention measures (e.g., hydraulic oil, grease, corrosion inhibitors). Typically these are small amounts of material that are evaluated for their performance characteristics, removed, and discarded.	ARD Bayview Shore

Table 2.4-1: Testing Activity Descriptions (continued)

Test Activity	Summary Name	Description and Activity	Location within Testing Area
Alternative 1 Testing Activities			
9	Underwater EM Passive	Measuring energy from operations. Similar to passive acoustic testing, the passive sensors detect the EM energy from the operation of vessels or test structures.	LSV, ISMS
10	Underwater EM Active	(Using EM source) A source of EM energy is operated to determine the characteristics and advance the science and engineering of understanding how energy propagates through the water.	ISMS, Entire Lake
11	Infrared Measurements	(Measuring energy from operations). These tests use passive sensors to measure infrared or heat energy.	LSV, ISMS, other
Alternative 2 Testing Activities			
16	Laser Testing	Lasers are used for experiments at or near the surface of the lake to evaluate applications for potential fleet use. Laser testing consists of measuring the distance of the reflected and refracted beams of light directed at the water surface using directing mirrors. Test activities measure the laser-generated acoustic signals using deployed hydrophones, acoustic targets, and transducers at depths from 3 to 600 ft. (1 to 183 m). Activities also include testing and measuring the laser's interferometer's ability to detect underwater sound (Figure 2-1). Each test would occur from 8 to 16 hours.	LSV, ISMS, Entire Lake
17	Shallow Water	Shallow water surface and submerged activities involve boat operations at all speeds and occasionally mooring of a temporary barge (every 2–3 years).	North and South ends of Lake Pend Oreille
18	Other Testing	Use of test apparatus in other areas. Portable tracking devices, manned and unmanned vehicles, and other sensors and equipment may be needed in any area of the lake.	Entire Lake

Notes: ARD = Acoustic Research Detachment, EM = electromagnetic, ft. = feet, ISMS = Intermediate Scale Measurement System, LSV = Large Scale Vehicle, m = meter(s)

Table 2.4-2: Baseline and Proposed Testing Activities

Activity	Name Summary	No Action Alternative		Alternative 1		Alternative 2 (Preferred Alternative)	
		Events per Year[1]	Range Location	Events per Year	Range Location	Events per Year	Range Location
1	Passive Acoustic	100	LSV, ISMS	100	LSV, ISMS	100	LSV, ISMS
2	Structural Acoustic	80	Static Test Barge, ISMS	80	Static Test Barge, ISMS	80	Static Test Barge, ISMS
3	Self Noise, Flow Noise	60	Buoyant Vehicle Range, ISMS	60	Buoyant Vehicle Range, ISMS	60	Buoyant Vehicle Range, ISMS
4	Hydrodynamic	20	LSV, Entire Lake	20	LSV, Entire Lake	20	LSV, Entire Lake
5	Tracking	130	LSV, Static Test Barge	130	LSV, Static Test Barge	130	LSV, Static Test Barge
6	Towing Arrays	40	Entire Lake	40	Entire	40	Entire Lake
7	Radar Testing	20	LSV, Entire Lake	20	LSV, Entire Lake	20	LSV, Entire Lake
8	Sensor Calibration	130	Static Test Barge	130	Static Test Barge	130	Static Test Barge
9	Underwater EM Passive	0	n/a	10	LSV, ISMS	10	LSV, ISMS
10	Underwater EM Active	0	n/a	10	ISMS	10	ISMS
11	Infrared Measurements	0	n/a	15	ISMS, LSV	15	ISMS, LSV
12	Radar Operations	470	Entire Lake	470	Entire	470	Entire Lake
13	Radio Communications for Operations	710	Entire Lake	710	Entire Lake	710	Entire Lake
14	Maintenance	135	Entire Lake	135	Entire Lake	135	Entire Lake
15	Hazardous Material, Hazardous Waste Process, or Residue	135	ARD Bayview Shore	135	ARD Bayview Shore	135	ARD Bayview Shore
16	Laser Testing	0	n/a	0	n/a	10	LSV
17	Shallow Water	0	n/a	0	n/a	10	North & South ends of Lake Pend Oreille
18	Other	0	n/a	0	n/a	10	Entire Lake

[1] An Event is defined as an 8-hour shift of activity in support of a test activity.

Notes: ARD = Acoustic Research Detachment, EM = electromagnetic, ISMS = Intermediate Scale Measurement System, LSV = Large Scale Vehicle, n/a = not applicable

Table 2.4-3: Acoustic Source Levels

System	Source Depth (ft.)	Source Level[1] (dB)	Sound Pressure Level (dB at 150 ft. Depth)	Beamwidth horizontal and vertical	Frequency and Bandwidth	Transmit Length (ms)	Duty (seconds) Cycle (%)	Test Duration (hours)
ISMS Transmit Array Pulsed	600	@ 0.1 kHz: 191 @ 1 kHz: 207	148 164	Omni	0.1–5.6 kHz	50	10 0.5%	3–20
ISMS Transmit Array CW	600	@ 0.1 kHz: 185 @ 1 kHz: 201	142 158	Omni	0.1–5.6 kHz	Continuous waveform	100%	3–20
ISMS Positioning	600	180	137	Omni	10–25 kHz	0.4	10 0.02%	3–20
LSV Tracking Buoys	1,150	190	140	Omni	56–68 kHz	50	8 0.6%	6–8
LSV Tracking Vehicle	30–400	186	186	180 degree	56–68 kHz	50	8 0.6%	6–8
Proposed LSV Tracking	30–400	186	186	180 degree	82–94 kHz	5	8 0.6%	6–8
LSV RN Tracking Arms	30–400	182	182	Omni	90 kHz	2	1 0.2%	6–8
Proposed LSV RN Tracking	30–400	182	182	Omni	65 kHz	10	1 1%	6–8
Calibration Sources	50–200	150	150	Omni	0.2–95 kHz	5	1 0.5%	8
AUV Tracking	20–100	182	182	Omni	26 kHz	1–4	16 25%	4
SEAJET Tracking	15	182	182	Omni	50–100 kHz	5	1 0.5%	3–6
Small Craft Fathometer	3	EST: 190–250	190–250	25 degrees @ 200 kHz	20–455 kHz	Various	Various	3–12

[1] Sound Pressure Levels are in decibels (dB) referenced to 1 micropascal at 1 meter.

Notes: AUV = Autonomous Underwater Vehicle, CW = continuous waveform, dB= decibel(s), ft. = feet, ISMS = Intermediate Scale Measurement System, kHz = kilohertz, LSV = Large Scale Vehicle, RN = radiated noise, ms = millisecond(s)

Table 2.4-4: In-Water Noise Guidelines

Frequency Range (Hz)	Pulsed SPL[1] Should Not Exceed (dB re 1 □Pa)	Continuous SPL[2] Should Not Exceed (dB re 1□Pa)[2]
0–300	200	172
300–400	212	172
400–500	220	172
500–600	231	172
600–1,000	240	172
1,000–2,000	240	177
2,000–110,000	240	182
110,000–150,000	240	200

[1] Sound pressure level should not exceed these values in the upper 150 feet of the lake. Pulsed value based on ISMS duty cycle of a 20-millisecond pulse every 6 seconds.
[2] Area within the lake above a depth of 150 feet should be in the farfield of the acoustic source used for the continuous pulse generation.

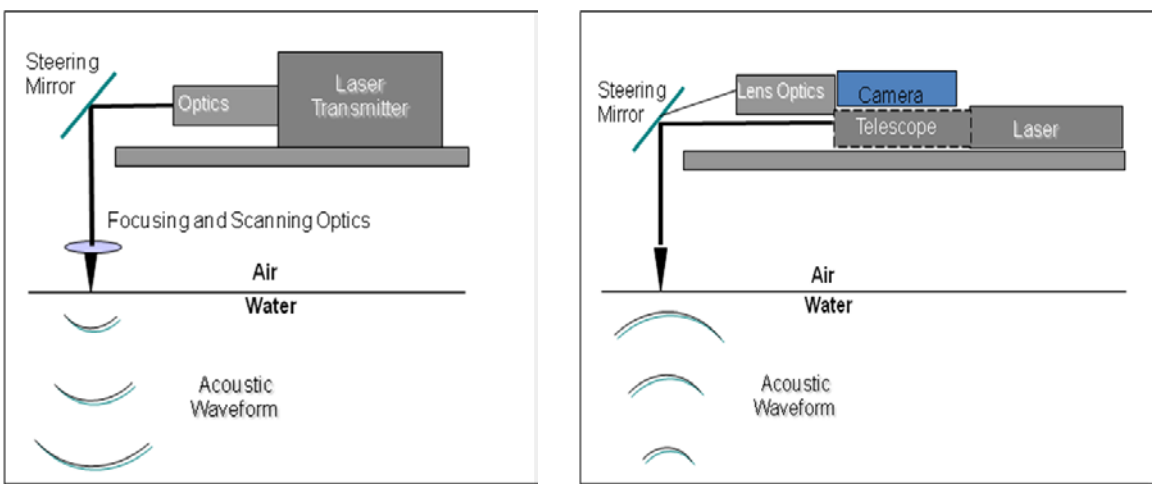


Figure 2-1: Laser Generated Underwater Sound (left) and Laser Detection of Sound (right) Conceptualization

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.0 INTRODUCTION

This chapter describes existing environmental conditions at Bayview and Lake Pend Oreille, Idaho, as well as the analysis of resources potentially impacted by the Proposed Action described in Chapter 2 (Description of Proposed Action and Alternatives). The Study Area is described in Section 1.2 (Location and Description of Acoustic Research Detachment Bayview) and depicted in Figure 1-2. Section 3.0.1 (Regulatory Framework) presents the regulatory framework on which this EA is based. Section 1.4.1 (Data Sources and Best Available Data) lists the sources of data used in the analysis.

3.0.1 REGULATORY FRAMEWORK

In accordance with the CEQ regulations for implementing the requirements of NEPA, other planning and environmental review procedures are integrated to the fullest extent possible. This section provides a brief overview of the primary federal statute that forms the regulatory framework for the resource evaluations. Chapter 5 (Other Considerations) provides a summary listing and status of compliance with the applicable environmental laws, regulations, and EOs that were considered in preparing this EA (including those that may be secondary considerations in the resource evaluations). More detailed information on the regulatory framework may be presented as necessary in each resource section.

National Environmental Policy Act (NEPA)

The Navy prepared this EA in accordance with the President's CEQ regulations implementing NEPA (40 C.F.R. §§1500–1508). NEPA requires federal agencies to prepare an EA for a proposed action that briefly provides sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI. A "finding of no significant impact" means the federal action will not have a significant effect on the human environment. If the federal action is determined from the analysis in the EA to have the potential to significantly affect the quality of the human environment, an EIS will be prepared which will disclose significant environmental impacts, inform decision makers and the public of the reasonable alternatives to the Proposed Action, and consider comments to the EIS.

NEPA requires that an analysis of the resources and areas potentially affected by a proposed action be completed by federal agencies. However, while all resources must be considered, those resources that will not be affected by a proposed action need not be analyzed in detail or may be incorporated by reference.

This document focuses on potential environmental impacts associated with activities listed under the No Action Alternative, Alternative 1, and Alternative 2 (Preferred Alternative) at Lake Pend Oreille in Bayview, Idaho: (1) RDT&E, fleet support, and in-service engineering for surface and undersea vehicle hull, mechanical and electrical systems, and propulsors; (2) logistics research and development; and (3) support to the maritime administration and industry. ARD Bayview is defined by the Navy as a research facility and as such, conducts no training.

Table 3.0-1 summarizes the resources evaluated and indicates which of the resources are analyzed based on Navy resource categories. Table 3.0-1 also includes the rationale for why resources were not carried forward.

Table 3.0-1: Relevant Resources that May be Impacted and Carried Forward for Analysis

Resource		Carried Forward for Detailed Analysis	Rationale
Geologic		No	The Proposed Action does not include construction on undeveloped lands or ground-disturbing activities over an undisturbed area. Testing activities do not involve dredging, regrading, or changing of the soil/sediment in and around Lake Pend Oreille. Therefore, this resource area was not carried forward for detailed analysis.
Water Quality		Yes	Testing activities could impact water quality in Lake Pend Oreille. Detailed analysis provided in Section 3.1 (Water Quality).
Air Quality		Yes	Ambient air quality could be impacted by testing activities. Detailed analysis provided in Section 3.2 (Air Quality).
Biological Resources	Fish	Yes	The bull trout (*Salvelinus confluentus*) is protected by the ESA under the jurisdiction of the U.S. Fish and Wildlife Service. ARD Bayview currently works with the Fish and Wildlife Service to determine areas of kokanee (*Oncorhynchus nerka*) spawning beds in order to minimize impacts of operations on this prey species for bull trout. Testing activities could create in-water noise levels that affect bull trout and impact spawning habitat for prey (kokanee). Testing activities could impact fish species in Lake Pend Oreille, including the bull trout. Detailed analysis is provided in Section 3.4 (Biological Resources).
	Mammals	No	The forests surrounding Lake Pend Oreille provide habitat for a variety of animal species, including white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), gray wolves (*Canis lupus*), moose (*Alces alces*), squirrels, black bears (*Ursus americanus*), coyotes (*Canis latrans*), and bobcats (*Felis rufus*). Special status species known to occur or potentially occurring in this area include grizzly bear (*Ursus arctos horribilis*; ESA threatened species), Canada lynx (*Lynx Canadensis*; ESA threatened species), and North America wolverine (*Gulo gulo luscus*; ESA proposed species). Aquatic mammals include the American beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*); however, annual drawdown of the lake limits their occupancy. Vessel noise associated with test activities may cause minor, temporary disturbances to terrestrial mammals. These activities would generally occur away from shallow areas where beaver and muskrat may be found and would therefore be unlikely to have significant impacts on these species.

Table 3.0-1: Relevant Resources that May be Impacted and Carried Forward for Analysis (continued)

Resource		Carried Forward for Detailed Analysis	Rationale
Biological Resources	Birds	No	Lake Pend Oreille provides over 26 square miles of aquatic habitat for waterfowl and aquatic birds. The lake and surrounding lands support approximately 70 bird species, including great blue heron (*Ardea herodias*), turkey vulture (*Cathartes aura*), osprey (*Pandion haliaetus*), various hawks and owls, woodpeckers, and many waterfowl. Special status bird species known occurring in or near the area include the yellow-billed cuckoo (*Coccyzus americanus*; ESA proposed threatened species), bald eagle (*Haliaeetus leucocephalus*; BGEPA), and a wide variety of migratory birds (MBTA). Vessel noise associated with testing activities may cause minor, temporary disturbances to terrestrial birds. However, the noise levels that would propagate to the shore (where birds may be nesting) are not expected to exceed daytime ambient noise levels. Birds in or over the water near testing areas would likely move away from testing areas to adjacent suitable habitat as vessels approach and/or test vehicles are positioned into place, which would result in momentary disruptions to behavior and is not anticipated to contribute adversely to daily energy expenditure. In addition, test activities are temporary and occur within a relatively small area of the lake during any one event, further minimizing the potential impacts to individual birds. Overall impacts to birds or bird populations are expected to be insignificant.
	Invasive Species	No	The invasive species, Eurasian milfoil (*Myriophyllum spicatum*) and Asian clam (*Corbicula fluminea*), are present and in the northern section of Lake Pend Oreille. Testing activities would not further exacerbate or enhance the spread of invasive species because ARD Bayview follows standard protocols for decontaminating all vessels and equipment that have been in contact with other water bodies prior to entering the lake.
Land Use		No	The Proposed Action would not change the manner of use or quality of land, land encroachments, or land forms and soil. The Proposed Action does not include construction on undeveloped lands or ground-disturbing activities over an undisturbed area. Therefore, this resource area was not carried forward for detailed analysis.
Cultural Resources		No	There are no historical or cultural resources near the Proposed Action. Therefore, this resource area was not carried forward for detailed analysis.
Transportation		No	The Proposed Action does not include construction activities or additional employees that could impact transportation. While there may be an increase in personnel travelling to Bayview for testing activities, the number of vehicle trips is low and highway transportation around Lake Pend Oreille will not be impacted by continuation of testing activities that occur within the lake.
Socioeconomics		Yes	Boating, fishing, and other recreational activities at Lake Pend Oreille could be impacted by testing activities. Detailed analysis is provided in Section 3.5 (Socioeconomics).

Table 3.0-1: Relevant Resources that May be Impacted and Carried Forward for Analysis (continued)

Resource	Carried Forward for Detailed Analysis	Rationale
Environmental Justice and Protection of Children	Yes	Minority, low-income populations, and children could be affected or disproportionately burdened by the Proposed Action. Detailed analysis required by Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations) is provided in Section 3.5 (Socioeconomics).
Aesthetics and Visual Resources	No	The Proposed Action does not include activities that could impact aesthetic and visual resources. Testing activities at ARD Bayview will not change the current aesthetics of Lake Pend Oreille. While an additional barge may be used, its utilization will only take place once every 2–3 years, for durations of up to 2 weeks. This temporary barge will not affect the permanent viewshed.
American Indian Traditional Resources	Yes	Testing activities could impact American Indian traditional cultural properties or accustomed tribal fishing grounds at Lake Pend Oreille. Detailed analysis is provided in Section 3.6 (American Indian Traditional Resources).
Public Health and Safety	Yes	Testing activities could impact public health and safety at Lake Pend Oreille. Detailed analysis is provided in Section 3.7 (Public Health and Safety).

Notes: ARD = Acoustic Research Detachment, BGEPA = Bald and Golden Eagle Protection Act, ESA = Endangered Species Act, MBTA = Migratory Bird Treaty Act, U.S. = United States

3.0.2 INTRODUCTION TO ACOUSTICS

This section introduces basic acoustic principles and terminology describing how noise travels or "propagates" in air and water. These terms and concepts are used when analyzing potential impacts due to sounds and noises from military testing activities. This section briefly explains the transmission of noise, and defines acoustical terms, abbreviations, and units of measurement. Finally, it discusses the various sources of underwater noise, including physical, biological, and anthropogenic noises. Potential impacts of noise on biological resources are addressed in Section 3.4 (Biological Resources) as well as on public neighbors and sensitive receptors in Section 3.7 (Public Health and Safety).

Sound is an oscillation in pressure, particle displacement, and particle velocity, as well as the auditory sensation evoked by these oscillations, although not all sound waves evoke an auditory sensation (i.e., they are outside of an animal's hearing range) (American National Standards Institute 1994). Sound may be described in terms of both physical and subjective attributes. Physical attributes may be directly measured. Subjective (or sensory) attributes cannot be directly measured and require a listener to make a judgment about the sound. Physical attributes of a sound at a particular point are obtained by measuring pressure changes as sound waves pass.

Noise is an unintentional byproduct of acoustic emissions (waste) such as vessel or engine noise. Under certain conditions, noise can interfere with human activities at home and work, cause hearing loss, and affect human health and well-being in various ways. This section addresses airborne noise associated with the Proposed Action and potential effects to human receptors. Underwater noise and its potential effects on marine life are addressed in the biological resources sections.

3.0.2.1 Sound Characteristics

Sound results from vibrations, introduced into a medium such as air, that stimulate the auditory nerves of a receptor to produce the sensation of hearing. Sound is undesirable if it interferes with communication, is intense enough to damage hearing, or diminishes the quality of the environment. Human responses to noise vary with the types and characteristics of the acoustic source, the distance between the source and receptor, receptor sensitivity, the background sound level, and other factors such as time of day. Sound may be intermittent or continuous, steady or impulsive, and may be generated by stationary sources such as industrial plants or transient sources such as automobiles and aircraft.

Acoustic energy travels in waves. Its intensity at a receptor varies as a function of source intensity, the characteristics of the acoustic wave, the distance between source and receiver, and environmental conditions. Reflection, refraction, diffraction, and absorption are physical interactions between sound waves and surfaces or the medium through which the sound travels.

The extent to which an intrusive sound affects a given receptor in the environment depends upon the degree to which the intruding sound exceeds the background sound level. Both background and intrusive sound may affect the quality of life in a given environment. Cumulative, long-term exposure to excessive background sound is recognized as the primary cause of hearing loss. Intrusive sound, although not a cause of permanent hearing loss, can contribute to stress, irritability, loss of sleep, and impaired work efficiency.

3.0.2.2 Sound Spectrum

Sound oscillates in waves, and the rates of oscillation (frequencies) are measured in cycles-per-second, or Hertz (Hz). The human ear can detect sounds ranging in frequency from about 0.02 to 20 kilohertz (kHz), with the ear most sensitive to frequencies from 1 to 4 kHz (U.S. Army 2005). Most environmental sounds consist not of a single frequency, but rather a broad band of frequencies that vary in intensity. Sound frequencies from military activities vary greatly. Some examples of frequencies at peak sound energy include fixed-wing aircraft (2–4 kHz), street vehicles (approximately 0.06 kHz), and diesel trucks (approximately 0.25 kHz) (U.S. Department of the Navy 1978; U.S. Army 2005).

3.0.2.3 Sound Metrics

The human ear is not equally sensitive to all acoustic frequencies within the frequency range of human hearing; the human ear cannot detect lower frequencies as well as it can detect higher frequencies. Thus, the “raw” acoustic intensity measured by mechanical devices is selectively weighted—or filtered—to simulate the non-linear response of the human ear.

Weighting networks are used in noise meters to adjust their frequency response to “raw” (unweighted) measured noises. The A-weighting network is designed to duplicate the sensitivity of the human ear, and heavily discounts noise energy at low frequencies and at very high frequencies. In several studies, a person’s judgment of the loudness of a noise has been shown to correlate well with the A-weighted values of those noises (U.S. Department of the Navy 1978). For this reason, the A scale is the most common weighting scheme for community noise measurements and standards, and is used for most environmental noise evaluations. These adjusted noise levels are termed “A-weighted” noise levels, denoted as dB(A) or simply dBA. The A-weighted scale is used internationally in noise standards and regulations. Therefore, dBA is the primary metric to be used in analyzing acoustic effects under

environmental consequences because its characteristics are reflective of the human ear's frequency response.

A continually varying noise level over a given period can be described as a single "equivalent" noise level (L_{eq}) that contains an amount of energy equal to that of the actual noise level. Thus, the L_{eq} is a measure of the average acoustic energy over a stated period. Equivalent noise levels can represent any length of time, but typically are associated with some meaningful period, such as an 8-hour L_{eq} for an office, or a 1-hour L_{eq} for a classroom lecture (U.S. Army 2005). The L_{eq} is averaged over a 1-, 8-, or 24-hour period. The L_{eq} is used to describe continuous noise sources, and may be obtained by averaging noise levels over a selected period. This level is the estimation of the continuous noise level that would be equivalent to the fluctuating noise signal under consideration (U.S. Department of the Navy 1978). A L_{eq} that is a 24-hour average can also be termed the Day-Night Average Sound Level (Ldn or DNL), with a caveat. The DNL is the average noise level over a 24-hour period. However, the noise between the hours of 10 p.m. and 7 a.m. is artificially increased by 10 dB. This noise is weighted to take into account the decrease in community background noise of 10 dB during this period. DNL is the accepted unit for quantifying annoyance to humans from general environmental noise. As the DNL increases, the number of compatible land uses (Federal Interagency Committee on Urban Noise land use compatibility guidelines [Federal Interagency Committee on Urban Noise 1980] decreases.

3.0.2.4 In-Air Noises

Sound intensity is expressed in decibels (dB), a logarithmic scale that compares the power of an acoustical signal to a reference power level. A noise level of 0 dB is defined as the threshold of human hearing. The quietest environmental conditions yield noise levels of about 20 A-weighted decibels (dBA). Typical night-time noise levels in quiet residential areas have a noise level of about 35–45 dBA. Normal speech has a noise level of about 60 dBA at a distance of about 1 m. A freight train passing by at about 49.2 ft. (15.0 m) yields a noise level of about 85 dBA. The human pain threshold is about 120 dBA (Table 3.0-2).

A 1 dB change in the noise level is not perceptible to humans (imperceptible change), a 3 dB change is barely perceptible, and a 5 dB change is clearly noticeable. A change in noise level of 10 dB represents more than a three-fold change in sound intensity. However, a 10 dB change is perceived by the human ear as a doubling or halving in loudness.

3.0.2.5 Underwater Noises

The acoustic environment of Lake Pend Oreille is produced by a combination of factors, both natural and man-made. Wind and waves are major sources of natural background noise within the lake. A direct correlation exists between measured wind speed and background noise levels; the higher the measured wind speed, the higher the background noise level.

Table 3.0-2: Noise Levels of Selected Noise Sources and Environments

Source	Noise Level (dBA)	Human Perception of Loudness (relative to 70 dBA)
Military Jet Takeoff w/ afterburner at 50 ft. (15.2 m) Civil Defense Siren	130	**Above Threshold of Pain**
Commercial Jet Takeoff at 200 ft. (61 m)	120	**Threshold of Pain** 32 times as loud
Pile Driver at 50 ft. (15.2 m)	110	16 times as loud
Ambulance Siren at 100 ft. (30.5 m) Power Lawn Mower at 3 ft. (0.9 m)	100	**Very Loud** 8 times as loud
Motorcycle at 25 ft. (7.6 m) Propeller Plane at 1,000 ft. (304.8 m)	90	4 times as loud
Garbage Disposal at 3 ft. (0.9 meter) Passenger Car, 65 mph at 25 ft. (7.6 m)	80	2 times as loud
Vacuum Cleaner at 3 ft. (0.9 m) Living Room Stereo at 15 ft. (4.6 m)	70	**Moderately Loud** (Reference Loudness)
Normal Conversation at 5 ft. (1.5 m)	60	1/2 as loud
Light Traffic at 100 ft. (30.5 m)	50	1/4 as loud
Distant Bird Calls	40	**Quiet** 1/8 as loud
Soft Whisper at 5 ft. (1.5 m)	30	1/16 as loud
	0	**Threshold of Hearing**

Note: dBA = decibels, A-weighted; ft. = feet; m = meter(s)
Source: Federal Interagency Committee on Urban Noise 1992, U.S. Army 2005

In addition to noises generated during Navy testing, other non-Navy activities also introduce similar types of anthropogenic (human-generated) noise into the lake from a number of sources, including non-military vessel traffic. The primary source of man-made acoustic energy in the lake is recreational boat traffic. High-speed boats produce a broadband noise spectrum that covers a frequency range from 100 Hz to 5,600 Hz. Since recreational boat traffic is temporal in nature, the average background noise levels within Lake Pend Oreille exhibit temporal variation. During the summer months (when boat traffic is at a maximum), background noise tends to be higher than during the winter months. (Bennett et al. 1994)

All vessels from sailing ships to rowboats cause at least hydrodynamic friction noise, which is caused by the friction between the hull and water. However, it is not significant when comparing it to the noise of the power-driven vessels. A significant amount of noise is caused by cavitation. Cavitation generates small air bubbles due to the momentary low pressure in the propeller blades and is the main source of noise in large vessels. Instantaneous low pressure makes the water boil, and the bubbles produce short and loud broadband high-frequency noises (Urick 1975). In power-driven vessels noise can also be caused by the engine, vibration of the hull, rotation of the axels and propellers, and steering gear; and in small boats, another cause of noise is exhaust gas bubbles.

3.0.2.6 Sound Propagation

Acoustic energy radiates outward from its source. This acoustic energy attenuates (decreases in intensity) as it moves away from its source because of geometric spreading of the sound energy,

atmospheric absorption, ground attenuation, and shielding. Sound metrics for discrete sources are expressed in terms of a distance from the source (a typical reference distance is 50 ft. [15.2 m]).

Acoustic waves from point sources radiate in a spherical pattern, with the wave intensity attenuating in air due to geometric spreading by 6 dB per doubling of distance from the source (U.S. Army 2005). Line sources such as roads generate composite acoustic waves from numerous moving point sources that radiate outward in parallel planes; these waves attenuate due to geometric spreading by only 3 dB per doubling of distance.

Underwater noise propagation is highly dependent upon environmental characteristics such as bathymetry, bottom type, water depth, temperature, and salinity. The noise received at a particular location will be different than near the source due to the interaction of many factors, including propagation loss; how the noise is reflected, refracted, or scattered; the potential for reverberation; and interference due to multi-path propagation. However, a very simple estimate of sonar transmission loss can be calculated using the spherical spreading law, TL = 20 log10r, where r is the distance from the acoustic source and TL is the transmission loss in decibels.

3.0.2.7 Time-Averaged Sound Levels

Ambient noise standards regulate ambient noise levels through time-averaged L_{eq} limits. Noise standards for land use compatibility established by Department of Defense (DoD) and civilian jurisdictions are expressed in terms of the DNL. Based on numerous sociological surveys and recommendations of federal interagency councils, the most common benchmark for assessing environmental noise impacts is a DNL of 65 dBA (Schomer 2005, Federal Interagency Committee on Urban Noise 1992). Noise levels up to 65 dBA DNL are considered to be compatible with land uses such as residences, transient lodging, and medical facilities. Appropriate mitigation is recommended for new development in areas where the DNL exceeds 65 dBA. The U.S. Army Public Health Command (formally known as the United States Army Center for Health Promotion and Preventive Medicine) has defined the following three land use planning zones to account for annoyance from installation training noise (U.S. Army 2005):

- **Noise Zone I** includes all areas in which the A-weighted DNL (ADNL) is less than 65 dBA. Noise Zone I is the zone farthest from the acoustic source and includes all areas not within the other two Noise Zones. This area is suitable for all types of land uses.
- **Noise Zone II** includes all areas in which the ADNL is between 65 and 75 dBA. Noise exposure in this zone is substantial, and allowable land uses include manufacturing, warehousing, transportation, and resource protection. Residential development in this zone is not normally recommended.
- **Noise Zone III** includes all areas in which the ADNL is above 75 dBA. Noise-sensitive land uses, such as housing, schools, churches and medical facilities, are not recommended for this zone.

3.0.2.8 Ambient Sound Guidance Documents

- The Office of the Chief of Naval Operations (OPNAV) Manual OPNAV M-5090.1, Environmental Readiness Program Manual) contains guidance for considering sound. Chapter 35, *Environmental Compliance Afloat*, contains guidance for sound control.
- Planning in the Noise Environment (U.S. Department of the Navy 1978), provides compatibility criteria for various land uses.
- The 49 U.S.C. §44715 (The Noise Control Act of 1972)

3.1 WATER QUALITY

3.1.1 AFFECTED ENVIRONMENT

ARD Bayview is located at the southern end of Lake Pend Oreille (see Figure 1-1), a freshwater lake that contains the majority of the lake's volume in a large, deep, glacially scoured basin (Fields et al. 1996) with water depths up to 1,150 ft. (350.5 m). The lake is one of the world's quietest bodies of water, with 26 mi.^{2} (67.3 km^2) of current-free water.

The lake is part of the Clark Fork-Pend Oreille watershed, which lies within three states, 14 counties, and two Native American reservations and is managed under the Clark Fork-Pend Oreille Basin Management Plan. Adjacent land is largely undeveloped, leading to good water quality in the lake; however, population growth across the watershed is leading to escalating runoff, municipal/industrial discharges, shoreline development, and riparian degradation (Tri-State Water Council 2007). Water levels in the lake are controlled through a dam at Albeni Falls by the USACE. Levels are determined with input from USFWS and IDFG to mimic pre-dam winter conditions, protect shorelines from winter storms, and provide healthy spawning conditions for fish.

In 1994, the State designated the lake as "threatened" and developed a total maximum daily load for phosphorus to maintain water quality standards in the nearshore waters of the lake. The total maximum daily load applies to the summer months (June–September). The target was established at 9 micrograms per liter (µg/L) total phosphorus with an action threshold of 12 µg/L during the summer when algae growth occurs. IDEQ monitored water quality in the lake in June 2010 at six nearshore monitoring locations and two open water locations. Results are presented in Table 3.1-1.

Table 3.1-1: Lake Pend Oreille Water Quality Monitoring

Parameter	Results
Water clarity	Measurements ranged from 3.25 to 5.5 m (Secchi)
Average June Nutrient Concentrations (epilimnion)	7.9 µg/L Total Phosphorous 86 µg/L Total Nitrogen
Average June Nutrient Concentrations (hypolimnion)	5.6 µg/L Total Phosphorous 134 µg/L Total Nitrogen
Nutrient Loading Estimates	Clark Fork River inflow 16,072 hm^3 (13,029,731 acre-feet) Total phosphorus loading 139,054 kg (306,562 pounds) Total nitrogen loading 2,234,235 kg (4,925,645 pounds)

Notes: hm^3 = cubic hectometers, kg = kilograms, m = meters, µg/L = micrograms per liter
Source: Hydrosolutions 2011

Qualitative sediment samples taken from Lake Pend Oreille showed predominantly fine-grained (e.g., silt, sandy silt, and silty sand) material in water depths of 50–55 ft. (15.3–16.8 m) to coarse-grained materials elsewhere (e.g., cobbles) (U.S. Department of Navy 1996).

3.1.1.1 Regulatory Requirements

Creating state-level water quality standards and guidelines begins with each state establishing a use for the water, which is referred to as its "designated" use. Designated uses for Lake Pend Oreille include fish, shellfish, and wildlife protection, propagation, and recreation. A water body is considered "impaired" if any one of its designated uses is not met. Once this use is designated, standards or guidelines are established to protect the water at the desired level of quality. Idaho Water Quality Law

at Idaho Code Section 39-3601 et seq. sets forth a process for addressing impaired water bodies of the state and defines the roles of state agencies with respect to improving and protecting water quality.

Federal standards and guidelines are mainly the responsibility of the USEPA. Lake Pend Oreille was added in 1994 to the list of impaired waters under the CWA Section 303(d) list prepared by the USEPA. It has been retained on this list during subsequent revisions. The impairments responsible for the inclusion of Lake Pend Oreille are listed as mercury, other flow regimes, and phosphorus (U.S. Environmental Protection Agency 2010). Several creeks draining into Lake Pend Oreille are also included on the list of impaired waters.

3.1.1.2 Determination of Significance

Potential impacts from the Proposed Action are evaluated based on the extent to which they could directly or indirectly impact water quality in such a way that violation of existing laws or established standards or guidelines would occur. This includes violating the established total maximum daily load for Lake Pend Oreille.

3.1.1.3 Current Requirements and Management Practices

Military equipment used in the Study Area is properly maintained in accordance with applicable Navy requirements. As specified in OPNAV M-5090.1, Environmental Readiness Program Manual, U.S. Navy vessels do not discharge sewage, gray water, or oily waste with a visible sheen in U.S. internal waters and territorial seas.

A Comprehensive Environmental Response Plan (U.S. Department of the Navy 2009a) has been prepared to address potential releases of hazardous substances. The plan identifies potential pollution sources and addresses spill prevention, control, and countermeasures. The Comprehensive Environmental Response Plan presents a consolidated approach to satisfying the requirements and procedures of several similar plans:

- Spill Prevention Control and Countermeasures Plan (40 C.F.R. §112)
- Emergency Response Action Plan (40 C.F.R. §112)
- Stormwater Pollution Prevention Plan (40 C.F.R. §122)
- Hazardous Waste Contingency Plan (40 C.F.R. §265)
- Emergency Response Plan (29 C.F.R. §1910.120)

Additionally, the Navy has adopted standard operating procedures (SOPs) to reduce the potential for spills while fueling surface craft and barges. As fueling of these craft is required on a frequent basis, the Navy has developed a disciplined procedure to ensure that all personnel involved in fuel transfer operations follow the same process each time. The procedures identified in ARD Instruction 11410.1 are followed to conduct safe fuel transfer operations at Wharf 48 and Wharf 42.

3.1.2 Environmental Consequences

This section discusses potential impacts to the water quality of the Study Area. The primary issues considered were potential changes in water quality due to operation of vessels and support boats at or below the surface of the water and routine maintenance support activities. Acoustic energy (active and passive), electromagnetic energy, passive sensors, and lasers would not have an impact on water quality and are not discussed below.

3.1.2.1 No Action Alternative

Under the No Action Alternative, components of testing activities with the potential to impact water quality involve the operation and maintenance of vessels, barges, and support boats and associated equipment. These activities occur at or below the surface of the water, and include routine underwater maintenance. During such activities, the use of fuels and other petroleum products poses a risk of inadvertent spills into the water. The risk of a spill and possible effects from a spill are reduced by following OPNAV M-5090.1 procedures, the Comprehensive Environmental Response Plan, and SOPs for fuel transfer. The movement and placement of cables and anchors on the lake bed associated with pulling test models into position, anchoring, as well as certain maintenance activities, may disturb bottom sediments. A temporary increase in water column turbidity could occur during these activities, but the impacts would be localized and turbidity levels would return to baseline conditions shortly after maintenance completion.

Small amounts of hazardous materials are used during some RDT&E activities that require special handling, waste stream, or pollution prevention measures. During some activities, the Navy uses small amounts of hazardous materials that are sold in “household consumer” quantities. Generally, these are adhesives, lubricants, or corrosion inhibitors. The Navy complies with federal and state laws governing storage, handling, and disposal of hazardous substances. In addition, ARD Bayview implements a Spill Prevention Control and Pollution Prevention Plan, requiring that spill kits are readily available, staff are trained, and clean and well-maintained equipment are used. Implementation of these measures minimizes the risk of adverse effects on water quality resulting from an accidental release of hazardous materials.

Baseline conditions for water quality would not change under the No Action Alternative because this alternative entails a continuation of current activities, and none of the activities would lead to a violation of state or federal water quality standards or guidelines. Specifically, the proposed activities would not affect the established total maximum daily load for nutrient loading. Therefore, there would be no significant impact on water quality as a result of the implementation of the No Action Alternative.

3.1.2.2 Alternative 1

The potential effects of Alternative 1 on water quality would be similar to those described for the No Action Alternative. Alternative 1 consists of the No Action Alternative plus passive and active underwater electromagnetic measurements and infrared measurements (passive measurements of heat energy) as detailed in Table 2.4-2. As stated in Section 3.1.2 (Environmental Consequences), these passive measurements would not affect water quality; however, vessel use associated with new testing activities would have an effect. A slight increase in fuel use is expected, but the risk of a spill and possible effects from a spill are reduced by following OPNAV 5090.1 procedures, the Comprehensive Environmental Response Plan, and SOPs for fuel transfer.

The movement and placement of cables and anchors on the lake bed associated with pulling test models into position and anchoring would increase under Alternative 1 compared to the No Action Alternative due to an additional 150 testing activities per year. Therefore, the frequency at which the bottom sediments would be disturbed would increase. A temporary increase in water column turbidity could occur during these activities, but the impacts would be localized and turbidity levels would return to baseline conditions shortly after the activity. The number of routine underwater maintenance activities would not change. Therefore, Alternative 1 would have negligible impacts on water quality.

Baseline conditions for water quality would not change under Alternative 1, and none of the activities would lead to a violation of state or federal water quality standards or guidelines. Specifically, the proposed activities would not affect the established total maximum daily load for nutrient loading. Therefore, there would be no significant impact on water quality as a result of the implementation of Alternative 1.

3.1.2.3 Alternative 2 (Preferred Alternative)

The potential effects of Alternative 2 (Preferred Alternative) on water quality would be similar to those described for the No Action Alternative and Alternative 1. Alternative 2 (Preferred Alternative) consists of all activities that would occur under Alternative 1 plus laser testing, shallow water testing, and other testing as detailed in Table 2.4-2. An increase in fuel use is expected due to increased surface vessel activities, but the risk of a spill and possible effects from a spill are reduced by following OPNAV 5090.1 procedures, the Comprehensive Environmental Response Plan, and SOPs for fuel transfer.

The movement and placement of cables and anchors on the lake bed associated with pulling test models into position and anchoring would increase under Alternative 2 (Preferred Alternative) compared to the No Action Alternative due to an additional 150 testing activities per year. Therefore, the frequency at which the bottom sediments would be disturbed would increase. A temporary increase in water column turbidity could occur during these activities, but the impacts would be localized and turbidity levels would return to baseline conditions shortly after the activity. The number of routine underwater maintenance activities would not change. Therefore, Alternative 2 (Preferred Alternative) would have negligible impacts on water quality.

Alternative 2 (Preferred Alternative) includes shallow water testing activities that involve unmanned underwater vehicles. These would operate in depths of 600 ft. (183 m) or shallower, at a variety of operating speeds and depths utilizing an electric motor/propulsion system. These activities would occur up to 10 times per year at the south and north ends of Lake Pend Oreille. Additionally, a temporary barge may be moored (up to 2 weeks every 2–3 years) to support buoyant tests and static tests performed at 600 ft. (183 m) utilizing passive and active acoustics. The increase in shallow water testing activities will also increase fuel use due to increased surface vessel activities, but no impacts to water quality are anticipated based on continued implementation of procedures in accordance with OPNAV M-5090.1, and fuel transfer SOPs. Specifically, the proposed activities would not affect the established total maximum daily load for nutrient loading. Therefore, there would be no significant impact on water quality as a result of the implementation of Alternative 2 (Preferred Alternative).

3.2 AIR QUALITY

3.2.1 AFFECTED ENVIRONMENT

The ARD Bayview site and its support facilities are located in Bonner and Kootenai Counties, Idaho. Therefore, these two counties are considered to be the Study Area or region of influence (ROI) for the air quality analysis. The following section provides the regulatory framework for air quality and contains general information and definitions of terms commonly used in this section.

3.2.1.1 Regulatory Requirements

The USEPA is responsible for enforcing the CAA of 1970 and its 1977 and 1990 amendments (42 U.S.C. §7401, et seq.). The purposes of the CAA are to classify air basins according to their attainment status under the National Ambient Air Quality Standards (NAAQS) (40 C.F.R. §50), to develop schedules and strategies to meet the NAAQS, and to regulate emissions of criteria pollutants and air toxics to protect the public health and welfare.

Criteria pollutants are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended particulate matter (PM) less than or equal to 10 micrometers (µm) in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 µm in diameter ($PM_{2.5}$), and lead (Pb). Air basins that exceed a NAAQS are designated as “nonattainment” for that pollutant, while air basins that are in compliance with a NAAQS are in “attainment” for that pollutant. Nonattainment areas are required by the USEPA to develop and execute a State Implementation Plan that describes actions that will lead the state into compliance with all federal air quality standards. Areas that have achieved attainment may be designated as “maintenance areas,” which are subject to maintenance plans showing how the area will continue to meet federal air quality standards. Non-criteria air pollutants that can affect human health are categorized as hazardous air pollutants under Section 112 of the CAA. The USEPA has identified 188 hazardous air pollutants, such as benzene, perchloroethylene, and methylene chloride. Hazardous air pollutants are examined individually where there is a source of these pollutants.

Section 176 (c)(1) of the CAA, commonly known as the General Conformity Rule (conformity), requires federal agencies to ensure that their actions conform to applicable implementation plans for achieving and maintaining NAAQS for criteria pollutants. To ensure conformity, a federal action must not contribute to new violations of ambient air quality standards, increase the frequency or severity of existing violations, or delay timely state or regional attainment of standards. A conformity review must be completed for every federal action that generates air emissions in nonattainment or maintenance (former non-attainment) areas. The General Conformity Rule does not apply to the Proposed Action because the Study Area is not in a nonattainment or maintenance area.

Air pollutants are classified as either primary or secondary pollutants. Primary air pollutants are those emitted directly into the atmosphere, such as CO, SO_2, Pb, and PM. Secondary air pollutants, such as O_3, are those formed through atmospheric chemical reactions. Such reactions usually involve primary air pollutants and normal constituents of the atmosphere. Sunlight and meteorological conditions, such as temperature and humidity, also can affect atmospheric chemistry. Air pollutants such as organic gases and PM are a combination of primary and secondary pollutants. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. PM_{10} and $PM_{2.5}$ also can be formed as secondary pollutants, however, through chemical reactions or by the condensation of gaseous pollutants into fine aerosols.

Compounds that react to form secondary air pollutants, such as O_3, are called pollutant precursors. Precursors for O_3 fall into two broad groups of chemicals: nitrogen oxides (NO_x) and organic compounds. NO_x consists of nitric oxide and NO_2. Organic compound precursors of O_3 are routinely described by a number of different terms, including volatile organic compounds, reactive organic compounds, and reactive organic gases. The latter term, reactive organic gases, is used in this document to refer to organic compound precursors of O_3.

Air pollutant emissions refer to the amount (weight or volume) of one or more specific compounds emitted into the atmosphere by a source. Most air pollutant emissions are expressed as a rate (e.g., pounds per hour, pounds per day, or tons per year). Typical measurement units for emission rates on a source activity basis include pounds per thousand gallons of fuel burned, pounds per ton of material processed, and grams per vehicle-mile of travel.

Ambient air quality is determined by the atmospheric concentrations of specific air pollutants at a particular time and location. The ambient air pollutant concentrations measured at a particular location are determined by the pollutant emissions rate, local meteorology, and atmospheric chemistry. Wind speed and direction and precipitation patterns affect the dispersal, dilution, and removal of air pollutant emissions. Ambient air quality data are generally reported as a mass per unit volume (e.g., micrograms per cubic meter of air) or as a volume fraction (e.g., parts per million by volume).

3.2.1.2 Determination of Significance

The impact analysis for air quality considered possible degradation in ambient air quality that could result from the Proposed Action. Such changes could arise from air pollutant emissions associated with combustion emissions from vehicles, vessels, or generators. Factors used in determining if impacts on air quality would be significant include whether emissions from the alternatives would be expected to change the NAAQS attainment status and whether emissions would exceed allowable Prevention of Significant Deterioration (PSD) increments.

3.2.1.3 Regional and Local Air Quality

The Study Area generally has good air quality, and is not located in a Non-Attainment or maintenance area. The most recent air emissions inventory data that are available for the Study Area are from 2008 (Table 3.2-1).

Table 3.2-1: Annual Baseline (2008) Criteria and Precursor Air Pollutant Emissions

Geographic Area	Criteria and Precursor Air Pollutant Emissions (tons/year)					
	CO	NO_x	VOC[1]	SO_x	$PM_{2.5}$	Pb
Bonner County	15,928	3,183	795	3,844	1,574	0
Kootenai County	42,999	5,432	2,731	6,769	3,162	0
Study Area Total	58,927	8,615	3,526	10,613	4,736	0

[1] Presented as volatile organic compounds in U.S. Environmental Protection Agency 2008
Notes: CO = carbon monoxide, NO_x = nitrogen oxides, VOC = volatile organic compounds, SO_x = sulfur oxides, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter
Source: U.S. Environmental Protection Agency 2013

The IDEQ monitors criteria air pollutants through a network of air quality monitoring sites throughout the state. Based on data collected from these monitoring sites, the USEPA prepares annual summaries of local air quality that identify those areas that exceed NAAQS for one or more air pollutants. Geographic areas that have not consistently met the NAAQS are designated as nonattainment areas.

Maintenance areas are geographic areas that had a history of nonattainment, but are now consistently meeting NAAQS and have a maintenance plan.

3.2.1.3.1 Maintenance and Non-Attainment Areas

Sandpoint PM_{10} Non-Attainment Area

Located in Bonner County, this Non-Attainment Area lies on the northwestern corner of Lake Pend Oreille within the Panhandle National Forest. The topography influences much of the PM buildup in the area. In 1997, the area was designated moderate PM_{10} nonattainment, and an emissions inventory identified the primary PM_{10} source as residential wood burning. Fugitive road dust and some industrial sources are also considered significant contributors. Since 1997, significant improvements in air quality have been realized due to the efforts of the community. In December 2011, the IDEQ submitted a request to USEPA to re-designate the area to Attainment status.

Pinehurst PM_{10} Non-Attainment Area

This Non-Attainment Area is located in the Silver Valley in Shoshone County, surrounded by the Coeur d'Alene and St. Joe National Forests. The local topography is a significant factor in the buildup of air pollutants. The emission inventory identified residential wood burning as the primary PM_{10} source and fugitive road dust as a secondary source.

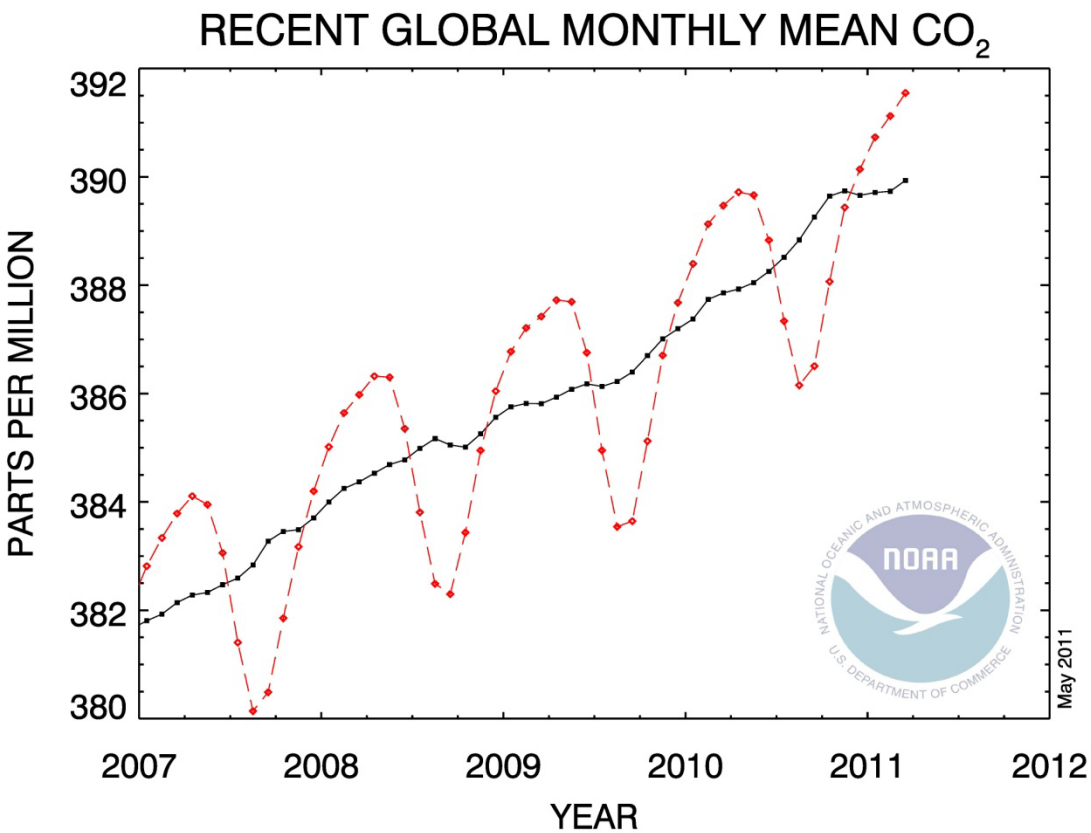
3.2.1.3.2 Class I Air Quality Areas

Haze-forming pollution can travel hundreds of miles. Regional haze in Idaho's natural parks and scenic areas is attributable to a variety of natural and human sources of air pollution and is greatly impacted by climate. During the summer months, haze is often caused by smoke from fires caused by wildfires, prescribed burning, and agricultural burning. In the wintertime, particularly during inversions, sources include wood burning, vehicle exhaust, and local industrial emissions.

Class I air quality areas are afforded the greatest degree of air quality protection under the Federal CAA. Class I areas are deemed to have special natural, scenic, or historic value. The Cabinet Mountains Wilderness Area is the Class I area closest to Bayview. Glacier National Park (140 mi. east-northeast of Bayview) and Yellowstone National Park (375 mi. southeast of Bayview) are also Class I air quality areas. The PSD program established in Title I of the CAA protects these areas from air pollutants emitted by major new stationary sources or major modifications of existing sources. The Proposed Action does not include any major new stationary sources.

3.2.1.4 Climate Change

Global warming is the increase in the average temperature of the earth's near-surface air and oceans since the mid-twentieth century. Global surface temperatures have increased by an average of about 1.3 degrees Fahrenheit (°F) during the last century (Solomon et al. 2007). Climate change has been attributed to many factors, including increasing atmospheric concentrations of carbon dioxide (CO_2), NO_2, methane, and other greenhouse gases. Figure 3-1 illustrates the global increase in CO_2 concentration over the past 5 years (Department of Commerce 2011). Most of the observed temperature increase since the mid-twentieth century is correlated with increasing amounts of greenhouse gases emitted by human activities, such as combustion of fossil fuels and deforestation (Solomon et al. 2007).



Notes: The dashed red line with diamond symbols represents the monthly mean values, centered on the middle of each month. The black line with the square symbols represents the same, after correction for the average seasonal cycle.
Source: Department of Commerce 2011

Figure 3-1: Recent Carbon Dioxide Global Trend

The greenhouse gas effect is the process by which certain gases in the atmosphere allow long-wave radiation in, but also keep short-wave (infrared) radiation from escaping, which then warms the planet's lower atmosphere and surface. Greenhouse gases are transparent to long-wave radiation from the sun; this radiation passes through the atmosphere without being absorbed or reflected, and warms the earth's surface. Greenhouse gases trap short-wave radiation emitted by the earth's surface, however, preventing it from dissipating into space and causing it to re-radiate down to the surface of the earth. The existence of the greenhouse effect is not disputed. The issues and interrelationship between these issues that are not clearly defined include how the strength of the greenhouse effect changes with different concentrations of greenhouse gases, the relationships among natural sources and sinks of greenhouse gases, human sources of greenhouse gases, and atmospheric concentrations of greenhouse gases. Climate processes are understood at a general level, and more research is needed before impacts may be clearly defined.

CO_2 is the major greenhouse gas emitted by human activities, primarily from the combustion of fossil fuels such as coal, oil, and natural gas. Atmospheric concentrations of CO_2 have increased by 36 percent since the mid-1700s (U.S. Environmental Protection Agency 2010). This level is much higher than at any time during the last 650,000 years (Canadell et al. 2007). Less direct geological evidence indicates that CO_2 values this high were last seen about 20 million years ago (Pearson and Palmer 2000). The burning

of fossil fuel has produced about 75 percent of the increase in CO_2 from human activity over the past 20 years. The potential effects of proposed greenhouse gas emissions are by nature global and may result in cumulative impacts, as individual sources of greenhouse gas emissions are not large enough to have any noticeable effect on climate change. Therefore, the impact of proposed greenhouse gas emissions on climate change is discussed in the context of cumulative impacts in Chapter 4 (Cumulative Impacts).

3.2.1.5 Current Requirements and Management Practices

Equipment used by military units in the Study Area, including generators and vehicles, are properly maintained in accordance with applicable Navy requirements. Operating equipment meets federal and state emission standards, where applicable.

3.2.2 ENVIRONMENTAL CONSEQUENCES

This section discusses potential impacts to the air quality of the Study Area. The primary issues considered were the potential changes in air quality due to emissions that result from operation of vessels, support boats, and testing activities. Acoustic energy (active and passive), electromagnetic energy, passive sensors, and lasers would not have an impact on air quality. Therefore, these resources are dismissed from analysis and are not discussed below.

3.2.2.1 No Action Alternative

Under the No Action Alternative, signature tests would continue at the pierside and at test locations in Lake Pend Oreille. Air pollutant emissions from ARD Bayview test activities would not change under the No Action Alternative (see Table 3.2-2). Fuel combustion would emit air pollutants (NO_x, SO_2, CO, and PM). Sources would include surface vessels supporting test activities, and ground vehicles and generators at remote shore facilities. Emissions from battery-powered test vessels would be negligible.

Effects of current ARD Bayview activities on air quality are negligible and local because emissions are intermittent, the emissions are limited to a few sources, and pollutants are rapidly dispersed by prevailing winds. The No Action Alternative would have no significant impact on air quality.

Table 3.2-2: Estimated Annual Criteria and Precursor Air Pollutant Emissions, No Project Alternative

Source	Criteria and Precursor Air Pollutant Emissions (tons/year)					
	CO	NO_x	VOC	SO_x	$PM_{2.5}$	Pb
Vessels	1,069	67	32	4	3	0
Generators	8	33	3	2	2	0
Total	1,077	100	35	6	5	0
Study Area Total	58,927	8,615	3,526	10,613	4,736	0
Bayview % of Study Area Emissions	2	1	1	0.1	0.1	0

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, VOC = Volatile Organic Compounds, SO_x = sulfur oxides, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter.

3.2.2.2 Alternative 1

Criteria Pollutants

Alternative 1 includes slight increases in test activities that produce emissions (see Table 2.4-2). Operation of support vessels would also increase slightly. The increases in surface vessel activities would result in a corresponding increase in air pollutant emissions, but the emissions would not be appreciably different from those under the No Action Alternative (see Table 3.2-3). Effects of Alternative 1 on air

quality would be negligible and local because emissions would be intermittent, the emissions would be limited to a few small sources, and pollutants would be rapidly dispersed by prevailing winds. Air pollutant emissions under Alternative 1 would not result in violations of state or federal air quality standards because they would not have a measurable impact on air quality. Alternative 1 would have no significant impact on air quality.

Table 3.2-3: Estimated Annual Criteria and Precursor Air Pollutant Emissions, Alternative 1

Source	Criteria and Precursor Air Pollutant Emissions (tons/year)					
	CO	NO_x	VOC	SO_x	$PM_{2.5}$	Pb
Vessels	1,084	71	33	4	3	0
Generators	8	34	3	2	2	0
Total	1,092	105	36	6	5	0
Study Area Total	58,927	8,615	3,526	10,613	4,736	0
Increase Over No-Project Emissions	15	5	1	0	0	0
Bayview % of Study Area Emissions	2	1	1	0.1	0.1	0

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, VOC = Volatile Organic Compounds, SO_x = sulfur oxides, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter.

3.2.2.3 Alternative 2 (Preferred Alternative)

Criteria Pollutants

Alternative 2 (Preferred Alternative) includes some new test activities not included in Alternative 1. Operations of support vessels and generators would increase slightly. The increases in surface vessel and generator activity would result in corresponding, minor increases in air pollutant emissions over those under the No Action Alternative (see Table 3.2-4). Effects of Alternative 2 (Preferred Alternative) on air quality would be negligible and local because emissions would be intermittent, the emissions would be limited to a few small sources, and pollutants would be rapidly dispersed by prevailing winds. Air pollutant emissions under Alternative 2 (Preferred Alternative) would not result in violations of state or federal air quality standards because they would not have a measurable impact on air quality. Alternative 2 (Preferred Alternative) would have no significant impact on air quality.

Table 3.2-4: Estimated Annual Criteria and Precursor Air Pollutant Emissions, Alternative 2

Source	Criteria and Precursor Air Pollutant Emissions (tons/year)					
	CO	NO_x	VOC	SO_x	$PM_{2.5}$	Pb
Vessels	1,95	74	33	4	3	0
Generators	8	34	3	2	2	0
Total	1,103	108	36	6	5	0
Study Area Total	58,927	8,615	3,526	10,613	4,736	0
Increase Over No-Project Emissions	26	8	1	0	0	0
Bayview % of Study Area Emissions	2	1	1	0.1	0.1	0

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, VOC = Volatile Organic Compounds, SO_x = sulfur oxides, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter.

3.3 IN-AIR NOISE

3.3.1 AFFECTED ENVIRONMENT

3.3.1.1 Sensitive Receptors

Noise-sensitive areas are those areas where noise interferes with normal activities associated with its use. Normally, noise-sensitive areas include residential, educational, health, religious structures and sites, parks, recreational areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historical sites. Sources of airborne noise at Bayview include engines of surface vessels being tested, surfaced submarines, and support vessels operated in the open waters of Lake Pend Oreille. Noise associated with the pierside facilities is limited to routine human activities and possible operation of emergency generators. Other sources of airborne noise in the vicinity of Bayview are primarily related to recreation and include fishing and ski boats. While these noise sources are present year-round, noise in the area generally increases during the summer because these activities increase with additional tourism and outdoor recreation activities that occur in the summer.

Activities that produce airborne noise occur in and over the open waters of Lake Pend Oreille or at the ARD Bayview Operations Center located in Scenic Bay, at the southern arm of Lake Pend Oreille. The shoreline along the southern arm of the lake is steep and rocky, and falls sharply into the deeper waters of the lake. With the exception of the communities of Bayview, Sandpoint, and other small shoreline communities, the surrounding land is largely undeveloped and primarily managed by the U.S. Forest Service. Therefore, sensitive human noise receptors in the areas are primarily limited to recreational users of Lake Pend Oreille and adjacent state and national forests.

3.3.1.2 Ambient Noise Conditions

Noise is made up of background noise caused by distant airplanes, traffic, boats, etc., and higher-level noise dominated by nearby sources such as vehicle passage, airplane flyovers, or nearby construction activity. Noise levels are affected by the distance between the noise source and the receiver, the size/loudness of the noise source, and intervening topography and vegetation. No noise monitoring has been done at ARD Bayview Operations Center; however, ambient aboveground daytime noise levels are expected to range between a DNL of 55 and 65 dBA. Additionally, as indicated in Section 3.0.2.3 (In-Air Noises), typical night-time noise levels in quiet residential areas have a noise level of about 35–45 dBA, which is expected to be similar to the residential areas surrounding Lake Pend Oreille. The main activity at ARD Bayview Operations Center is the passing of vehicles through the main gate and the loading/unloading of materials. Noises associated with activities in and around the waterfront may include the occasional use of generators, cranes, grinders, forklifts, and other equipment. The primary noise generator off-site is vehicle traffic on State Highway 54.

3.3.2 ENVIRONMENTAL CONSEQUENCES

3.3.2.1 No Action Alternative

Under the No Action Alternative, airborne noises would be primarily produced by surface vessels being tested and support vessels operated in the open waters of Lake Pend Oreille. As described in Section 2.1 (Description of the Proposed Action) the vast majority of activities occurring under the No Action Alternative are underwater. In-air noise would continue to be emitted from the surface support vessels and towing vessels that accompany underwater testing. Airborne noise emissions were modeled for a multipurpose ship and a fishing research vessel by Badino et al. (2012) and compared with field measurements. At 82.0 ft. (25 m) from the operating vessels, the modeled received noise level was approximately 60 dBA for the fisheries vessel and 70 dBA for the multipurpose vessel. At distances of

1,640.4 ft. (500 m), these received levels would drop to approximately 36 and 46 dB, respectively, due to propagation loss. Operating vessels in Lake Pend Oreille would likely be at or greater than 1,640.4 ft. (500 m) from shore during testing activities. These received levels are anticipated to be below daytime ambient noise levels and at or near ambient noise levels at nighttime. While some receptors may receive noise levels slightly above ambient, the elevated noise levels are expected to be brief, as vessel operation associated with testing activities are intermittent, and not at a fixed position. As such, sensitive receptors along the shoreline are not expected to be impacted from noises emitting from surface ships, and noises emitting from surface ships are not expected to contribute enough energy to exceed 65 dBA DNL at the shoreline.

Maintenance activities under the No Action Alternative would occur approximately 135 times annually. During these maintenance activities, noise levels would be anticipated to temporarily rise with the additional use of cranes, generators, additional vessels, etc. Many of the maintenance activities will occur at the testing sites, which are typically greater than 1,640.4 ft. (500 m) from the shoreline. Noises associated with the maintenance would likely not reach the shoreline, unless maintenance activities occurred within Scenic Bay at the Static Test Barge. While maintenance noise could reach sensitive receptors, it is unlikely that given their intermittent nature and distance from shore, the contribution to a DNL that exceeds 65 dBA would be minimal. Additionally, many of the maintenance activities occur within enclosed spaces, which minimizes the amount of RN into the environment. Such noises are common in the area of Scenic Bay, as there are a number of additional marinas in Scenic Bay, which create similar noise sources and noise levels, and effects on sensitive human receptors would be negligible. The No Action Alternative would have no significant impact on the in-air acoustic environment.

3.3.2.2 Alternative 1

As described in Table 2.4-2 and in comparison to the No Action Alternative, Alternative 1 introduces three new activities (Activity 9 – Underwater Electromagnetic [EM] Passive, Activity 10 – Underwater EM Active, and Activity 11 – Infrared Measurements). All other testing activities would remain at the same levels as presented for the No Action Alternative. The three activities could occur at the ISMS or LSV testing sites. Both of these sites are located over 3,280.4 ft. (1,000 m) from the shore; therefore, in-air noise associated with these testing activities is unlikely to reach the shorelines at levels that would contribute to the acoustic environment.

Day-to-day noise levels are not expected to be different than current noise levels. With the exception of the new activities, the same vessels would be tested and used under Alternative 1 as are currently used, and the same testing locations would be used. Therefore, the associated noise from individual activities would be similar. As discussed for the No Action Alternative, airborne noises associated with Alternative 1 would be intermittent and localized. Effects on sensitive human receptors would be negligible. Alternative 1 would have no significant impact on the in-air acoustic environment.

3.3.2.3 Alternative 2 (Preferred Alternative)

As described in Table 2.4-2 and in comparison to the No Action Alternative, Alternative 2 (Preferred Alternative) introduces five new activities (Activity 9 – Underwater EM Passive, Activity 10 – Underwater EM Active, Activity 11 – Infrared Measurements, Activity 16 – Laser Testing; and Activity 17 – Shallow Water Testing). All other testing activities would remain at the same levels as presented for the No Action Alternative. Three activities (Activity 9 – Underwater EM Passive, Activity 10 – Underwater EM Active, and Activity 11 – Infrared Measurements) could occur at the ISMS or LSV testing sites. Both of these sites are located over 3,280.4 ft. (1,000 m) from the shore; in-air noise associated with these

testing activities is unlikely to reach the shorelines at levels that would contribute negligibly to the acoustic environment. Alternative 2 (Preferred Alternative) would have no significant impact on the in-air acoustic environment.

3.4 BIOLOGICAL RESOURCES

3.4.1 AFFECTED ENVIRONMENT

3.4.1.1 Fish

Lake Pend Oreille and its tributaries support populations of kokanee salmon (*Onchorhynchus nerka*), Dolly Varden (*Salvelinus malma malma*), Kamloops trout (*Oncorhynchus mykiss kamloops*), cutthroat trout (*Oncorhynchus clarkii lewisi*), lake trout (*Salvelinus namaycush*), brook trout (*Salvelinus fontinalis*), bull trout (*Salvelinus confluentus*), mackinaw (*Salvelinus namaycush*), mountain and lake whitefish (*Prosopium williamsoni* and *Coregonus clupeaformis*), perch, largemouth bass (*Micropterus salmoides*), and crappies. Kokanee, which were introduced as a result of a flood in the 1930s (Crenshaw 1986), flourished into a commercial fishery, with over a million harvested on an annual basis between 1950 and 1965 (Jeppson 1953; Maiolie and Elam 1993). The lower Clark Fork River also supported important fisheries for mountain whitefish and bull trout, and provided 90 percent of the spawning area in the system (Crenshaw 1986). Westslope cutthroat trout were also found in the river and provided a fishery for fluvial and adfluvial fish. In addition to these species, several catastomids, sculpins, chubs, and dace are found in Lake Pend Oreille (U.S. Department of the Navy 2003).

The kokanee, along with other fisheries on the lake, have undergone substantial declines since the mid-twentieth century for a variety of reasons. The construction of the Cabinet Gorge Dams in 1952 cut off major spawning runs in the Clark Fork River. Kokanee spawn in shallow, nearshore areas throughout Lake Pend Oreille, including Scenic Bay. This made them especially susceptible to lake level drawdowns caused by water releases from the Albeni Falls Dam, also built in 1952, which exposed salmon beds during kokanee spawning periods and caused a significant decline of the kokanee population (U.S. Army Corps of Engineers 1983; Maiolie and Elam 1993). In 1968, freshwater shrimp (*Mysis relicta*) was intentionally introduced as a food source to increase kokanee production. Instead, the kokanee, which feed primarily on plankton, rapidly declined as a result of disruption of the plankton composition in the lake by the shrimp, which prey on plankton. Lake trout and rainbow trout (*Oncorhynchus mykiss*) were introduced to Lake Pend Oreille by the U.S. Fish Commission in 1925. The introduction of these species has contributed to recent decline of the kokanee population through predation (Maiolie et al. 2002; U.S. Department of the Navy 2004; Hansen 2007). Declines in bull trout in Lake Pend Oreille have also been partly attributed to competition with lake trout for habitat and prey (kokanee), which have displaced bull trout in many northwestern systems after introduction (Donald and Alger 1993; Fredenberg 2002).

A variety of efforts have been undertaken to restore populations of kokanee and bull trout in Lake Pend Oreille, including hatchery programs and management of lake levels to avoid affecting salmon beds. The Lake Pend Oreille Fisher Recovery Project was established to recover the kokanee and bull trout populations through restoring and protecting spawning habitat and reducing the lake trout and rainbow trout populations in the lake through an aggressive Angler Incentive Program and focused fish removal efforts (Wahl et al. 2011). In recent years, the kokanee and bull trout populations have increased (Idaho Fish and Game 2013), although not fully to historic numbers. The lake trout harvest incentive program continues through 2013; however, the rainbow trout harvest incentive program ended on 1 January 2013.

The kokanee fishery was reopened to recreational fishing in 2013. Currently, rainbow trout, brown trout, westslope cutthroat trout, and mountain whitefish are the primary sport fish in the lower Clark Fork River. Due to the impacts of Albeni Falls Dam, most fish species occurring in the Pend Oreille River are now warm water species (Bennett and DuPont 1993).

3.4.1.1.1 Bull Trout

General Description

Bull trout (*Salvelinus confluentus*) are a native fish in western North America that inhabit pristine cold water streams. Bull trout require colder water temperatures than other salmonids and exhibit both resident and migratory life-history strategies. Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear 1–4 years before migrating to either a lake (adfluvial form), river (fluvial form), or, in certain coastal areas, to saltwater (anadromous). Resident and migratory forms may be found together, and either form may give rise to offspring exhibiting either resident or migratory behavior. Current knowledge suggests that local populations within the Clark Fork Recovery Unit consist primarily of the migratory form (U.S. Fish and Wildlife Service 2002). Juvenile bull trout feed primarily on invertebrates, notably larval and adult aquatic insects and crustaceans. The main diet of adult bull trout in Lake Pend Oreille is kokanee salmon.

Status, Population Trends, and Threats

The bull trout occurs within the Proposed Action Area and is listed as threatened under the ESA of 1973 (16 U.S.C. §§1531–1543). The USFWS issued a final rule listing the Columbia River population of bull trout as a threatened species on 10 June 1998 (63 Federal Register [FR] 31647). Subsequently, the bull trout in the coterminous United States was listed as threatened on 1 November 1999 (64 FR 58910).

The historic distribution of bull trout was throughout the Columbia River Basin, east to Montana, south to northern California, and north to southeastern Alaska (U.S. Fish and Wildlife Service 1998b). Bull trout populations have been on the decline over the past century in Idaho, which led to no-harvest regulations in 1994 as well as their designation as a threatened species under the ESA.

Many factors have contributed to the decline of bull trout within the Proposed Action Area, including, but not limited to, dams, forest management practices, livestock grazing, agricultural practices, transportation networks, mining, residential development and urbanization, fisheries management, isolation and habitat fragmentation, alteration of stream flow patterns and habitat degradation, barriers to fish passages, channel alterations, water quality problems, non-native species, and climate change. Declines in bull trout in Lake Pend Oreille have been partly attributed to competition with lake trout for habitat and prey (kokanee). The introduction of rainbow trout has displaced bull trout in many northwestern systems (Donald and Alger 1993; Fredenberg 2002). Additionally, the decline in the kokanee population, an important prey of the bull trout, has coincided with the decline in the bull trout population (U.S. Fish and Wildlife Service 2002).

At the time of listing in 1998, the Lake Pend Oreille subpopulation was considered to be trending downward (U.S. Fish and Wildlife Service 2002). However, abundance surveys have indicated that, since 1998, there is a general increasing trend in the linear density (fish per 100 m) across monitoring sites in Idaho (High et al. 2008). Further, redd counts (counts of nesting beds made by salmonids) in Lake Pend Oreille have fluctuated from 600 to less than 200 between 1985 and 1994. Similar to general surveys, the number of redds observed in Lake Pend Oreille has also trended upward since 1994 (High et al. 2008). Efforts to manage lake levels for benefit of kokanee, restore spawning habitat, and remove introduced fish species have likely helped increase bull trout numbers.

Occurrence in the Study Area

Within the Proposed Action Area, bull trout can be found throughout Lake Pend Oreille, which they use for foraging, migrating, and overwintering habitat.

Critical Habitat

On 30 September 2010, the USFWS designated critical habitat for bull trout throughout their U.S. range (75 FR 63898). Lake Pend Oreille is within the Clark Fork River Basin Critical Habitat unit for the bull trout. ARD Bayview has an Integrated Natural Resources Management Plan (INRMP) that has been approved by the DoD, Department of the Interior, and the USFWS. As a result, the 16 ac. of in-water habitat within Scenic Bay is exempt from the Critical Habitat area designation (U.S. Fish and Wildlife Service 2002). The remainder of Lake Pend Oreille is listed as Critical Habitat for the bull trout.

The quantity and quality of Critical Habitat are evaluated by reference to primary constituent elements (PCEs), defined as those sites and habitat components that support one or more life stages and are deemed essential for the conservation of the species. The PCEs defined during the Critical Habitat designation (75 FR 63898) determined essential to the conservation of bull trout are as follows:

- Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia
- Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including, but not limited to, permanent, partial, intermittent or seasonal barriers
- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish
- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.
- Water temperatures ranging from 2 to 15 degrees Celsius (36 to 59°F) with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence
- Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 millimeter (0.03 inch) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions
- A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges; or, if flows are controlled, they minimize departures from a natural hydrograph.
- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited
- Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present

Lake Pend Oreille provides several of the PCEs, including migratory, overwintering, and foraging habitats; an abundant food base; a complex lake environment; habitat structure; depth and temperature gradients; and sufficient water quality that does not inhibit growth, reproduction, and

survival. Several other PCEs are either not applicable to a lake environment or have experienced significant degradation. For instance, several nonnative predatory and competitive species have been introduced and established in Lake Pend Oreille, most significantly the lake trout.

3.4.1.2 Regulatory Requirements

Regulatory requirements that are applicable to the Proposed Action in the project area are listed below. The President may issue an EO to further define the federal agency compliance requirements for a specific law. Within the DoD, even where exemptions to administrative procedures may apply, the Secretary of Defense requires observance of the statutes to the fullest extent possible. A discussion of the project's compliance with applicable regulations is provided in Section 5.1 (Consistency with Federal, State, and Local Plans, Policies, and Regulations).

3.4.1.2.1 Endangered Species Act

The ESA of 1973 (16 U.S.C. §§1531–1543) established protection over and conservation of threatened and endangered species and the ecosystems on which they depend. An "endangered" species is a species that is in danger of extinction throughout all or a significant portion of its range, while a "threatened" species is one that is likely to become endangered within the foreseeable future throughout all or in a significant portion of its range. The USFWS administers the ESA for terrestrial and freshwater species. The ESA allows the designation of geographic areas as critical habitat for threatened or endangered species.

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Section 7(a)(2) requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. If a BA of a federal agency's action determines that the action "is not likely to adversely affect" a listed species and the USFWS concurs with this finding, the USFWS would send a letter of concurrence. When a federal agency's action "is likely to adversely affect" a listed species, that agency is required to consult formally with USFWS, depending upon the species or designated critical habitat that may be affected by the action (50 C.F.R. 402.14(a)). If the BA determines that the action "is likely to adversely affect" a listed species, the USFWS may issue a Biological Opinion with an Incidental Take Permit. Under the terms of Section 7(b)(4) and Section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement. For species that are proposed for listing as endangered or threatened, Section 7(a)(4) of the ESA requires agencies to confer with the USFWS on any agency action that is likely to jeopardize the continued existence of the species.

3.4.1.2.2 Other Federal and State Regulations for Biological Resources

In addition to the regulations described above, additional regulatory requirements that are applicable to the Proposed Action in the project area are listed below in Table 3.4-1.

Table 3.4-1: Other Federal and State Regulations Applicable to Biological Resources.

Law	Citation	Summary
Conservation Programs on Military Installations (Sikes Act)	16 U.S.C. §670(a) et seq.	Requires military departments to manage natural resources on their lands. Authorizes military departments to enter into cooperative agreements with states, local governments, and others to carry out natural resources projects.
Fish and Wildlife Coordination Act	16 U.S.C. §661	Integrates fish and wildlife conservation programs with federal water development projects and conservation projects that affect water resources.
Environmental Conservation Program	DoD Instruction 4715.3 (3 May 1996)	Implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control.

Notes: U.S.C. = United States Code, DoD = Department of Defense

3.4.2 ENVIRONMENTAL CONSEQUENCES

This section discusses potential impacts to the biological resources of the Study Area. Operation of vessels, support boats, and testing activities occur at or below the surface of the water, with minimal overlap with airborne or terrestrial environs of the Study Area. In-water acoustics and electromagnetic energy associated with testing activities would not overlap with birds or mammals in the Study Area. Therefore, these resources are dismissed from analysis and are not discussed below (see Table 3.0-1).

3.4.2.1 Determination of Significance

3.4.2.1.1 Fish

Potential impacts from the Proposed Action are evaluated based on the extent to which the impacts could substantially degrade fish habitats, cause a fish species to drop below self-sustaining levels, threaten to extirpate a fish species, or significantly reduce a population or restrict the range of an endangered, rare, or threatened species.

3.4.2.1.1.1 Underwater Sound

This section summarizes information about how fish, in general, and salmonids, including the bull trout, specifically, may respond to sound. The effects of sound on salmonids (including bull trout) under the No Action Alternative are then analyzed for each sound or noise source.

3.4.2.1.1.2 Fish Hearing

All fish have two sensory systems to detect sound in the water: the inner ear, which functions very much like the inner ear in other vertebrates, and the lateral line, which consists of a series of receptors along the fish's body (Popper 2008). The inner ear generally detects relatively higher-frequency noises, while the lateral line detects water motion at low frequencies (< 0.3 kHz) (Hastings and Popper 2005).

The inner ears of fish are directly sensitive to acoustic particle motion rather than acoustic pressure. Although a propagating acoustic wave contains pressure and particle motion components, particle motion is most significant at low frequencies (< 0.3 kHz) and closer to the acoustic source. However, a fish's gas-filled swim bladder can enhance detection by converting acoustic pressure into localized

particle motion, which may then be detected by the inner ear. Fish with swim bladders generally have better sensitivity and better high-frequency hearing than fish without swim bladders (Popper and Fay 2010). Some fish also have specialized structures such as small gas bubbles or gas-filled projections that terminate near the inner ear. These fish have been called "hearing specialists," while fish that do not possess specialized structures have been referred to as "generalists" (Popper et al. 2003). In reality many fish species possess a continuum of anatomical specializations that may enhance their sensitivity to pressure (versus particle motion), and thus to higher frequencies and lower intensities (Popper and Fay 2010).

Although hearing capability data only exists for fewer than 100 of the 29,000 fish species (Popper 2008), current data suggest that most species of fish detect signals from 0.05 to 1.0 kHz, with few fish hearing signals above 4 kHz (Popper 2008; National Research Council [NRC] 2003). Moreover, studies indicate that hearing specializations are quite rare and that most fish are considered hearing generalists (Popper 2003, Amoser and Ladich 2005), including the Atlantic salmon (*Salmo salar*) (Hawkins and Johnstone 1978). Moreover, it is believed that the majority of fish have their best hearing sensitivity at or below 0.3 kHz. Most other species investigated to date lack higher-frequency hearing (i.e., greater than 1,000 Hz). This notably includes Atlantic salmon that could detect signals up to about 0.5 kHz (Hawkins and Johnstone 1978; Kane et al. 2010). Given the paucity of information on different species' hearing abilities, the Atlantic salmon is used as an analogous species for hearing capabilities in the discussion of effects on bull trout.

3.4.2.1.1.3 Potential Impacts from Underwater Sound

This section is largely based on a technical report prepared for the Navy: *Effects of Mid- and High-Frequency Sonars on Fish* (Popper 2008). Additionally, Popper and Hastings (2009) provide a critical overview of some of the most recent research regarding potential effects of anthropogenic sound on fish. Fish that have been exposed to short-duration, high-intensity signals, such as might be found near high-intensity sonar, pile driving, or a seismic air gun survey, may experience death, hearing loss, or long-term physiological consequences (Doksæter et al. 2009; Govoni et al. 2003; McCauley et al. 2003; Popper et al. 2007).

3.4.2.1.1.4 Hearing Loss from Sound

In mammals, exposure to high intensity sound can cause hearing loss, also known as a sound-induced threshold shift, or simply a threshold shift (Miller 1974). A temporary threshold shift (TTS) is a temporary, recoverable loss of hearing sensitivity. A TTS may last several minutes to several weeks and the duration may be related to the intensity of the sound source and the duration of the sound (including multiple exposures). A permanent threshold shift (PTS) is non-recoverable, results from the destruction of tissues within the auditory system, and can occur over a small range of frequencies related to the sound exposure. As with temporary threshold shift, the animal does not become deaf but requires a louder noise stimulus (relative to the amount of PTS) to detect a sound within the affected frequencies; however, in this case, the effect is permanent.

Permanent hearing loss, or PTS, has not been documented in fish. The sensory hair cells of the inner ear in fish can regenerate after they are damaged, unlike in mammals where sensory hair cells loss is permanent (Lombarte et al. 1993; Smith et al. 2006). As a consequence, any hearing loss in fish may be as temporary as the timeframe required to repair or replace the sensory cells that were damaged or destroyed (e.g., Smith et al. 2006).

Studies of the effects of long-duration noises with sound pressure levels below 170–180 dB referenced to (re) 1 micropascal (µPa) indicate that there is little to no effect of long-term exposure on fish species that lack notable anatomical hearing specialization (Amoser and Ladich 2003; Scholik and Yan 2001; Smith et al. 2004a, b; Wysocki et al. 2007). The longest of these studies exposed young rainbow trout (*Onorhynchus mykiss*) to a level of sound equivalent to one that fish would experience in an aquaculture facility (e.g., on the order of 150 dB re 1 µPa) for about 9 months. The investigators found no difference in hearing (i.e., TTS) when these fish were compared to fish raised at lower sound levels (110 dB re 1 µPa; Wysocki et al. 2007).

Studies have also examined the effects of the sound exposures from Navy towed sonar arrays (Surveillance Towed Array Sensor System Low-Frequency Active) on fish hearing (Kane et al. 2010; Popper et al. 2007). Hearing was measured with caged trout in a lake environment both immediately post exposure and for several days thereafter. Maximum received sound pressure levels were 193 dB re 1 µPa for 324 or 628 seconds. Catfish and some specimens of rainbow trout showed 10–20 dB of hearing loss immediately after exposure to the low-frequency active sonar when compared to baseline and control animals; however, another group of rainbow trout showed no hearing loss. Recovery in trout took at least 48 hours, but studies were not completed. Studies of mid-frequency active sonar also examined potential effects on fish hearing and the inner ear (Halvorsen et al. 2012; Kane et al. 2010). Out of the four species tested (rainbow trout, channel catfish, largemouth bass, and yellow perch) only one group of channel catfish showed any hearing loss after exposure to mid-frequency active sonar.

3.4.2.1.1.5 Physiological Stress and Behavioral Reactions to Underwater Sound

A fish must first be able to detect a sound above its hearing threshold for that particular frequency and the ambient sound before a behavioral reaction or physiological stress can occur. There is little data available on the behavioral reactions of fish and almost no research conducted on any long-term behavioral effects or the potential cumulative effects from repeated exposures to loud sounds (Popper and Hastings 2009).

Behavioral effects to fish could include disruption or alteration of natural activities such as swimming, schooling, feeding, breeding, and migrating. Sudden changes in sound level can cause fish to dive, rise, or change swimming direction in order to avoid the sound. There is a lack of studies that have investigated the behavioral reactions of unrestrained fish to anthropogenic sound. Studies of caged fish have identified three basic behavioral reactions to sound: startle, alarm, and avoidance (McCauley et al. 2000; Pearson et al. 1992; Scripps Institution of Oceanography and Foundation 2008). Changes in sound intensity may be more important to a fish's behavior than the maximum sound level. Sounds that fluctuate in level tend to elicit stronger responses from fish than even stronger sounds with a continuous level (Schwartz 1985). Wysocki et al. (2007) exposed rainbow trout (*Onorhynchus mykiss*) to continuous band-limited sound with a sound pressure level of about 150 dB re 1 µPa for 9 months with no observed stress effects. Growth rates and effects on the trout's immune system were not significantly different from control animals held at sound pressure level of 110 dB re 1 µPa.

3.4.2.1.2 Threatened and Endangered Species

A BA was prepared for the Proposed Action to support the consultation process with USFWS. This BA provided the Navy's determinations of effect for listed species based on guidance contained in the Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service 1998a). Terms commonly used in making a determination of effect are defined as follows:

- "No effect" is the appropriate conclusion when a species will not be affected, either because the species will not be present or because the project does not have any elements with the potential to affect the species. "No effect" does not include a small effect or an effect that is unlikely to occur.
- "May affect, not likely to adversely affect" means that all effects are beneficial, insignificant, or discountable. Beneficial effects have concurrent positive effects without any adverse effects to the species or habitat (i.e., there cannot be balancing, wherein the benefits of the project would be expected to outweigh the adverse effects). Insignificant effects relate to the magnitude or extent of the impact (i.e., they must be small and would not rise to the level of a take of a species). Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.
- "May affect, likely to adversely affect" means that all adverse effects cannot be avoided. A combination of beneficial and adverse effects is still "likely to adversely affect," even if the net effect is neutral or positive. Adverse effects do not qualify as discountable simply because it is not certain they will occur. The probability of occurrence must be extremely small to achieve discountability. Likewise, adverse effects do not meet the definition of insignificant because they are less than major. If the adverse effect can be detected in any way or if it can be meaningfully articulated in a discussion of the results, then it is not insignificant; it is likely to adversely affect.

The impact analysis for the bull trout considered effects of the No Action Alternative and the two Action Alternatives on individual animals, populations, and critical habitat. The analysis first looked at how individuals would respond to an activity and whether the response would affect the fitness of an individual. Fitness refers to changes in an individual's growth, survival, annual reproductive success, or lifetime reproductive success. If individual fitness is not affected, then no impacts to populations would be expected. The potential for impacts to occur at the population level depends on several things, including whether individual fitness has been reduced, the number of individuals affected, the size of the affected population, and numerous life history and ecological factors. Potential impacts to critical habitat were evaluated based on whether the Proposed Action would affect the PCEs discussed in Section 3.4.1.1.1 (Bull Trout).

The scientific limitations associated with predicting the responses of individuals and populations to activities create a relatively high degree of uncertainty. Accordingly, a conservative approach was used in making conclusions when the level of uncertainty was considered high.

3.4.2.2 Current Requirements and Management Practices

The DoD is required to prepare and implement an INRMP in accordance with the Sikes Act, as amended, in part to conserve and rehabilitate natural resources on the installations. During the preparation of the INRMP, ARD Bayview coordinated with the USFWS and the IDFG to develop elements of the plan that will work toward conservation, protection, and management of fish and wildlife resources on the installation. Current requirements and management practices applicable to biological resources at ARD Bayview and Scenic Bay are described in the ARD Bayview INRMP (U.S. Department of the Navy 2010a). The INRMP does not include the rest of the Proposed Action Area, Wigwam, or OUTPOST.

3.4.2.3 No Action Alternative

Under the No Action Alternative, components of testing activities that were carried forward for analysis for their potential to impact biological resources were those that would produce underwater sound or cause the potential resuspension of lake bottom sediments. The potential impacts associated with each of the proposed activities under the No Action Alternative are described in Table 3.4-2.

Table 3.4-2: Potential Impacts of Activities Proposed under the No Action Alternative

Activity	Description	Sound Production	Vessel Noise	Resuspension of Sediments
1	Passive Acoustic		X	
2	Active Acoustic	X	X	
3	Structural Acoustic	X	X	
4	Hydrodynamic		X	
5	Tracking	X	X	
6	Towing Arrays		X	
8	Sensor Calibration	X		
14	Maintenance		X	X

Of these activities, only Activities 2, 3, 5, and 8 actively produce sound and only Activity 14 causes potential resuspension of sediments from the lake bottom. All other activities involve monitoring and measuring sound passively and are only carried forward into the analysis of potential effects for vessel noise associated with these activities.

3.4.2.3.1 Impacts from Underwater Sound under the No Action Alternative

Fish, including bull trout, can be found in any part of the Study Area at any time and could be exposed to underwater noise from project activities. As described in Chapter 2 (Description of the Proposed Action), Tables 2-1 and 2-2, activities under the No Action Alternative include those that produce in-water noise from the use of active acoustic sources. As listed in Table 2.4-1, active acoustic sources would be used under the No Action Alternative in most locations within the Study Area. The characteristics of these sources as presented within Table 3.4-3 and range from 0.1 to 455 kHz and 100 to 250 dB.

Table 3.4-3: Comparison of Systems Used and Salmonid Hearing

System	Frequency and Bandwidth	Overlaps with Salmonid Hearing
ISMS Transmit Array Pulsed	0.1–5.6 kHz	Yes
ISMS Transmit Array CW	0.1–5.6 kHz	Yes
ISMS Positioning	10–25 kHz	
LSV Tracking Buoys	56–68 kHz	
LSV Tracking Vehicle	56–68 kHz	
Proposed LSV Tracking	82–94 kHz	
LSV RN Tracking Arms	90 kHz	
Proposed LSV RN Tracking	65 kHz	
Calibration Sources	0.2–95 kHz	Yes
AUV Tracking	26 kHz	
SEAJET Tracking	50–100 kHz	
Small Craft Fathometer	20–455 kHz	

Notes: AUV = Autonomous Underwater Vehicle, CW = continuous waveform, ISMS = Intermediate Scale Measurement System, kHz = kilohertz, LSV = Large Scale Vehicle, RN = radiated noise

Only a few species of shad within the Clupeidae family (herrings) are known to be able to detect high-frequency sonar and other active acoustic sources (> 10 kHz). As described in Section 3.4.2.1.1.2 (Fish Hearing), Atlantic salmon could detect signals up to about 0.5 kHz (Hawkins and Johnstone 1978; Kane et al. 2010). Given the paucity of information on different species hearing abilities, the Atlantic salmon is used as an analogous species for hearing capabilities in the discussion of salmonids in the study area. Salmonids, including the bull trout, would not detect these signals since high-frequency noises are well above the fishes hearing ranges. It is unlikely that these noises would trigger behavioral disturbance, or auditory masking due to the lack of perception of these noises. Similarly, because the bull trout probably cannot detect mid-frequency sonar between 1 and 10 kHz, impacts are not expected for these fish. Long-term consequences for bull trout populations due to exposure to high- or mid-frequency active acoustic sources are not expected.

Bull trout may be able to detect low-frequency active acoustic sources associated with Test Activities 2, 3, 5, and 8. As listed in Table 3.4-3, the only sources that have these characteristics are the ISMS transmit arrays as well as calibration sources. As source levels of the arrays may exceed 180 dB, it is possible that individual fish in the immediate vicinity of the activity may experience TTS. Fish within a few kilometers around a low-frequency active source could experience brief periods of physiological stress, and behavioral disturbance while the system is used, with effects most pronounced closer to the source. However, overall effects would be localized and infrequent and would not cause effects to the populations of fishes that inhabit the lake. Based on the short duration of potential exposure to low-frequency active acoustic sources, long-term consequences for fish populations are not expected. Sounds produced by testing activities are not impulsive (such as those associated with underwater detonations) by nature, and are therefore not expected to have any impact to substrate, or benthic habitat. Therefore, because these activities are temporary and localized, sounds produced by activities at ARD Bayview as well as noises associated with testing activities are not expected to impact overall water quality, thermal refugia, migratory habitats, food availability, shoreline environments, water temperature, substrate type, or flow rates within Lake Pend Oreille.

As discussed in Section 2.1.1 (Activities at Remote Facilities and Test Sites), activities under the No Action Alternative include vessel movement. Vessel noise has the potential to expose fish to noise, which could result in short-term behavioral or physiological responses (e.g., avoidance, stress, increased heart rate). While vessel movements have the potential to expose fish occupying the water column to noise and general disturbance, potentially resulting in short-term behavioral or physiological responses, such responses would not be expected to compromise the general health or condition of individual fish since they can move away from the disturbance. Although vessel traffic could occur anywhere within the Study Area, it would be concentrated at test sites and occur intermittently with variable duration. Furthermore, public boat use occurs across the lake all year and fish likely habituate to vessel noise, reducing potential disturbance from vessel noise associated with the Proposed Action. Therefore, impacts from vessel noise would be temporary and localized, and long-term effects to populations of the fishes that inhabit the lake would not occur.

The creation of non-impulse active noise sources for activities under the No Action Alternative would have no significant impact on fish in Lake Pend Oreille.

Pursuant to the ESA, underwater sound and noise associated with activities under the No Action Alternative may affect, but is not likely to adversely affect the ESA-listed bull trout and is not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout.

3.4.2.3.2 Suspended Sediments and Turbidity

The maintenance and replacement of cables, anchors, and other equipment located on the lake bed (Activity 14; see Table 2.4-1), may create temporary disruptions to lake bottom sediments and therefore cause localized increases in suspended sediments and turbidity in the water column. The effects would be localized in the vicinity of the lake bottom equipment being repaired or replaced. In addition, the number of maintenance activities that would potentially resuspend sediments off of the lake bottom would be small (three events annually). No new underwater model handling systems or cables would be installed and no dredging would occur.

Due to the localized nature of potential resuspension of sediments, fish, if present, would be able to move away from the disturbance. Since both the concentration of suspended solids and the duration of exposure determine the impact to salmonids (Newcombe and MacDonald 1991), the ability to move away from a localized sediment plume would minimize any potential effects on individual bull trout or other fish that may be present. In-water facilities maintenance activities would only occur from 1 July to 1 November, when bull trout are least common in the lake since they have migrated to tributaries to spawn. In addition, kokanee are spawning in shallow areas of the lake during this period, away from the deep lake bottom locations where these maintenance activities will occur.

Quantifying the population-level effects of suspended sediments due to maintenance activities is not possible given the current lack of knowledge on the level of sediment resuspension due to deep water maintenance activities. The area affected and the duration of the effect would be relatively small compared to the total habitat available at Lake Pend Oreille. Therefore, it is unlikely that the viability of a fish population would be threatened and large areas of historically occupied habitat would be unaffected by the action. In addition, the Navy will continue implementing best management practices, described in the ARD Bayview INRMP (U.S. Department of the Navy 2010a), that serve to avoid potential impacts to bull trout and kokanee. These include restricting routine in-water construction and maintenance to an approved work time (1 July–1 November), when these species are least likely to be

present. Suspended sediments and increased turbidity associated with the No Action Alternative will have no significant impact on fish in Lake Pend Oreille.

The movement and placement of cables and anchors on the lake bed associated with pulling test models into position, and anchoring, as well as certain maintenance activities, may create temporary disruptions to lake bottom sediments and therefore cause localized and temporary increases in suspended sediments and turbidity at the lake bottom, temporarily degrading water quality. Because these activities are temporary and localized, they are not expected to impact overall water quality or thermal refugia, migratory habitats, food availability, shoreline environments, water temperature, substrate type, or flow rates within Lake Pend Oreille.

Suspended sediments and increased turbidity associated with activities under the No Action Alternative would have no significant impact on fish in Lake Pend Oreille.

Pursuant to the ESA, suspended sediments and increased turbidity associated with testing activities under the No Action Alternative may affect, but are not likely to adversely affect the ESA-listed bull trout and are not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout.

3.4.2.4 Alternative 1

Alternative 1 would consist of the No Action Alternative plus testing activities which include passive and active underwater electromagnetic measurements (Activities 9 and 10, respectively), and infrared measurements (passive measurements of heat energy; Activity 11) (Table 3.4-4). The potential effects of underwater noise and resuspension of lake bottom sediments would remain the same as presented for the No Action Alternative.

Table 3.4-4: Potential Impacts of Activities Proposed under Alternative 1 (in Addition to Activities Included under the No Action Alternative)

Activity	Description	Sound Production	Vessel Noise	Resuspension of Sediments	EM Energy
10	Active EM Measurements	X	X	X	X
11	Infrared Measurements		X	X	

Note: EM = electromagnetic

Electromagnetic measurements will occur under Alternative 1 (up to 140 activities per year), and in most cases, the devices simply mimic the electromagnetic signature of a vessel passing through the water or record the electromagnetic signature of a test device. None of the devices include any type of electromagnetic “pulse.” The static magnetic field generated by the electromagnetic systems is of relatively minute strength, typically 23 gauss at the cable surface and 0.002 gauss at a radius of 656 ft. (199.9 m). The strength of the electromagnetic field decreases quickly away from the cable down to the level of earth’s magnetic field (0.5 gauss) at less than 13 ft. (3.9 m) from the source (U.S. Department of the Navy 2013).

Electromagnetic sensitivity in salmonids is already well developed at early life stages (Ohman et al. 2007), with sensitivities reported as low as 0.6 millivolt per cm in Atlantic salmon (Formicki et al. 2004); however, most of the limited research that has occurred focuses on adults. Some species appear to be attracted to undersea cables, while others show avoidance (Ohman et al. 2007). For any electromagnetically sensitive fishes in close proximity to the source, the generation of electromagnetic fields during testing activities has the potential to interfere with prey detection and navigation. They may also experience temporary disturbance of normal sensory perception or could experience avoidance reactions (Kalmijn 2000), resulting in alterations of behavior and avoidance of normal foraging areas or migration routes. Mortality from electromagnetic devices is not expected.

Therefore, the electromagnetic devices used would not cause any potential risk to fishes because (1) the range of impact (i.e., greater than earth's magnetic field) is small (i.e., 13 ft. [4.0 m] from the source), (2) the electromagnetic components of these activities are limited to simulating the electromagnetic signature of a vessel as it passes through the water, and (3) the electromagnetic signal is temporally variable and would cover only a small spatial range during each activity in the Study Area. Some fishes could have a detectable response to electromagnetic exposure, but any impacts would be temporary with no anticipated impact on an individual's growth, survival, annual reproductive success, or lifetime reproductive success (i.e., fitness). Further, electromagnetic fields associated with Alternative 1 activities will have no significant impacts on fish, including bull trout, in Lake Pend Oreille.

Given the information above, it is unlikely that any prey species would be impacted from electromagnetic devices associated with testing activities at ARD Bayview. Additionally, if a prey species could detect and respond to the electromagnetic stimuli from testing activities, their response would be similar to those of the bull trout—temporary and localized. Kokanee (an important prey species for the bull trout) inhabit the same waters as bull trout, and would be exposed to the same activity disturbances; therefore, impacts would be the same as those described for bull trout. If kokanee (or other prey species) could detect and respond to electromagnetic stimuli from testing activities, their response would be similar to those of the bull trout—temporary and localized.

Due to the limited range of electromagnetic fields associated with testing activities at ARD Bayview, electromagnetic devices are not expected to have any impact to substrate, or benthic habitat. Additionally, since there are no anticipated impacts to substrates or benthic habitats from electromagnetic devices associated with testing activities, there are no anticipated impacts to water quality (e.g., changes in turbidity).

Because these activities are temporary and localized, electromagnetic fields produced by activities at ARD Bayview are not expected to impact overall water quality, thermal refugia, migratory habitats, food availability, shoreline environments, water temperature, substrate type, or flow rates within Lake Pend Oreille and would therefore have no effect on bull trout critical habitat.

The use of electromagnetic devices associated with activities under Alternative 1 would have no significant impact on fish in Lake Pend Oreille.

Pursuant to the ESA, use of electromagnetic devices associated with activities under Alternative 1 may affect, but is not likely to adversely affect the ESA-listed bull trout and is not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout.

3.4.2.5 Alternative 2 (Preferred Alternative)

Alternative 2 (Preferred Alternative) consists of all activities that would occur under Alternative 1 with the addition of laser testing (Activity 16) and shallow water testing (Activity 17), as detailed in Table 3.4-5. Both activities have stressors (and impacts) that are similar to those discussed above, sound production, vessel noise, resuspension of sediments, and EM energy.

It is important to note that the laser used during laser testing does not penetrate into the water column, rather it is converted from optical to acoustic energy (pulses with frequencies higher than 10 kHz) at the air-water interface. Therefore, there are no additional stressors to fish other than the laser-generated sound. Salmonids, including the bull trout, would not detect these signals since high-frequency noises are well above the fishes hearing ranges. It is unlikely that these noises would trigger behavioral disturbance, or auditory masking due to the lack of perception of these noises, which are above the estimated hearing range of most fish.

Although the number of events increases, the potential effects from underwater noise, resuspension of lake bottom sediments, and electromagnetic energy would remain the same as presented for the No Action Alternative and Alternative 1. The addition of 32 annual activities would only slightly increase the amount of noise, resuspension of sediments, and EM energy than those analyzed for the No Action and Alternative 1. This increase in activity and impact is not expected to contribute significantly to the overall health of biotic systems in Lake Pend Oreille. Alternative 2 would have no significant impacts on fish, including bull trout, in Lake Pend Oreille.

Table 3.4-5: Potential Impacts of Activities Proposed under Alternative 2 (Preferred Alternative) (in Addition to Activities Included under the No Action Alternative and Alternative 1)

Activity	Description	Sound Production	Vessel Noise	Resuspension of Sediments	EM Energy
16	Laser Testing	X	X	X	X
17	Shallow Water Testing		X	X	

Note: EM = electromagnetic

3.5 SOCIOECONOMICS

3.5.1 AFFECTED ENVIRONMENT

Socioeconomics includes an evaluation of the basic attributes and resources associated with the human environment, particularly population, and economic activity. Economic activity encompasses employment, personal income, and industrial growth. Impacts on these fundamental socioeconomic components influence other issues, such as housing availability and provision of public services.

3.5.1.1 Regulatory Requirements

This section evaluates effects related to socioeconomics and environmental justice (as required under EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*). EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The CEQ Guidance on Environmental Justice (10 December 1997) provides direction on type of information generally used, requires that the analysis determine whether the Proposed Action has adverse human health effects on the minority populations, low-income populations, or Indian tribes, and whether the Proposed Action has other adverse environmental effects or impacts on the minority populations, low-income populations, and Indian tribes.[1]

Section 1-101 of EO 12898 provides specific guidance to federal agencies for determining whether or not disproportionately high and adverse human health or environmental effects are caused by programs, policies, and activities. The guidance includes:

> "When determining whether human health effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:
>
> (a) Whether the health effects, which may be measured in risks and rates, are significant (as employed by the National Environmental Policy Act [NEPA]), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death; and
>
> (b) Whether the risk or rate of hazard exposure by a minority population, low-income population, or Indian tribe to an environmental hazard is significant (as employed by NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and
>
> (c) Whether health effects occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards."

Further information is provided for determining disproportionate environmental effects in the guidance:

> "When determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

[1] The definitions for "low-income population," "minority," and "minority population" are found in Section 1-101 of EO 12898.

(a) Whether there is or will be an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment; and

(b) Whether environmental effects are significant (as employed by NEPA) and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and

(c) Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards."

For this Proposed Action, analysis for EO 12898 requires assessment of readily available demographic data on the local, regional, and national populations, including race and ethnicity, age, income, and poverty metrics. Information to support this analysis is derived from the U.S. Census Bureau readily accessible documents and internet sites. The U.S. Decennial Census forms the basis of the data for 2000 and 2010, which is completed every 10 years; the most recent census occurred in 2010. The U.S. Census American Community Survey for 2007–2011 data is used to document the most recent conditions.

3.5.1.2 Determination of Significance

Factors used to assess the significance of impacts on socioeconomics and environmental justice include the extent or degree to which an alternative would have a serious negative impact on regional and community economics, employment, housing, and population growth, as well as disproportionately high and adverse human health or environmental effects on minority populations or low-income populations.

3.5.1.3 Region of Influence

ARD Bayview is located at the southern end of Lake Pend Oreille in Bayview, Idaho. Lake Pend Oreille is located in Bonner and Kootenai Counties of northern Idaho. ARD Bayview, test facilities, and remote sites are located on the southern arm of the freshwater lake. The adjacent land is developed with private and commercial buildings, and the surrounding area is largely undeveloped and primarily managed by the U.S. Forest Service. The socioeconomic ROI includes Bonner and Kootenai Counties.

3.5.1.4 Regional and Local Economy

3.5.1.4.1 Regional Employment

The economy of Bonner and Kootenai Counties are diversified; the leading employment sectors are recreation and tourism, and retail trade and services. The estimated total employment for Bonner and Kootenai Counties for the years 2000 and 2010 is shown in Table 3.5-1. The Kootenai County had a higher percent change in total employment between the 2000 and 2010 data than Bonner County and Idaho.

Table 3.5-1: Estimated Total Employment

	2000[1]	2010[2]	Percent Change
Idaho	641,088	763,598	19.1%
Bonner County	17,149	19,233	12.1%
Kootenai County	54,471	69,096	28.8%

[1] U.S. Census Bureau 2000
[2] U.S. Census Bureau 2010

From the 2010 U.S. Census data, the Bonner County average unemployment rate was 3.7 percent, which is below the state rate of 5.1 percent and the federal rate of 5.6 percent. The Kootenai County average unemployment rate was 7.7 percent, which is above the state and federal rates. Employment at ARD Bayview varies depending on the number of ongoing research and development projects. ARD Bayview employs approximately 105 persons, including 46 civilian personnel and approximately 59 contractors, scientists, and engineers with a variety of disciplines and skill levels.

3.5.1.4.2 Fisheries

Lake Pend Oreille and its tributaries currently support several recreational fisheries, including Kamloops trout, cutthroat trout, lake trout, brook trout (*Salvelinus fontinalis*), mackinaw, mountain and lake whitefish, perch, largemouth bass, and crappies. Kokanee, which were introduced as a result of a flood in the 1930s (Crenshaw 1986), flourished into a commercial fishery, with over a million harvested on an annual basis between 1950 and 1965 (Jeppson 1953; Maiolie and Elam 1993). The kokanee, along with other fisheries on the lake, experienced significant declines after the construction of the Cabinet Gorge and Albeni Falls Dams in 1952 (Maiolie and Elam 1993). Introduced shrimp and lake trout, as well has poor water level management in the past, have also had negative impacts on kokanee populations (Maiolie et al. 2002; U.S. Department of the Navy 2004; Hansen 2007). Recently, hatchery programs, improved management of lake levels, and removal of introduced species from the lake have coincided with increases in kokanee populations efforts (Idaho Fish and Game 2013). Although not fully recovered to historic numbers, the kokanee fishery was reopened to recreational fishing in 2013.

Recreational fishing is an important portion of the economy in Kootenai County. In 2003, anglers fished 280,333 fisherman days (i.e., total cumulative days fished among all anglers) on 209,275 total trips to Kootenai County, spending an average of $65 per trip and totaling $13,639,955 (Idaho Fish and Game 2008). Anglers spent an additional $1,060,376 on fishing licenses and permits purchased in Kootenai County (Idaho Fish and Game 2008).

3.5.1.5 Population and Housing

3.5.1.5.1 Regional Housing

According to the 2010 U.S. Census data, housing stock in Bonner County was 24,669 units and Kootenai County housing stock was 63,177 (Table 3.5-2). Bonner County shows a lower percent of increase in total housing units between the 2000 and 2010 data compared to Kootenai County and Idaho.

Table 3.5-2: Estimated Total Housing Units

	2000[1]	2010[2]	Percent Change	Percent of Units Occupied 2010	Percent of Units Built after 2005[3]
Idaho	527,824	667,796	26.5%	87.0%	8.4%
Bonner County	19,646	24,669	25.5%	75.7%	7.2%
Kootenai County	46,607	63,177	35.5%	88.7%	9.7%

[1] U.S. Census Bureau 2000
[2] U.S. Census Bureau 2010
[3] U.S. Census American Community Survey 2007–2011

3.5.1.5.2 Population Demographics

Table 3.5-3 presents population characteristics, including the population in 2000, 2010, and the percent change in population between 2000 and 2010. Bonner County has a lower percentage of change in population between the 2000 U.S. Census and the 2010 U.S. Census data compared to Kootenai County and Idaho. The City of Bayview, on the southern portion of Lake Pend Oreille, has an estimated annual population of 744 (U.S. Census Bureau 2010), and the City of Sandpoint, on the northern point of Lake Pend Oreille, has a population of 7,365 (U.S. Census Bureau 2010), which makes it the largest city in Bonner County.

Table 3.5-3: Estimated Total Population Growth

	2000[1]	2010[2]	Percent Change from 2000 to 2010
Idaho	1,293,953	1,567,582	21.1%
Bonner County	36,835	40,877	11.0%
Kootenai County	108,685	138,494	27.4%

[1] U.S. Census Bureau 2000
[2] U.S. Census Bureau 2010

Minority Populations

Table 3.5-4 provides the racial and ethnic composition for the county, state, and nation, using the 2010 U.S. Census data. In general, Bonner and Kootenai Counties and Idaho have similar racial compositions. However, Idaho has a higher percentage of Hispanic individuals than either Bonner or Kootenai county populations.

Table 3.5-4: Population, Race, and Ethnicity for the Acoustic Research Detachment Bayview Region of Influence

Race/Ethnicity	Bonner County	Kootenai County	Idaho	United States
Population (%)[1]	40,877	138,494	1,567,582	298,757,310
White	96.3	95.2	89.1	72.4
Black or African American	0.2	0.4	0.6	12.6
American Indian and Alaskan Native	0.8	1.4	1.4	0.9
Asian	0.5	0.8	1.2	4.8
Native Hawaiian and Pacific Islander	0.1	0.1	0.2	0.2
Other race	0	0	5.1	6.2
Two or more races	2.1	2.2	2.5	2.9
Hispanic[2]	2.4	4.0	11.2	16.3

[1] U.S. Census Bureau 2010

[2] The Hispanic category is an ethnic, rather than a racial, distinction. The individuals counted under other racial categories (white, black or African American, American Indian and Alaskan Native, Asian, Native Hawaiian and Pacific Islander, and other races) may also be categorized as Hispanic.

Low-Income Populations

Table 3.5-5 depicts median household income and poverty levels for the county, state, and nation, using the 2010 census data. Bonner County has a median household income below Kootenai County, Idaho, and the United States. Bonner County also has a greater percentage of persons below the poverty level than Kootenai County, Idaho, and the United States. Both Kootenai County and Idaho have a lower percentage of persons below the poverty level than national populations.

Table 3.5-5: Low-Income Populations for the Acoustic Research Detachment Bayview Region of Influence

Metrics	Bonner County	Kootenai County	Idaho	United States
Population	40,877	138,494	1,567,582	308,745,538
Median household income	$42,989	$48,075	$46,890	$52,762
% Persons below poverty	11.9	9.1	10.2	10.5

3.5.2 ENVIRONMENTAL CONSEQUENCES

This section focuses on potential impacts and overall changes, as they relate to employment, housing, and minority and low-income populations associated with implementation of all current and proposed activities at ARD Bayview.

3.5.2.1 No Action Alternative

Under the No Action Alternative, the number of personnel stationed at ARD Bayview and tempo of testing would continue at levels presented in Table 2.4-2 (Baseline and Proposed Testing Activities). The duration of testing typically varies from a few hours to several weeks. Testing is conducted around the

clock, year-round, and whenever weather and background noise conditions permit. Prior to and during testing, approaching non-Navy vessels are requested to maneuver around the test site area, and testing is suspended until the area is clear. Additionally, during the recreational boating season, the majority of testing is limited to the hours of darkness since the underwater noise generated by passing vessels masks the quiet noise level required for acoustic tests.

No changes to the current socioeconomic conditions (employment, housing, and population growth) of Bonner and Kootenai Counties is expected under the No Action Alternative as ARD Bayview would maintain the number of personnel already employed and no changes in testing activities would occur. Testing conducted at ARD Bayview requires coordination with the community (such as ensuring the testing area is clear of nonparticipants before commencing activities) to ensure that all testing can be accomplished safely. However, the Navy does not have any jurisdiction over Lake Pend Oreille, and therefore cannot limit access to any area outside the ARD Bayview waterfront area. Further, the area used for testing activities would not include the entire lake and would not impact the overall recreational use (and thus the use of shoreline facilities for food and fuel). In addition, as discussed in Section 3.4.2.3 (No Action Alternative), the activities proposed under the No Action Alternative would not have an impact on fish populations and thus would have no impact on the recreational fishery at Lake Pend Oreille. Therefore, regional and community economics, employment, housing, and population growth are not affected as a result of the No Action Alternative.

Based on the analysis presented herein on Air Quality, Fisheries, and Public Health and Safety associated with the No Action Alternative, the following conclusions are presented in regard to human health and environmental effects to low-income communities and minority populations:

- Air Quality – Air emissions do occur from the No Action Alternative but do not pose human health or environmental risks and do not pose health or environmental risks disproportionately on low-income communities and minority populations, as all surrounding communities are affected by air emissions from this action.
- Recreational Fisheries – As discussed in Section 3.4.2.3 (No Action Alternative), the activities proposed under the No Action Alternative would not have an impact on fish populations; therefore, there would be no impact on fisheries.
- Public Health and Safety – The Navy has specific and documented procedures in place to ensure that nonparticipants are not endangered by Navy actions. Concerns related to noise from the No Action Alternative on the surrounding communities include hearing loss, non-auditory health effects, and speech interference/temporary attention. Based on the distribution and magnitude of noise impacts under the No Action Alternative, surrounding communities are slightly affected by testing noise; however, no disproportionate effect on low income or minority populations occurs.

The nature of project activities would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions.

3.5.2.2 Alternative 1

As described in Table 2.4-2 and in comparison to the No Action Alternative, Alternative 1 introduces three new activities (Activity 9 – Underwater EM Passive, Activity 10 – Underwater EM Active, and Activity 11 – Infrared Measurements). No changes to the current socioeconomic conditions (employment, housing, and population growth) of Bonner and Kootenai Counties is expected under Alternative 1 as the Navy is not anticipating increasing levels of personnel employed at ARD Bayview.

However, some testing events may bring additional personnel to the region for single day or short term activities. The additional personnel may utilize local resources (food, gas, lodging, etc.) while in the area. The increase in personnel for these events may have a positive impact on the regional economy.

Implementation of Alternative 1 would result in increased scheduling and coordination by the Navy to ensure testing and recreational uses are not in conflict. Further, the area used for testing activities would not include the entire lake and would not impact the overall recreational use (and thus the use of shoreline facilities for food and fuel). In addition, as discussed in Section 3.4.2.4 (Alternative 1), the activities proposed under Alternative 1 would not have an impact on fish populations and thus have no impact on the recreational fishery at Lake Pend Oreille. Therefore, regional and community economics, employment, housing, and population growth would not be affected as a result of Alternative 1.

Based on the analysis presented herein on Air Quality, Fisheries, and Public Health and Safety associated with Alternative 1, the following conclusions are presented in regard to human health and environmental effects to low-income communities and minority populations:

- Air Quality – Air emissions do occur from Alternative 1 but do not pose human health or environmental risks and do not pose health or environmental risks disproportionately on low-income communities and minority populations, as all surrounding communities are affected by air emissions from this action.
- Recreational Fisheries – As discussed in Section 3.4.2.4 (Alternative 1), the activities proposed under Alternative 1 would not have an impact on fish populations; therefore, there would be no impact on fisheries.
- Public Health and Safety – The Navy has specific and documented procedures in place to ensure that nonparticipants are not endangered by Navy actions. Concerns related to noise from Alternative 1 on the surrounding communities include hearing loss, non-auditory health effects, and speech interference/temporary attention. Based on the distribution and magnitude of noise impacts under Alternative 1, surrounding communities are slightly affected by operational noise; however, no disproportionate effects on low-income or minority populations occur.

The nature of project activities under Alternative 1 would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions.

3.5.2.3 Alternative 2 (Preferred Alternative)

Alternative 2 (Preferred Alternative) would include all elements of the No Action Alternative. As described in Table 2.4-2 and in comparison to the No Action Alternative, Alternative 2 (Preferred Alternative) introduces six new activities (Activity 9 – Underwater EM Passive, Activity 10 – Underwater EM Active, Activity 11 – Infrared Measurements, Activity 16 – Laser Testing; and Activity 18 – Shallow Water).

Despite the increase in activities, no changes to the current socioeconomic conditions (employment, housing, and population growth) of Bonner and Kootenai Counties are expected under Alternative 2 (Preferred Alternative) as the Navy would maintain baseline levels of personnel already employed at ARD Bayview. However, some testing events may bring additional personnel to the region for single day or short-term activities. The additional personnel may utilize local resources (food, gas, lodging, etc.) while in the area. The increase in personnel for these events may have a positive impact on the regional economy, since the personnel are likely to spend money locally on items such as food, gas, and lodging.

Implementation of Alternative 2 (Preferred Alternative) would result in increased scheduling and coordination by the Navy to ensure testing and recreational uses are not in conflict. Further, the area used for testing activities would not include the entire lake and not impact the overall recreational use (and thus the use of shoreline facilities for food and fuel). In addition, as discussed in Section 3.4.2.5 (Alternative 2 [Preferred Alternative]), the activities proposed under Alternative 2 (Preferred Alternative) would not have an impact on fish populations and thus have no impact on the recreational fishery at Lake Pend Oreille. Therefore, regional and community economics, employment, housing, and population growth are not affected as a result of Alternative 2 (Preferred Alternative).

Based on the analysis presented herein on Air Quality, Fisheries, and Public Health and Safety associated with the No Action Alternative, the following conclusions are presented in regard to human health and environmental effects to low-income communities and minority populations:

- Air Quality – Air emissions do occur from Alternative 2 (Preferred Alternative) but do not pose human health or environmental risks and do not pose health or environmental risks disproportionately on low-income communities and minority populations, as all surrounding communities are affected by air emissions from this action.
- Recreational Fisheries – As discussed in Section 3.4.2.5 (Alternative 2 [Preferred Alternative]), the activities proposed under Alternative 2 (Preferred Alternative) would not have an impact on fish populations; therefore, there would be no impact on fisheries.
- Public Health and Safety – The Navy has specific and documented procedures in place to ensure that nonparticipants are not endangered by Navy actions. Concerns related to noise from Alternative 2 (Preferred Alternative) on the surrounding communities include hearing loss, non-auditory health effects, and speech interference/temporary attention. Based on the distribution and magnitude of noise impacts under Alternative 2 (Preferred Alternative), surrounding communities are slightly affected by testing noise; however, no disproportionate effects on low-income or minority populations occur.

The nature of project activities under Alternative 2 (Preferred Alternative) would not affect local population trends, housing, industrial growth, or other measures of socioeconomic conditions.

3.6 AMERICAN INDIAN TRADITIONAL RESOURCES

3.6.1 INTRODUCTION

The approach to assessing American Indian traditional resources includes defining the resource; presenting the regulatory requirements for identifying, evaluating, and treating the resource within established jurisdictional parameters; consulting with tribal governments to identify resources; and describing the method of impact analysis.

American Indian traditional resources are resources associated with beliefs or cultural practices of a living culture, subculture, or community. These beliefs and practices must be rooted in the group's history and must be important in maintaining the cultural identity of the group. Traditional cultural properties are not limited to American Indians but can represent any ethnic group with strong ties to the property (National Park Service 1998). Traditional cultural properties are those resources listed on or eligible for listing on the National Register of Historic Places are afforded the same protection as other types of historic properties. Resources that are significant to American Indian Tribes and may be considered traditional cultural properties include, but are not limited to archaeological sites and artifacts, locations of historic and contemporary events, sacred areas, landscapes, sources of raw materials used to produce tools and sacred objects, traditional hunting or gathering areas, and usual and accustomed tribal fishing grounds. Many resources are also sacred places important to American Indians and may include mountain peaks, springs, and burial sites. Traditional uses may prescribe the use of particular native plants, animals, or minerals from specific places. The community may consider these resources essential for the continuation of their traditional culture.

Protected tribal resources, as defined in DoD Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes*, are "those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by or reserved by or for Indian tribes through treaties, statutes, judicial decisions, or EOs, including tribal trust resources." This section also addresses American Indian protected tribal resources and other traditional resources that are retained or reserved by or for American Indian tribes through treaties. These resources include plants, animals, habitat, and locations associated with hunting, fishing, and gathering activities for subsistence or ceremonial use.

3.6.2 REGULATORY REQUIREMENTS

3.6.2.1 Regulatory Framework

Native American traditional cultural properties are protected by the NHPA of 1966, as amended (16 U.S.C. 470). Traditional cultural properties are eligible for listing in the National Register of Historic Places because of their association with cultural practices or beliefs of a living community that (1) are rooted in that community's history, and (2) are important in maintaining and continuing cultural identity of the community. Traditional cultural properties may be identified by Native Americans or other living communities. Even if resources that are significant to Native American Tribes may not be considered traditional cultural properties, these resources may be afforded protection by other laws, regulations, or EOs.

Secretary of the Navy Instruction (SECNAVINST) 5090.8a, *Policy for Environmental Protection, Natural Resources and Cultural Resources Programs*, and OPNAV M-5090.1, Chapter 23, *Cultural Resources Compliance and Management* require the Navy to consider the effects of its undertakings on cultural resources in its planning and program efforts. SECNAVINST 4000.35a, *Department of the Navy Cultural Resources Program*, establishes policy and assigns responsibilities within the Department of the Navy for fulfilling the requirements of cultural resources laws such as the NHPA.

Section 106 of the NHPA requires federal agencies to consider the effects of their actions on cultural resources listed in or eligible for inclusion in the National Register. The regulations implementing Section 106 (36 C.F.R. §800) specify a consultation process to assist in satisfying this requirement. Consultation with the appropriate State Historic Preservation Offices, the Advisory Council, American Indian tribes, the public, and state and federal agencies is required by Section 106 of the NHPA.

In January 2014, the Navy sent scoping letters inviting involvement of associated American Indian tribes in public participation efforts associated with this EA. In fulfillment of Section 106 obligations for completion of the EA, the Navy will consider comments from American Indian tribes resulting from communications during the NEPA process. The following tribes were invited to participate in government-to-government consultation (listed in alphabetical order): Coeur d'Alene Tribe, Confederate Salish and Kootenai Tribes, Kootenai Tribe of Idaho, and Kalispel Tribe. To date, no tribes have requested consultation.

Under NEPA, an EA must address the adverse and beneficial effects of a proposed federal action on important historic and cultural aspects of our national heritage (40 C.F.R. §1508.8) (here defined as resources eligible for or listed in the National Register of Historic Places). While NEPA and Section 106 of the NHPA represent two separate procedural laws, the public participation for the Proposed Action has been integrated to the extent possible. The NEPA scoping and Draft EA public review processes provide opportunities for the public to not only participate in the NEPA process but also contribute to public involvement in accordance with Section 106 of the NHPA.

3.6.2.2 Determination of Significance

Factors considered when determining if an alternative could have a significant impact on Native American traditional resources includes whether and to what degree the resource would be affected and whether access by tribal members to the resource would change. If requested by Native American tribes, government-to-government consultation will be conducted with potentially affected federally recognized Native American tribes to identify affected protected tribal resources and other traditional resources, evaluate the extent of any adverse effects, determine the significance of impacts, and develop mitigation measures.

Under Section 106, an undertaking (i.e., the Proposed Action under NEPA) is considered to have an effect on a historic property when the undertaking may alter characteristics of the property that may qualify it for inclusion in the National Register of Historic Places. An effect is considered adverse when it diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 C.F.R. §800.5(a)(1)).

Adverse effects as defined under 36 C.F.R. §800.5(a)(2)(i) through (vii) include, but are not limited to:

1. Physical destruction, damage, or alteration of all or part of the property
2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register of Historic Places
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting
4. Neglect of a property resulting in its deterioration or destruction
5. Transfer, lease, or sale of the property

Adverse effects under the NHPA also include reasonably foreseeable effects, both direct and indirect, caused by the alternatives, and those effects that could occur later in time, be farther removed in distance, or be cumulative (36 C.F.R. §800.5(a)(1)). Because cultural resources are typically nonrenewable, most adverse effects on National Register of Historic Places-eligible or National Register of Historic Places-listed resources in the area of potential effects would be permanent.

Under NEPA, impacts on cultural resources and the subgroup of historic properties are explicitly identified as attributes that must be addressed to determine the significance of a project's anticipated environmental impacts. The potential for adverse effects on cultural resources is considered in this NEPA assessment. An adverse effect on a historic property, however, does not necessarily equate to a significant impact under NEPA. Under NEPA, a significant impact can be mitigated to less than significant through completion of the Section 106 process, resulting in development of an agreement document resolving the adverse effects through a form of mitigation that could include data recovery or other treatment measures. For this document, a significant impact under NEPA is defined as an "unresolvable" adverse effect under Section 106 of the NHPA.

3.6.3 Identification, Evaluation, and Treatment of Traditional Resources

For the purposes of Section 106, the project area defined in Chapter 2 (Description of Proposed Action and Alternatives) of this document also serves as the Area of Potential Effects. Procedures for identifying, evaluating, and treating American Indian traditional resources, particularly traditional cultural properties are contained in a series of federal and state laws and regulations, as well as in agency guidelines. Traditional resources along with archaeological and architectural resources are protected by various laws and their implementing regulations: the NHPA of 1966 as amended in 2006, the American Indian Religious Freedom Act of 1978, and the American Indian Graves Protection and Repatriation Act of 1990. The Advisory Council on Historic Preservation (Advisory Council) further guides treatment of cultural resources through the regulations *Protection of Historic Properties* (36 C.F.R. Part 800). The category of "historic properties" is a subset of cultural resources defined in the NHPA (16 U.S.C. §470w(5)) as any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the National Register of Historic Places (National Register), including artifacts, records, and material remains related to such a property or resource. Those traditional resources that are listed in or eligible for listing in the National Register are known as "traditional cultural properties."

3.6.4 Treaty Fishing Rights

American Indian Tribes are dependent sovereign nations. Accordingly, the United States has a trust relationship with American Indian Tribes. The DoD American Indian Policy states: "Under the federal trust doctrine, the United States—and individual agencies of the federal government—owe a fiduciary duty to Indian tribes. The nature of that duty depends on the underlying substantive laws (i.e., treaties, statutes, agreements) creating the duty. Where agency actions may affect Indian lands or off-reservation treaty rights, the trust duty includes a substantive duty to protect these lands and treaty rights 'to the fullest extent possible.' Otherwise, unless the law imposes a specific duty on the federal government with respect to Indians, the trust responsibility may be discharged by the agency's compliance with general statutes and regulations not specifically aimed at protecting Indian tribes." The trust responsibility has been interpreted to require federal agencies to carry out their activities in a manner that is protective of American Indian treaty rights. EO 13175, *Consultation and Coordination with Indian Tribal Governments,* affirms the trust responsibility of the United States and directs agencies to consult with American Indian Tribes, and respect tribal sovereignty when taking actions affecting such rights.

Treaties with American Indian Tribes are government-to-government agreements, similar to international treaties, and preempt contrary state laws. Tribal treaty rights are not affected by later federal laws (unless Congress clearly abrogates treaty rights). Treaty language securing fishing and hunting rights is not a "grant of rights (from the federal government to the Indians), but a grant of rights from them - a reservation of those not granted" (United States v. Winans, 25 S. Ct. 662, 1905). This means that the American Indian Tribes retain rights not specifically surrendered to the United States. Furthermore, the United States has a trust or special relationship with American Indian Tribes.

This unique relationship provides the basis for legislation, treaties, and EOs that grant unique rights or privileges to American Indians. The trust responsibility has been interpreted to require federal agencies to carry out their activities in a manner that is protective of American Indian treaty rights. EO 13175, *Consultation and Coordination with Indian Tribal Governments*, affirms the trust responsibility of the United States and directs agencies to consult with American Indian Tribes, and respect tribal sovereignty when taking actions affecting such rights.

The 1855 Treaty with the Flatheads gave tribes "the exclusive right of taking fish in all the streams running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places, in common with citizens of the Territory." The Boldt Decision in 1974 defined "usual and accustomed" fishing grounds and stations as "every fishing location where members of a tribe customarily fished from time to time at and before treaty times, however distant from the then usual habitat of the tribe, and whether or not other tribes then also fished in the same waters." Courts have subsequently determined that "usual and accustomed places" include all customary fishing areas of tribes (U.S. Department of Defense 2002a); however, per consultations with the tribes, the project area is not considered to be a usual and accustomed place (see Section 3.6.2.1, Regulatory Framework).

3.6.5 Area of Effect

For compliance with Section 106 of the NHPA, the area of potential effects is considered the same as the project area defined in Section 1.2 (Location and Description of Acoustic Research Detachment Bayview) of this document. The implementing regulations of Section 106 of the NHPA require federal agencies to take into account the effects that a proposed action would have on traditional resources included on or eligible for inclusion on the National Register. Traditional cultural properties are afforded the same protection as other types of historic properties.

3.6.6 Affected Environment

3.6.6.1 Coeur d'Alene Tribe

The aboriginal territory of the Coeur d'Alene Tribe encompassed approximately 4 million acres over an area that extended from Idaho into Washington and Montana and included numerous and permanent sites on the shores of Lake Coeur d'Alene, Lake Pend Oreille, and Hayden Lake. The Coeur d'Alene Reservation was established by an EO dated 8 November 1873 (Coeur d'Alene Tribe n.d.). The Coeur d'Alene's economy is largely centered on logging and agriculture, and the tribe's enterprises in the gaming industry are proving to be successful. The Coeur d'Alene tribal government is also a major contributor to the tribe's economy, employing at least 1,000 people. The area surrounding the reservation contains many streams, rivers, and lakes that support recreational fishing. Tribal members continue to fish on and beyond reservation boundaries (Tiller 2005). Hunting and fishing rights are reserved to the original boundaries of the EO. Although Lake Pend Oreille is outside the Reservation, the lake is included in the ceded, aboriginal lands of the Coeur d'Alene Tribe.

3.6.6.2 Confederate Salish and Kootenai Tribes

The Confederate Salish and Kootenai Tribes are a combination of the Salish, the Pend d'Oreille, and the Kootenai Tribes. The Confederate Salish and Kootenai Tribes signed the Treaty of Hellgate on 16 July 1855, which established the Flathead Indian Reservation. The treaty provided the tribes the right to hunt and fish throughout open and unclaimed ceded lands. Although the exact boundaries of the treaty rights are unclear, the ceded lands include Lake Pend Oreille (Confederated Salish & Kootenai Tribes 2004, State of Montana 2012). The Confederate Salish and Kootenai Tribes generate revenues from four business corporations and their subsidiaries, which include gaming, manufacturing, retail, banking, technology, and electric utilities. Their tribal land is also the primary source of timber for the region's lumber industry. The tribes also receive revenue from fishing, hunting, and camping fees (Tiller 2005). The Confederate Salish and Kootenai Tribes are interested in aboriginal water rights in the upper Clark Fork and Lake Pend Oreille.

3.6.6.3 Kootenai Tribe

The Kootenai Tribe of Idaho was historically part of the larger Kootenai Tribe situated in areas of Montana and Canada. The Idaho Kootenai Tribe was not represented at the signing of the Treaty of Hellgate dated 16 July 1855, although their lands were ceded. The tribe had the right to hunt and fish on open and unclaimed lands in their ceded territory. Tribal members received few federal allotments until 18 October 1974 when lands were set aside in trust for the Kootenai Tribes by the United States (Kootenai Tribe of Idaho n.d.). Tribal government, agriculture, gaming, and tourism are the major components of the Kootenai economy. The tribe has been working to repopulate the Kootenai River with sturgeon, a fish of spiritual significance to the tribe (Tiller 2005). The main ARD Bayview facility is far south in Lake Pend Oreille and considered outside the Kootenai Tribal lands. The tribe may have an interest in Navy activities at the outlying ARD Bayview properties that may be included in their aboriginal lands.

3.6.6.4 Kalispel Tribe

The Kalispel Tribe historically lived in the Pend Oreille River Valley until a reservation was created by EO in 1914. The tribe consisted of semi-nomadic hunters, diggers, and fishermen. The Kalispel Indian Reservation is located in Usk, Washington along 10 mi. of the Pend Oreille River. The Kalispel Tribe is a co-manager of the river's watershed (Kalispel Tribe of Indians 2009, State of Washington n.d.). Primary contributors to the Kalispel economy include tribal government, agriculture, gaming, and manufacturing. The tribe is highly concerned about pollution in the Pend Oreille River (Tiller 2005). There are no off-reservation hunting or fishing rights; however, aboriginal lands of the Kalispel Tribe included Lake Pend Oreille and surrounding areas.

3.6.6.5 Traditional Cultural Properties

No Native American traditional cultural properties have been identified in the Study Area.

3.6.6.6 Usual and Accustomed Rights

No usual and accustomed tribal fishing grounds have been identified in the Study Area.

3.6.7 ENVIRONMENTAL CONSEQUENCES

3.6.7.1 No Action Alternative

Under the No Action Alternative, the current RDT&E would continue and there would be no change to tribal resources, tribal rights, or Indian lands as a result of the Proposed Action. As described in Section

3.6.2.1 (Regulatory Framework), the Commanding Officer of Naval Station Everett invited the potentially affected, federally recognized tribes to initiate government-to-government consultation in letters dated 7 January 2014.

3.6.7.2 Alternative 1: Additional Testing Alternative

No known traditional cultural properties or usual and accustomed fishing rights have been identified in the Study Area.

3.6.7.3 Alternative 2 (Preferred Alternative): Expanded Additional Testing Alternative

No known traditional cultural properties or usual and accustomed fishing rights have been identified in the Study Area.

3.7 PUBLIC HEALTH AND SAFETY

3.7.1 AFFECTED ENVIRONMENT

ARD Bayview primary shore facility maintains two remote support facilities on the shoreline of Lake Pend Oreille and five test sites in the lake (see Figure 1-2). Three underwater testing facilities, a static test barge, and a tow testing site are located in the southern half of Lake Pend Oreille. Also at the southern end of Lake Pend Oreille in Kootenai County, ARD Bayview owns approximately 22 ac. (8.9 ha) on the shore and manages approximately 16 ac. (6.5 ha) of lake bottom.

The area of interest for assessing potential impacts on public health and safety is the entire lake where the proposed activities could occur. Military, commercial, institutional, and recreational activities take place simultaneously in the Study Area and have coexisted safely for decades. These activities coexist because there are rules and practices (e.g., OPNAV M-5090.1, *Environmental Readiness Program Manual*; OPNAV 5100, 19E, *Navy Safety and Occupational Health Program Manual for Forces Afloat*; OPNAV 5100.27B, *Navy Laser Hazards Control Program; ARDINST 5100.4, Operation of ARD Watercraft on Lake Pend Oreille*) that lead to the safe use of the waterway.

3.7.1.1 Determination of Significance

The baseline for public health and safety was derived from federal regulations, DoD directives, and Navy instructions. The directives and instructions provide specifications for mission planning and execution that describe criteria for public health and safety considerations. The baseline for public health and safety was derived from activities under the No Action Alternative and under the Study Area shown in Figure 1-2.

The alternatives were evaluated based on two factors: the potential that an activity could impact public health and safety and the degree to which those activities could have an impact. The likelihood that the public would be within an unsafe distance to an activity determines the potential for exposure to the activity. If the potential for exposure exists, the degree of the potential impacts on public health and safety, including increased risk for injury or loss of life, was determined. If the potential for exposure does not exist, there would be no impacts on public health and safety. Isolated incidents and other conditions that affect single individuals, although important for safety awareness, are not considered in this assessment.

3.7.1.2 Current Requirements and Management Practices

It is Navy policy to ensure the safety and health of personnel and the general public (M-5090.1). The Navy achieves these conditions by considering timing and location when planning activities, scheduling and notifying potential users of an area, and making sure an area is clear of nonparticipants. The Navy also has a proactive and comprehensive program of compliance with applicable standards and implementation of safety management systems and incorporates Operational Risk Management principles in test preparations, and additional safety restrictions are often self-imposed.

The Navy practices the fundamentals of safe navigation. While in transit, vessel operators are alert at all times, use extreme caution, use state-of-the-art satellite navigational systems, and are trained to take proper action if there is potential risk. Small boats are utilized during activities to make sure the area is clear of nonparticipants when necessary. Also, cameras relaying live feed are pointed on the two major moors and the OUTPOST to further ensure those areas are clear of nonparticipants.

The U.S. Navy Dive Manual (U.S. Department of the Navy 1999) prescribes safe distances from active sonar sources. Safety precautions regarding use of electromagnetic energy are specified in DoD Instruction 6055.11, *Protecting Personnel from Electromagnetic Fields* (U.S. Department of Defense 2009) and Military Standard 464A, *Electromagnetic Environmental Effects: Requirements for Systems* (U.S. Department of Defense 2002b). Safety precautions regarding specific distances from military vessels to piers, docks, other structures, shoreline or persons in the water are specified in *ARDINST 5100.4B (Operation of ARD Watercraft on Lake Pend Oreille)*.These distances would be used as the standard safety buffers for underwater energy and vessel use to protect public health and safety. If any unauthorized personnel are detected within the area, the activity would be temporarily halted until the area is clear of nonparticipants and secured.

ARD Bayview's Comprehensive Environmental Response Plan is a consolidated document that bring together a Spill Prevention, Control, and Countermeasure Plan; Emergency Response Action Plan; Stormwater Pollution Prevention Plan; Hazardous Waste Contingency Plan; and Emergency Response Plan into one document. This improves the response capability of base personnel and reduces the risk to public health and safety by consolidating responses for dealing with potential hazardous material spills.

3.7.2 ENVIRONMENTAL CONSEQUENCES

The primary factor considered in determining the significance of potential noise impacts includes the extent or degree to which implementation of the Proposed Action would affect the baseline noise environment. Based on numerous sociological surveys, and recommendations of federal interagency councils, the most common benchmark for assessing environmental noise impacts is a DNL of 65 dB for A-weighted noise (Schomer 2005, Federal Interagency Committee on Urban Noise 1992). When subjected to noise levels of 65 dBA DNL, approximately 12 percent of exposed individuals would be "highly annoyed." A noise level of 75 dBA DNL is a threshold above which effects other than annoyance can occur.

Vessels, targets, and towed devices could have a direct physical encounter with recreational, commercial, institutional, and governmental vessels and users such as swimmers, divers, and anglers. Underwater energy can come from acoustic sources, electromagnetic devices, and vessel movements. Laser (low and high) energy could also pose a risk to public health and safety. The potential for the public to have a direct physical encounter or be exposed to underwater or laser energy would be limited to individuals or vessels that are within unsafe proximity of an activity.

Impacts to public health and safety from pierside activities would be avoided because access to pierside locations by nonparticipants is controlled for safety and security reasons and therefore will not be discussed further.

3.7.2.1 No Action Alternative

Under the No Action Alternative, as addressed in Section 3.3 (In-Air Noise), airborne noises would be produced primarily by surface vessels being tested and support vessels being operated in the open waters of Lake Pend Oreille. As described in Section 2.1 (Description of the Proposed Action), the vast majority of activities occurring under the No Action Alternative are underwater. In-air noise would continue to be emitted by surface support vessels and towing vessels that accompany underwater testing. Airborne noise was modeled for a multipurpose ship and a fishing research vessel by Badino et al. (2012) and compared with field measurements. At a distance of 82 ft. (25 m) from the operating vessels, the modeled received noise level was approximately 60 dBA for the fisheries vessel and 70 dBA for the multipurpose vessel. At a distance of 1,640 ft. (500 m), these received levels would drop to

approximately 36 and 46 dB, respectively, due to propagation loss. Operating vessels in Lake Pend Oreille would likely be at a distance of 1,640 ft. (500 m) or more from shore during testing activities. These received levels are anticipated to be below daytime ambient noise levels and at or near nighttime ambient noise levels. While some receptors may receive noise slightly above the ambient noise level, these periods of elevated noise levels are expected to be brief because vessel operations associated with testing activities are intermittent, and not at a fixed position. Thus, sensitive receptors along the shoreline are not expected to be impacted by noise from surface ships, and noise from surface ships is not expected to contribute enough energy to exceed 65 dBA DNL at the shoreline.

Maintenance activities under the No Action Alternative would occur approximately 135 times annually. During these maintenance activities, noise levels would be anticipated to temporarily rise with the additional use of cranes, generators, additional vessels, and related motorized equipment. Many of the maintenance activities will occur at the testing sites, which are typically greater than 1,640.4 ft. (500 m) from the shoreline. Noises associated with the maintenance would likely not reach the shoreline, unless maintenance activities occurred within Scenic Bay at the Static Test Barge. While maintenance noise could reach sensitive receptors, it is unlikely that given their intermittent nature and distance from shore, the contribution to a DNL that exceeds 65 dBA would be minimal. Additionally, many of the maintenance activities occur within enclosed spaces, which minimizes the amount of RN into the environment. Such noises are common in the area of Scenic Bay, as there are a number of additional marinas in Scenic Bay that create similar noise sources and noise levels, and effects on sensitive human receptors would be negligible. The No Action Alternative would not result in significant impacts to the acoustic environment.

Impacts to public health and safety could occur if testing activities occurred near nonparticipants where they could be exposed to underwater energy or experience a direct physical interaction with Navy vessels or equipment. The potential for the public to be exposed to these activities would be limited to individuals who are within unsafe proximity to an activity.

Because of the Navy's implementation of SOPs that protect public health and safety as described in Section 3.1.2 (Environmental Consequences), there would be no impact on public health and safety from activities using underwater energy or from a direct physical interaction. These operating procedures include ensuring the area is clear of nonparticipants before commencing activities. Because of the Navy's safety procedures, the potential for impacts on public health and safety under the No Action Alternative would be unlikely. Therefore, there would be no significant impact to public health and safety as a result of implementation of the No Action Alternative. Further, the Navy has been operating in the lake without any public health and safety incidents since its inception in the 1940s.

Therefore, there would be no significant impact to public health and safety as a result of implementation of the No Action Alternative.

3.7.2.2 Alternative 1

As described in Table 2.4-2 and in comparison to the No Action Alternative, Alternative 1 introduces three new activities (Activity 9 – Underwater EM Passive, Activity 10 – Underwater EM Active, and Activity 11 – Infrared Measurements). All other testing activities would remain at the same levels as presented for the No Action Alternative. The three activities could occur at the ISMS or LSV testing sites. Both of these sites are located over 3,280.4 ft. (1,000 m) from the shore; therefore, in-air noise associated with these testing activities is unlikely to reach the shorelines at levels that would contribute to the acoustic environment.

Day-to-day noise levels are not expected to be different than current noise levels. With the exception of the new activities, the same vessels would be tested and used under Alternative 1 as are currently used, and the same testing locations would be used. Therefore, the associated noise from individual activities would be similar. As discussed for the No Action Alternative, airborne noises associated with Alternative 1 would be intermittent and localized. Effects on sensitive human receptors would be negligible. Alternative 1 would not result in significant impacts to the acoustic environment.

While Alternative 1 would increase the number and types of activities where nonparticipants could be exposed to underwater energy or experience a direct physical interaction with Navy vessels or equipment, the Navy would continue the implementation of standard operating and safety procedures. Because of this, an increased potential for impacts on public health and safety beyond those identified under the No Action Alternative would be unlikely. There would be no significant impact to public health and safety as a result of implementation of Alternative 1.

3.7.2.3 Alternative 2

As described in Table 2.4-2 and in comparison to the No Action Alternative, Alternative 2 introduces five new activities (Activity 9 – Underwater EM Passive, Activity 10 – Underwater EM Active, Activity 11 – Infrared Measurements, Activity 16 – Laser Testing, and Activity 17 – Shallow Water Testing). All other testing activities would remain at the same levels as presented for the No Action Alternative. Three activities (Activity 9 – Underwater EM Passive, Activity 10 – Underwater EM Active, and Activity 11 – Infrared Measurements) could occur at the ISMS or LSV testing sites. Both of these sites are located over 3,280.4 ft. (1,000 m) from the shore; therefore, in-air noise associated with these testing activities is unlikely to reach the shorelines at levels that would contribute negligibly to the acoustic environment.

Alternative 2 includes laser testing, shallow water testing, and other testing as detailed in Table 2.4-2. Two types of lasers are used under Alternative 2: low or high energy. The Navy would operate high-energy laser equipment in accordance with procedures defined in Operational Naval Instruction 5100.23G, *Navy Safety and Occupational Health Program Manual* (U.S. Department of the Navy 2011). A comprehensive safety program exists for the use of lasers. Current Navy practices protect individuals from the hazard of severe eye injury caused by laser energy. While Alternative 2 would increase the number and types of activities where nonparticipants could be exposed to underwater energy or experience a direct physical interaction with Navy vessels or equipment, the Navy would continue implementation of standard operating and safety procedures. Because of this, an increased potential for impacts on public health and safety beyond those identified under the No Action Alternative and Alternative 1 would be unlikely.

There would be no significant impact to public health and safety as a result of implementation of Alternative 2.

3.8 COMPARISON OF ALTERNATIVES AND EFFECTS

The comparison of alternatives presented in Table 3.8-1 is based on the information and analyses presented in this chapter (Chapter 3: Affected Environment and Environmental Consequences). The environmental stressors associated with each testing activity were evaluated for each resource or issue in assessing potential environmental impacts under each alternative. There were no recordable differences in potential impacts between the alternatives for most resources.

In addition, resources were evaluated in accordance with ESA and the NHPA. The potential impacts presented in Table 3.8-1 form the basis for providing choices to the decision maker.

Table 3.8-1: Summary Comparison of Alternatives and Effects

Resource or Issue	Alternatives		
	No Action Alternative	**Alternative 1**	**Alternative 2 (Preferred Alternative)**
Water Quality	Short-term, localized impacts to water quality as a result of turbidity from sediment disturbance. Baseline conditions for water quality would not change and testing activities would not lead to a violation of state or federal water quality standards or guidelines. No significant impact (Section 3.1.2.1).	Slight increase in surface vessel use and testing activities. Baseline conditions for water quality would not change and testing activities would not lead to a violation of state or federal water quality standards or guidelines. No significant impact (Section 3.1.2.2).	Slight increase in surface vessel use and implementation of shallow water testing. Baseline conditions for water quality would not change and testing activities would not lead to a violation of state or federal water quality standards or guidelines. No significant impact (Section 3.1.2.3).
Air Quality	Emissions associated with testing activities (surface vessels, vehicles, generators) would have no significant impact on regional air quality (Section 3.2.2.1).	Slight increase in emissions associated with testing activities. No significant impact (Section 3.2.2.2).	Slight increase in emissions associated with testing activities. No significant impact (Section 3.2.2.3).
In-Air Noise	Surface support vessels and towing vessels would emit airborne noise. Maintenance activities would be intermittent, far from the shoreline, and in enclosed spaces. Negligible impacts to sensitive receptors. No significant impact (Section 3.3.2.1).	Airborne noises associated testing activities would be intermittent and localized. Effects on sensitive human receptors would be negligible. No significant impact (Section 3.3.2.2)	Airborne noises associated testing activities would be intermittent and localized. Effects on sensitive human receptors would be negligible. No significant impact (Section 3.3.2.3).
Fish			
Underwater Noise	The creation of non-impulse active noise sources for testing activities would have no significant impact on fish (Section 3.4.2.3.1).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.5).

Table 3.8-1: Summary Comparison of Alternatives and Effects (continued)

Resource or Issue	Alternatives		
	No Action Alternative	Alternative 1	Alternative 2 (Preferred Alternative)
Fish (continued)			
Sedimentation and Turbidity	Suspended sediments and increased turbidity associated with testing activities would have no significant impact on fish (Section 3.4.2.3.2)	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.5).
Electromagnetic Measurements	Electromagnetic measurements would not occur. No effect.	Electromagnetic fields associated with Alternative 1 activities will have no significant impacts on fish (Section 3.4.2.4).	Electromagnetic fields associated with Alternative 2 activities will have no significant impacts on fish (Section 3.4.2.5).
Threatened and Endangered Species – Bull Trout			
Underwater Noise	Vessel noise associated with activities may affect, but is not likely to adversely affect the ESA-listed bull trout and is not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout (Section 3.4.2.3.1).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of underwater noise would be the same as presented for the No Action Alternative (Section 3.4.2.5).
Sedimentation and Turbidity	Suspended sediments and increased turbidity associated with testing activities may affect, but are not likely to adversely affect the ESA-listed bull trout and are not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout (Section 3.4.2.3.2)	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.4).	The potential effects of resuspension of lake bottom sediments would be the same as presented for the No Action Alternative (Section 3.4.2.5).
Electromagnetic Measurements	Electromagnetic measurements would not occur. No effect.	Use of electromagnetic devices associated with activities under Alternative 1 may affect, but is not likely to adversely affect the ESA-listed bull trout and are not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout.	Use of electromagnetic devices associated with activities under Alternative 2 may affect, but is not likely to adversely affect the ESA-listed bull trout and are not anticipated to result in the destruction or adverse modification of federally designated critical habitat for bull trout.

Table 3.8-1: Summary Comparison of Alternatives and Effects (continued)

Resource or Issue	Alternatives		
	No Action Alternative	**Alternative 1**	**Alternative 2 (Preferred Alternative)**
Socioeconomics	The nature of project activities would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions (Section 3.5.2.1).	The nature of project activities under Alternative 1 would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions (Section 3.5.2.2).	The nature of project activities under Alternative 2 would not affect local population trends, housing, industrial growth, or other measures of socio-economic conditions (Section 3.5.2.3).
American Indian Traditional Resources	No significant impacts to American Indian traditional resources would occur due to testing activities. In accordance with Section 106 of the National Historic Preservation Act, there would be no effect on cultural resources (Section 3.6.7.1).	No significant impacts to American Indian traditional resources would occur due to testing activities. In accordance with Section 106 of the National Historic Preservation Act, there would be no effect on cultural resources (Section 3.6.7.2).	No significant impacts to American Indian traditional resources would occur due to testing activities. In accordance with Section 106 of the National Historic Preservation Act, there would be no effect on cultural resources (Section 3.6.7.2).
Public Health and Safety	There would be negligible impacts from noise associated with vessel use or maintenance activities. With implementation of Navy standard operating procedures, there would be no impact on public health and safety from activities using underwater energy or from a direct physical interaction during testing activities.	The negligible impacts from noise of vessels and maintenance activities would be the same as presented for the No Action Alternative. With implementation of Navy standard operating procedures, there would be no impact on public health and safety from activities using underwater energy or from a direct physical interaction during testing activities.	The negligible impacts from noise of vessels and maintenance activities would be the same as presented for the No Action Alternative. High-energy laser equipment would be implemented in accordance with Naval procedures. With implementation of Navy standard operating procedures, there would be no impact on public health and safety from activities using underwater energy or from a direct physical interaction during testing activities.

4 CUMULATIVE IMPACTS

The analysis of cumulative impacts presented in this section follows requirements of the NEPA and CEQ guidance (Council on Environmental Quality 1997). CEQ regulations (407 C.F.R. §§1500–1508) provide the implementing regulations for NEPA. The regulations define cumulative impacts 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.*

An action's contribution to the overall impacts in a ROI is of particular concern. While a single project may have minor impacts, overall impacts may be collectively significant when the project is considered together with other projects on a regional scale. A cumulative impact is the additive effect of all projects in the geographic area. The CEQ provides guidance on cumulative impact analysis in *Considering Cumulative Impacts under the National Environmental Policy Act* (Council on Environmental Quality 1997). This guidance further identifies cumulative impacts as those environmental impacts resulting "from spatial and temporal crowding of environmental perturbations. The impacts of human activities will accumulate when a second perturbation occurs at a site before the ecosystem can fully rebound from the impacts of the first perturbation." Noting that environmental impacts result from a diversity of sources and processes, this guidance observes that "no universally accepted framework for cumulative impacts analysis exists," while noting that certain general principles have gained acceptance.

To understand the contribution of past actions to the context of the Proposed Action, this analysis relies on current environmental conditions as a proxy for the cumulative impacts of past actions. This approach is widely used because existing conditions reflect the aggregate impact of all prior human actions and natural events that have brought the environment to its current state. The CEQ issued an interpretive memorandum on 24 June 2005, on analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

For this cumulative impacts analysis, the Affected Environment sections in Chapter 3 (Affected Environment and Environmental Consequences) of this EA adequately describe the aggregate effects of past actions on each environmental resource to be analyzed. The potential contributions of present and reasonably foreseeable future projects are incorporated into the cumulative impacts analysis by (1) listing major individual projects in the ROI of the Proposed Action that could have additive or synergistic effects on environmental resources in combination with those of the Proposed Action, and (2) considering general trends in human activities and environmental conditions in the ROI.

4.1 OTHER ACTIONS ANALYZED IN THE CUMULATIVE IMPACT ANALYSIS

4.1.1 RECREATIONAL BOATING

Recreational boating use of Lake Pend Oreille is popular during the summer months and is anticipated to increase with population and retirement community growth. The Navy takes advantage of good communication with the local community to advise the public of its mission and new testing being conducted, and the Navy makes an effort to avoid testing during popular fishing derbies or holiday weekends.

4.1.2 LAKE PEND OREILLE WATER LEVEL MANAGEMENT

The USACE manages winter lake levels for Lake Pend Oreille to provide power generation, flood risk management, fish and wildlife conservation, and recreation. In cooperation with an interagency team (USFWS, IDFG, NMFS, and Kalispel Tribe), the USACE manages outflow of the top 11 ft. of Lake Pend Oreille with the Albeni Falls Dam. This protects erodible shorelines and provides spawning habitat for fish including kokanee inland sockeye salmon (*Oncorhynchus nerkus*) population, a food source for bull trout (*Salvelinus confluentus*).

4.1.3 ACOUSTIC RESEARCH DETACHMENT BAYVIEW PIER AND BOATHOUSE REPLACEMENT

The Navy intends to remove two boathouses and a pier and construct new structures that would meet ARD Bayview's current and future requirements. The existing structures present safety and environmental concerns due to their continued deterioration, location in shallow water during low lake levels, and release of toxins from the creosote piles. The boathouse and dock support pilings would be removed by cutting off the pilings at the lake bottom where possible, rather than pulling and removing entire pilings. This method will reduce turbidity and sediment disturbance as well as minimize leaching of creosote, chromated copper arsenate, and other chemicals into the lake from the existing pilings.

New pilings will be of pre-cast concrete or steel and will be put in place by vibratory hammer, followed by proofing with an impact hammer as needed to stabilize the pilings into the lake bottom. A bubble curtain will be employed during pile proofing to attenuate underwater noise levels. Replacement of these structures could potentially impact fish, threatened and endangered species, and water quality.

The Navy prepared a BA for this action and received concurrence (May 2010) from the USFWS that the proposed project "may affect, but is not likely to adversely affect" bull trout. Following this concurrence the Navy prepared a Categorical Exclusion (CATEX) which indicated that the Navy would not prepare an EA or EIS based on the categorical exclusion listed in OPNAVINST 5090.C Chapter 5, Table 5.1 #34: *New construction that is similar to existing land use and , when completed, the use or operation of which complies with existing regulatory requirements*. The CATEX only pertains to the Navy action to replace two boathouses and a pier at ARD Bayview.

4.1.4 ACOUSTIC RESEARCH DETACHMENT BAYVIEW INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

In its INRMP (U.S. Department of the Navy 2003), ARD Bayview proposed to work in coordination with IDFG to conduct studies of fish spawning habitats, spawning activity, assessments of invasive aquatic vegetation, and overall monitoring of impacts to bull trout habitat and kokanee spawning activity. At this time, the Navy has not implemented the proposed studies nor identified steps to reduce or eliminate Eurasian water milfoil from Lake Pend Oreille as testing activities would not further exacerbate or enhance the spread of invasive species and ARD Bayview follows standard protocols for decontaminating all vessels and equipment that have been in contact with other water bodies prior to entering the lake. However, since 2006, the state of Idaho has had a program in place targeting complete eradication of Eurasian water milfoil (Idaho State Department of Agriculture 2006).

4.1.5 UNITED STATES FOREST SERVICE LAND MANAGEMENT PLAN

Other federal actions along Lake Pend Oreille include U.S. Forest Service management of the Idaho Panhandle National Forests (U.S. Forest Service 2013). The Idaho Panhandle National Forests Land Management Plan was adopted in 1987 and is currently being revised. The new plan will provide a

framework for future management of the forested lands along the lake that include watershed improvements and management of vegetation for multiple objectives.

Under the proposed plan, subwatersheds within the Forest Service lands adjacent to Lake Pend Oreille have been identified as conservation or restoration areas. Conservation areas are intended to protect stronghold populations of native salmonids and complement restoration efforts. Restoration areas are identified as those subwatersheds with degraded habitat conditions, water quality limitations, depressed populations of native fish species, or a combination of the above, and a relatively higher potential for improvement. Implementation of a new forest management plan could affect fisheries, threatened and endangered species, and water quality.

4.1.6 Lake Pend Oreille Bull Trout Conservation Plan

The mission of the Lake Pend Oreille Bull Trout Conservation Plan is to "develop and implement a locally accepted conservation plan which will provide for a population of bull trout with long term viability and a harvestable surplus, while minimizing disruption to the lifestyles and industries of the area's population" (Lake Pend Oreille Watershed Advisory Group 1999). Through fisheries management, habitat management, education, enforcement, and monitoring, implementation of this plan will likely have a strong positive effect on the bull trout population in Lake Pend Oreille.

4.2 Potential Cumulative Impacts

A finding of a significant cumulative impact requires (1) a determination that the aggregate impact of past, present, and reasonably foreseeable future projects on a resource, including the Proposed Action, would be significant; and (2) a determination that the Proposed Action would contribute to that impact in an additive or synergistic manner. Where significance thresholds already have been exceeded by past, present, and approved future projects, this analysis assumes any incremental contribution to the existing adverse condition by the Proposed Action that impedes the reduction of that impact to a level of insignificance would be considered cumulatively significant.

4.2.1 Water Quality

The cumulative projects identified in Section 4.1 (Other Actions Analyzed in the Cumulative Impact Analysis) would have varying effects on water quality and sediments within the Study Area. The potential for increased recreational boating use of the lake is not expected to reduce water quality to a significant degree. There is not expected to be a rapid increase in boat traffic on the lake in the near future that would result in impairment of water quality. Construction of a new pier and boathouses at ARD Bayview would have highly localized negligible effects on water quality with implementation of best management practices to minimize turbidity and sediment disturbance and minimize leaching of creosote, chromated copper arsenate, and other chemicals into the lake from the existing pilings.

Management plans such as the ARD Bayview INRMP and the proposed Forest Management Plan would provide for the enhancement of natural resources including adjacent watersheds that would enhance the quality of water in the lake and entering the lake. The Proposed Action would have localized negligible adverse effects on the quality of the available water. Therefore, in conjunction with other past, present, or reasonably foreseeable projects, the Proposed Action would not result in significant cumulative impacts on water resources.

4.2.2 AIR QUALITY

There would be minimal cumulative air quality impacts from the boathouse and pier construction project listed in Section 4.1 (Other Actions Analyzed in the Cumulative Impact Analysis). Recreational boating use of the lake may increase over time due to growth in the region; however, it is not expected to be substantial enough to degrade air quality so that state and federal air quality standards could not be met. The aggregate air quality impacts of foreseeable future development in combination with the Proposed Action would be cumulatively insignificant. Therefore, further analysis of cumulative impacts air quality is not warranted at this time.

4.2.2.1 Climate Change

The increase in testing activities, along with regional growth and regional increases in recreational visitors, would not incrementally increase regional emissions of CO_2 and other greenhouse gases. Scientists are in general agreement that the Earth's climate is gradually changing, and that change is due—at least in part—to emissions of CO_2 and other greenhouse gases from manmade sources. The anticipated magnitude of global climate change is such that a significant cumulative impact on global climate exists.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (5 October 2009), requires greenhouse gas emission reductions in the federal government and by federal agencies. However, the exact amount of greenhouse gas reductions and the required Strategic Sustainability Performance Plan to achieve those reductions is still under development and therefore not included in the analysis for this document. The climate change research community has not yet developed tools specifically intended to evaluate or quantify end-point impacts attributable to the emissions of greenhouse gases from a single source. In particular, because of the uncertainties involving the assessment of such emissions regionally and locally, the very minor and incremental contribution of the Proposed Action to climate change cannot be determined given the current state of the science and assessment methods.

Although the Proposed Action would not contribute substantially to cumulative impacts associated with global climate change, this important topic warrants discussion of Navy leadership in broad-based programs to reduce energy consumption and shift to renewable and alternative fuels, thereby reducing emissions of CO_2 and other greenhouse gases. The Secretary of the Navy has established several goals for reducing the Navy's consumption of fossil fuels:

- Mandate that energy usage, efficiency, life-cycle costs, and other such factors be part of the Navy's decision when acquiring new equipment or systems, as well as vendors' efficiency or energy policies
- Cut petroleum use by half in the Navy's fleet of commercial vehicles by 2015, by phasing in new hybrid trucks to replace older ones
- Procure half the power at Navy shore installations from alternative energy sources—including wind or solar—by 2020, and where possible, supply energy back to the grid
- Reach the point that half the energy used throughout the Navy Department, including in ships, aircraft, vehicles and shore stations, comes from alternative fuel or alternative sources by 2020; today that percentage is about 17 percent

These examples illustrate the leadership role that the Navy has in achieving energy reductions that will contribute to the national effort to mitigate global climate change.

Several recent upgrades have been made to facilities that reduce energy consumption at ARD Bayview, including converting from propane to natural gas heating in Buildings 200 and 210 in 2008, upgrading high bay lighting from T-12 and metal halide fixtures to T-8 and T-5 fluorescent fixtures in 2010, and installing new energy efficient standby generator engine block heater assemblies in 2013.

4.2.3 NOISE

Construction of the boathouses and pier along with potential future development of residences along Lake Pend Oreille would increase daytime noise levels in the short-term in the vicinity of those projects. Increases in recreational visitors would increase average noise levels during the summer months but would not be incrementally more than existing levels to result in a greater impact on biological resources or the public. Daytime noise levels would likely increase more than nighttime noise levels. Overall, cumulative increases in long-term average noise levels in the Bayview area from planned and proposed projects would not be significant. Based on information available at this time, the action alternatives are not expected to contribute to cumulative long-term average noise levels. Therefore, further analysis of cumulative impacts on noise is not warranted at this time.

4.2.4 BIOLOGICAL RESOURCES

Overall, the actions and plans described in Section 4.1 (Other Actions Analyzed in the Cumulative Impact Analysis) would benefit fish and the federally endangered bull trout through improved water quality, habitat, and protection of prey species. As described in the *Biological Assessment P207 Pier and Boathouses* (U.S. Department of the Navy 2008), with implementation of mitigation measures, the replacement of boathouses and piers within ARD Bayview may affect but would not likely adversely affect in the Scenic Bay region of Lake Pend Oreille.

Other ongoing and proposed management actions would benefit fish including the bull trout. Operation of the Albeni Falls Dam to control the outflow of the top 11 ft. of Lake Pend Oreille benefits spawning of the lake's kokanee population, a food source for bull trout. This action likely serves to increase fish abundance and suitable habitat, thus indirectly benefiting the bull trout population in Lake Pend Oreille. The implementation of the ARD Bayview INRMP enhances habitat for fish as well as kokanee salmon, and may indirectly benefit the overall bull trout population in Lake Pend Oreille. The proposed Forest Service Land Management Plan that would restore and conserve watersheds along Lake Pend Oreille would improve water quality entering the lake improving fish habitat and would further protect habitat within forest streams that are important for bull trout. The Lake Pend Oreille Bull Trout Conservation Plan would also continue to benefit the bull trout population in Lake Pend Oreille.

Impacts of the Proposed Action on fish including bull trout, would be additive to the impacts of other actions described above; however, the contribution would be small when considered relative to these other actions such as Lake Pend Oreille Water Level Management or implementation of the Bull Trout Conservation Plan. Additionally, with the implementation of best management practices detailed in the ARD Bayview INRMP (U.S. Department of the Navy 2010a), the contribution to overall impacts on fish and bull trout would be reduced.

4.2.5 SOCIOECONOMICS

The reasonably foreseeable future development in the Bayview area consists largely of new residential developments. In the short term, these projects would provide construction employment that could positively affect employment and income in Bayview. The number of new permanent jobs that would result from these projects is expected to be relatively small, as most of the anticipated projects are not

labor-intensive. Overall, foreseeable future development would have a positive, but non-significant impact on socioeconomic conditions. Based on information available at this time, the action alternatives are not expected to contribute to cumulative socioeconomic impacts. Therefore, further analysis of cumulative impacts on cultural resources is not warranted at this time.

4.2.6 AMERICAN INDIAN TRADITIONAL RESOURCES

Impacts are not expected on traditional resources because these resources have not been identified as occurring within the Study Area. As such the other past, present, and reasonably foreseeable projects, in combination with the Proposed Action, would not result in a cumulative impact on traditional resources. Further analysis of cumulative impacts on Native American Traditional Resources is not warranted. [SECTION TO BE COMPLETED ONCE TRIBAL CONSULTATIONS ARE CONCLUDED]

4.2.7 PUBLIC HEALTH AND SAFETY

The Proposed Action, in conjunction with identified cumulative projects, would not result in significant cumulative public health and safety impacts. Although recreational use of Lake Pend Oreille is likely to increase in the future, the impacts of Navy testing activities on public health and safety would not increase. With implementation of SOPs, public safety would continue to be protected. Therefore, no additive or synergistic public safety risk would exist. In conjunction with other past, present, and reasonably foreseeable projects, the Proposed Action would not result in significant cumulative public health or safety impacts. Therefore, further analysis of cumulative impacts on public health and safety is not warranted at this time.

5 OTHER CONSIDERATIONS

5.1 CONSISTENCY WITH FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND REGULATIONS

Based on evaluation with respect to consistency and statutory obligations, the Navy's Proposed Action for RDT&E at ARD Bayview does not conflict with the objectives or requirements of federal, state, regional, or local plans, policies, or legal requirements. Table 5.1-1 summarizes environmental compliance requirements that may apply.

Table 5.1-1: Summary of Environmental Compliance for the Proposed Action

Plans, Policies, and Controls	Responsible Agency	Status of Compliance
National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] §§4321, et seq.) Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 C.F.R. §§1500–1508)	Navy	This EA has been prepared in accordance with NEPA, CEQ regulations, and the Navy's NEPA procedures. The Proposed Action would not result in significant impacts.
Department of the Navy Procedures for Implementing NEPA (32 C.F.R. §775)	Navy	
Endangered Species Act (ESA) (16 U.S.C. §§1531, et seq.)	USFWS	The Proposed Action may affect, but is not likely to adversely affect ESA-listed species and would comply with applicable requirements of the ESA. An informal consultation letter dated 17 October 2014 and BA was submitted to USFWS.
Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§703–712)	USFWS	The Proposed Action does not overlap with species covered by the MTBA and would therefore not result in reasonably foreseeable takes under the MBTA.
CAA (42 U.S.C. §§7401 et seq.)	USEPA	The air quality analysis conducted for this EA indicates that the Proposed Action would not cause National Ambient Air Quality Standards to be exceeded.
Bald and Golden Eagle Protection Act (BGEPA) of 1940	USFWS	The Proposed Action does not overlap with these resources and, therefore, there would be no reasonably foreseeable takes of Bald or Golden Eagles.
EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*	Navy	The Navy has addressed requirements of EO 12898 in the EA and determined that implementation of the Proposed Action would not result in any disproportionately high and adverse human health or environmental effects on minority or low-income populations.
EO 13045, *Environmental Health and Safety Risks to Children*	Navy	The Navy has addressed requirements of EO 13045 in the EA and determined that implementation of the Proposed Action would not result in disproportionate environmental health or safety risks to children.
EO 13175, *Consultation and Coordination with Indian Tribal Governments*	Navy	With consultation with American Indian tribal governments, the Navy has addressed requirements of EO 13175.
National Historic Preservation Act	Navy/SHPO	The Navy has addressed requirements of National Historic Preservation Act in the EA and determined that there would be no effect on cultural resources with implementation of the Proposed Action.

Notes: BA = Biological Assessment, CAA = Clean Air Act, EA = Environmental Assessment, EO = Executive Order, Navy = U.S. Department of the Navy, USEPA = U.S. Environmental Protection Agency, USFWS = U.S. Fish and Wildlife Service

5.2 Irreversible or Irretrievable Commitment of Resources

NEPA requires that environmental analysis include identification of "any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented" (NEPA Sec. 102 (2)(C)(v), 42 U.S.C. §4332). Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy or minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., the disturbance of a cultural site). For the alternatives, including the Proposed Action, most resource commitments are neither irreversible nor irretrievable. Most impacts are short term and temporary or, if long lasting, are negligible. No habitat associated with threatened or endangered species would be lost as result of implementation of the Proposed Action. The Proposed Action would not modify the environment, nor would it involve the consumption of non-renewable resources, other than the use of petroleum products to operate boats and test vehicles.

Implementation of the Proposed Action would require fuels used by generators, ground vehicles, and vessels. Therefore, consumption of fuel would increase and this nonrenewable resource would be considered irreversibly lost.

5.3 Relationship between Local Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Biological Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and of the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use eliminates the possibility of other uses being performed at the site. The Proposed Action would occur on government-owned lands, either operated by the Navy or the U.S. Forest Service. The nature of activities for the Proposed Action would not differ from current uses of these areas. Therefore, implementation of the Proposed Action would not result in significant impacts on sensitive resources. As a result, it is not anticipated that the Proposed Action would result in any environmental impacts that would permanently narrow the range of beneficial uses of the environment or pose long-term risks to health, safety, or the general welfare of the public.

6 LIST OF PREPARERS

6.1 GOVERNMENT PREPARERS

Steven Armstrong, Naval Surface Warfare Center
Carderock Division, Acoustic Research Detachment

Steve Finley, Naval Surface Warfare Center
Carderock Division, Acoustic Research Detachment

Alan Griffitts, Naval Surface Warfare Center
Carderock Division, Acoustic Research Detachment

Kimberly Kler, Naval Facilities Engineering Command, Northwest

Anna Whalen, Naval Facilities Engineering Command, Northwest
Project Manager and Navy Technical Representative

Linda Wagoner, Naval Facilities Engineering Command, Northwest
Everett PWD, Environmental Division

6.2 CONTRACTOR PREPARERS

Timberley Belish (Parsons Corporation), Environmental Scientist
M.S., Ecology and Evolution, University of Pittsburgh
B.S., Biology, Gannon University

Bruce Campbell (Parsons Corporation), Environmental Scientist
M.S., Environmental Management, University of San Francisco
B.S., Environmental Biology, University of California, Santa Barbara

Laura Egendorf (ManTech International Corporation), Technical Editor
B.A., English, Wesleyan University

John LaBonte (ManTech International Corporation), Project Manager
Ph.D. Biology, University of California, Santa Barbara
B.S., Ecology, Behavior, and Evolution, University of California, San Diego

Neomi Mustain (ManTech International Corporation), Geographic Information Systems Analyst
M.S., Earth Sciences, University of California, Santa Cruz
B.A., Geography, University of California, Los Angeles

Karyn Palma (ManTech International Corporation), Technical Editor
B.A., Environmental Studies, University of California, Santa Barbara

Cheryl Quaine (Parsons Corporation), Environmental Scientist
M.S., Environmental Science, Christopher Newport University
B.S., Zoology, University of Rhode Island

Heather Turner (ManTech International Corporation), Environmental Scientist
M.A.S., Marine Biodiversity and Conservation, Scripps Institution of Oceanography
B.S., Environmental Science, University of California, Berkeley

Lawrence Wolski (ManTech International Corporation), Biologist
M.S., Marine Sciences, University of San Diego
B.S., Biology, Loyola Marymount University

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