Appendix A Biological Assessment

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Unclassified

Biological Assessment for the Expeditionary Electronic Attack Squadron Realignment and Transition at Naval Air Station Whidbey Island, Oak Harbor, Washington

Final

March 2012

Department of the Navy

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Final
Biological Assessment for the Expeditionary Electronic Attack Squadron Realignment and Transition at Naval Air Station Whidbey Island, Oak Harbor, Washington

UNITED STATES DEPARTMENT OF THE NAVY

UNCLASSIFIED

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Lead Agency:
Department of the Navy

In accordance with Chief of Naval Operations Instruction 5090.1C, Change 1

BIOLOGICAL ASSESSMENT
EXPEDITIONARY ELECTRONIC ATTACK SQUADRON
REALIGNMENT AND TRANSITION
NAVAL AIR STATION WHIDBEY ISLAND
OAK HARBOR, WASHINGTON

March 2012

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Executive Summary

This biological assessment (BA) was prepared in accordance with Section 7 of the federal Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531–1544, as amended). The document evaluates the potential impacts on fish, wildlife, and plant species protected under the Endangered Species Act (ESA) from the potential realignment and transition of the expeditionary electronic attack squadrons (expeditionary VAQ squadrons) at Naval Air Station Whidbey Island (NAS Whidbey Island), Oak Harbor, Washington.

The Navy is proposing to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft; add up to 11 EA-18G Growler aircraft to the Fleet Replacement Squadron (FRS); increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide capacity for the new personnel and aircraft. Once transition to the Growler is complete, the number of aircraft operations is projected to be greater than the current 2010 baseline operations. However, there would be no change in the training syllabus or types of operations as currently conducted by the Expeditionary VAQ squadrons (arrivals, departures, or pattern operations), the locations of aircraft operations (flight tracks over land or water), or the current ratio of daytime to nighttime aircraft operations at Ault Field. With the proposed increase in aircraft, aircraft operations could increase total annual operations by 3 percent.

The EA-6B Prowler airframe is approaching the end of its service life. Failure to replace the EA-6B Prowler legacy aircraft by 2015 would affect combat readiness, potentially resulting in interruptions to operations and accruing costs for service-life extension of the EA-6B Prowler legacy aircraft. The proposed action is needed to provide sustainable and rapidly deployable electronic attack capability for overseas land bases in the interests of national security.

This document focuses on the potential effects of the proposed action on the marbled murrelet because air operations would be conducted over this species' habitat. Potential impacts would be related to a proposed increase in the number of flight operations and noise. ESA-listed fish and marine mammal species found within the marine waters would not be impacted by any increase in operations within the airspace above those marine waters or any sound transmitted underwater from flights within the airspace above the water. Because of the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from the water column (Richardson et al. 1995). Therefore, the transition of the EA-18G Growler squadrons would not impact fish or marine mammals in the action area and are not discussed in this BA.

The height at which the marbled murrelet flies and the speed of the aircraft would be the risk factors considered when assessing the likelihood of aircraft colliding with murrelets. It is assumed that flight altitudes of murrelets over marine waters next to Ault Field would be low as they descend from these altitudes to foraging sites. Alcid flight patterns in the marine environment are often closely associated with the surface of the water (USFWS 2010). Murrelets likely have adapted this behavior of low flight heights to optimize energy expenditure (increased lift from the interaction of air currents and wave action) or to stay near the water to escape from aerial predators through diving. Although data are lacking, it is assumed that flight altitude over water is generally less than 500 feet.

As such, the likelihood of collision between a marbled murrelet and an EA-18G on any given flight is largely determined by jet speed and the flight duration within 500 feet of the water. Unlike the EA-6B, the EA-18G departing from Ault Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B (less than 10 seconds) to pass through the 0 to 500 foot range of highest collision risk.

Given the very short duration and rapid ascent of the EA-18G, the risk of collision risk is expected to be low for departing flights and lower than current operations of the EA-6B.

Approaching aircraft spend comparatively more time in murrelet airspace than departing aircraft as they descend on approach to Ault Field because they maintain lower flight altitudes and a more horizontal trajectory. As a result, arriving aircraft could pose more of a strike risk to marbled murrelets than departing aircraft.

Overall, the expected intersection of murrelet flight with the EA-18G airspace is expected to be infrequent and brief, given the murrelets low-flight patterns in the marine environment and the rapid ascent of the EA-18G from Ault Field. While there is potential for a marbled murrelet strike to occur, the risk is low, even with the planned increase in air operations associated with the transition from the EA-6B to EA-18G aircraft. Therefore, there is an extremely low likelihood of murrelet exposure to aircraft strikes and the overall risk of a strike can be discounted.

Currently, there are no studies documenting behavioral responses of marbled murrelets to aircraft noise or if they are habituated to such noise. Studies that have assessed the response of birds becoming habituated to aircraft noise have typically shown limited response. For example, the response of American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) to exposure to low-level flying military aircraft at Piney and Cedar islands, North Carolina, was assessed. Investigators determined that the cost to each species was low because disruptions represented a low percentage of their time-activity budgets, only a small proportion of birds reacted to disturbance (approximately 2 percent), and the likelihood of resuming the activity disrupted by an aircraft disturbance event was high (64 percent) (Conomy et al. 1998a). Investigators concluded that levels of aircraft disturbance recorded were not adversely affecting the time-activity budgets of selected waterfowl species wintering at these islands. A second study, considered whether habituation was a possible proximate factor influencing the low proportion of free-ranging ducks reacting to military aircraft activities in a training range in coastal North Carolina during winters 1991 and 1992. Investigators conclude that initial exposure to aircraft noise elicited behavioral responses from black ducks, although with continued exposure to aircraft noise, black ducks became habituated (Conomy et al. 1998b).

While unable to definitively describe the magnitude of the acoustic effect from the EA-18G landing and take-off on individual murrelets, it is expected that individual marbled murrelets repeatedly exposed to the noise of the EA-18G taking off and landing could suffer incremental, deleterious effects as adrenal hormones, neurotransmitters, or immuno-cytokines released in response to this noise stressor. However, regardless of the response, it would be for a relatively short duration (up to 60 seconds) and because individuals in the area would become habituated to the noise, combined with noise from other ongoing air operations at the Naval Air Station Whidbey Island, noise is unlikely to have a significant long-term effect on an individual's fitness.

Because of the difference in the acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from entering the water column; therefore, there would be no indirect effect on foraging habitat or reduction in the primary food stocks of marbled murrelets.

The project would create new impervious surface, approximately 9,200 square feet, generating approximately 123,800 gallons of rainfall runoff per year. The 9,200 square feet would include a stand-alone facility next to the existing flight simulator building. The proposed flight simulator building is on upland terrain, avoiding wetlands. Storm water runoff for the proposed construction, renovation, and modifications would be contained in existing storm water detention facilities, which have capacity to hold

the runoff from the small area of proposed impervious surface. Best management practices along with utilizing the existing Ault Field drainage system, which includes oil/water separators throughout the airfield, would be used to maintain the existing water quality. Construction would adhere to existing National Pollutant Discharge Elimination System requirements for storm water and sediment control. This would prevent degradation of water quality in marine waters surrounding the installation, thereby avoiding impacts on the aquatic habitat of ESA-listed species.

The Navy has concluded from the information provided in this BA that the proposed action may affect, but is not likely adversely affect and is not likely to jeopardize, the continued existence of the marbled murrelet found within the action area.

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Acronyms and Abbreviations

AGL	above ground level
BA	biological assessment
BO	biological opinion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB	decibel
dBA	decibel A-weighted
DNL	day-night average sound level
DPS	distinct population segment
ESA	Endangered Species Act
ESU	evolutionary significant unit
FRS	fleet replacement squadron
km	kilometer
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NWTRC	Northwest Training Range Complex
SEL	sound exposure level
U.S.C.	United States Code
U.S. Navy	United States Department of the Navy
USFWS	United States Fish and Wildlife Service
VAQ	expeditionary electronic attack squadrons

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1. Introduction

1.1 Background

This biological assessment (BA) analyzes the realignment and transition of the expeditionary electronic attack squadrons (expeditionary VAQ squadrons) at Naval Air Station Whidbey Island (NAS Whidbey Island), Oak Harbor, Washington (Figure 1-1). The purpose of the BA is to examine the effect of the proposed action on threatened and endangered species and to determine whether the proposed action will degrade or adversely modify designated critical habitat.

This BA was prepared in accordance with Section 7 of the federal Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] 1531–1544, as amended) and used the best scientific and commercial information available to assess the risks posed to the listed species and/or critical habitat(s) if the proposed action were to be implemented. The ESA requires that federal agencies "ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destructive or adverse modification of critical habitat of such species." The purpose of the ESA is to provide a means for conserving the ecosystem upon which threatened and endangered species depend and to provide a program for protecting these species.

Section 7(a)(2) of the ESA implementing regulations requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), collectively known as "the services," regarding species protected under this act. The USFWS has jurisdiction over bull trout and all listed wildlife and terrestrial plant species, while NMFS oversees listed marine mammals, sea-based fish species, and several anadromous salmonid species.

This BA constitutes the U.S. Department of the Navy's analysis of potential effects on species protected under the ESA, as required by Section 7(a)(2) of the ESA implementing regulations.

The purpose of the BA is to:

- Meet the requirements of the ESA and the National Environmental Policy Act (42 U.S.C. 4321 et seq., implemented at 40 Code of Federal Regulations [CFR] parts 1500–1508).
- Evaluate the effects of the proposed action on listed species and/or their critical habitat that are known to be or could be present within the action area.
- Specify mitigation and conservation measures, as needed, for populations of listed species that occur in and around NAS Whidbey Island.

The ESA defines an *endangered species* as a species that is in danger of extinction throughout all or a major portion of its range. A *threatened species* is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a major portion of its range. *Critical habitat* is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the USFWS or NMFS under the ESA.

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Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006;
NAS Whidbey Island, 2007.

Figure 1-1
Project Vicinity
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

1.2 Consultation History

On December 2, 2010, representatives from the Navy met with representative from the USFWS at the USFWS offices in Lacy, Washington. In addition, representatives from the Navy participated via telephone.

The USFWS expressed concern regarding the potential impact that changes to the VAQ may have on the marbled murrelet. According to the USWFS, the population of marbled murrelets in Puget Sound has decreased by 7.2 percent since 2009 and by almost 40 percent since 2001. The USWFS identified two stressors to marbled murrelet: potential impacts from acoustics and the risk of air strike. Of the two stressors, the USFWS acknowledged that acoustic impact was of more concern; in particular, a departing aircraft increases the risk of acoustic impacts more than its approach. The USFWS requested a sound analysis on how much surface area (over water) would be impacted by a single noise event.

The USFWS identified the need to evaluate marbled murrelet use of water, land/water, and land. The USFWS indicated that the risk of an aircraft strike could be greater during approach than departure, with the greatest likelihood of a strike at 500 feet or below, over marine waters. The USFWS referred to the U.S. Pacific Fleet's Northwest Training Range Complex in the Northern Pacific Coastal Waters off the States of Washington, Oregon and California and Activities in Puget Sound and Airspace over the State of Washington Biological Opinion (NWTRC BO; USFWS 2010) as a source of information on approximate aircraft flight elevations to and from Whidbey Island, and the (potential) interaction aircraft may have with murrelets in the area.

On December 8, 2011, representatives from the Navy met with the USFWS at the USFWS offices in Lacy, Washington. In addition, members from the Navy participated via telephone. The intention of this meeting was to provide the USFWS an updated description of the proposed action. The USFWS agreed that, due to the short duration of aircraft operations below 500 feet above ground level (agl), the bird strike hazard due to the proposed action can be discounted. The supporting analysis for this finding is detailed in the NWTRC BO (USFWS 2010).

The Navy discussed the current noise modeling effort and highlighted the data available from the model that could support the impact analysis. The USFWS explained that there is not a lot of detailed information available on the effects of acoustical disturbance from aircraft operations on the marbled murrelet and reiterated that this BA should consider the findings of the BO that the USFWS issued on the Explosive Handling Wharf project (USFWS 2011a).

The USFWS also explained that historically 92 decibels (dBA) sound exposure level (SEL) has been established as the disturbance threshold for airborne noise for the marbled murrelet (USFWS 2010, 2011a). The BO for the Explosive Handling Wharf stated the USFWS has previously evaluated the effects of sound-related disturbance in the terrestrial environment and determined that marbled murrelets could be adversely affected by sounds above 92 dBA (Livezey et al. 2007 *as cited in* USFWS 2011a). However, the USFWS acknowledged that there are no known studies or data available that evaluate the response of marbled murrelets (or other alcids) to elevated in-air sound in the marine environment. For projects in the marine environment, the USFWS assumes that marbled murrelet response to above-ambient sounds on the water is similar to those expected in the terrestrial environment.

Therefore, the USFWS would like to see a 92 dB SEL contour for air operations at Ault Field as well as an analysis of the frequency and duration of aircraft operations at > 92 dBA SEL. The USFWS requested the Navy's analysis consider the potential effects of the changes in aircraft operations as well as what effect long-term habituation to these noise events may have on the marbled murrelet.

1.3 Project Description

NAS Whidbey Island is located in Island County, Washington, on Whidbey Island in northern Puget Sound (Figure 1-1). The air station is in the north-central part of the island, adjacent to the town of Oak Harbor, and is divided into four distinct parcels: Ault Field, Lake Hancock, Outlying Landing Field Coupeville, and the Seaplane Base. The proposed action would occur at Ault Field, the training and operational center of NAS Whidbey Island. The remaining three parcels would not be affected by the proposed action and are therefore not discussed further.

NAS Whidbey Island has supported the expeditionary VAQ community for more than 30 years. It is currently home to VAQ squadrons operating the EA-6B Prowler and EA-18G Growler, maritime patrol squadrons and a reserve squadron operating the P-3 ("Orion"), fleet air reconnaissance squadrons operating the EP-3E ("Aries"), a C-9 squadron, and H-60 search-and-rescue helicopters.

The Navy proposes to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft; add up to 11 EA-18G Growler aircraft to the fleet replacement squadron (FRS); increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide more space for the new personnel and proper configuration for the new aircraft.

The EA-18G Growler is a variant of the F/A-18F ("Super Hornet") strike-fighter aircraft, equipped with the same electronic weapons systems as the EA-6B Prowler. The primary types of mission training and readiness requirements for the EA-18G Growler are nearly identical to those for the EA-6B Prowler.

The EA-6B Prowler airframe is approaching the end of its service life. Failure to replace the EA-6B Prowler legacy aircraft by 2015 would affect combat readiness, potentially resulting in interruptions to operations and accruing costs for service-life extension of the aircraft. The proposed action is needed to provide sustainable and rapidly deployable electronic attack capability to overseas land bases in the interest of national security. The EA-18G are airborne electronic attack aircraft capable of suppressing enemy air defenses in support of strike aircraft and ground troops by interrupting enemy electronic activity and obtaining tactical electronic intelligence within the combat area. As the nation's only operational airborne electronic attack assets, these very unique Navy aircraft and their highly trained flight crews are low-density-high demand strategic national assets that have and continue to provide an essential umbrella of protection to U.S. and coalition ground forces while on deployment.

Building Facilities

The proposed action would provide the facilities and functions necessary to retain the expeditionary VAQ mission at NAS Whidbey Island and to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft. Each expeditionary VAQ EA-18G Growler squadron would consist of five aircraft; each existing EA-6B Prowler squadron includes four aircraft. In addition, the existing FRS (VAQ-129) would gain additional aircraft. In order to maintain expeditionary VAQ capability, the squadrons must transition to the EA-18G Growler by 2015. To achieve this, the Navy is proposing that the EA-6B squadrons remain operational at NAS Whidbey Island and transition to the EA-18G beginning in 2012 at a rate of about one squadron per year through 2014.

NAS Whidbey Island does not currently have adequate hangar space, flight line electrical distribution systems, or capacity in the flight simulators to support up to four EA-18G Growler squadrons. An environmental assessment (EA) is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR1500-1508); Navy procedures for implementing NEPA (32 CFR 775); and the Chief of Naval

Operations Instruction, OPNAVINST 5090.1C Change 1 to assess the potential environmental impacts associated with the Navy's proposed action to realign and transition up to four expeditionary VAQ squadrons from EA-6B (Prowler) aircraft to EA-18G (Growler) aircraft at NAS Whidbey Island. The proposed action includes expansion of the flightline electrical distribution system and construction, renovation, or modification of the following facilities and functions (see Figure 1-2). Potential impacts on ESA-listed species were based on the maximum construction footprint and air operations:

Hangar 10 (Building 2699). An approximately 32,500-square-foot addition to Hangar 10 would be constructed; this addition may connect Hangar 10 with Hangar 8 (Building 2642), but this is unlikely. Hangar 10's auxiliary buildings R-42, R-55, R-56, and 2705 would be demolished. Hangar 10's auxiliary buildings 2893 and 2894 would be relocated. The Hangar 10 addition would have aircraft power utilities (400 Hz) and would include secure spaces for mission planning, briefing, and debriefing functions. All construction would occur on existing impervious surface.

Flight Simulator Building (Building 2593). An approximately 9,200-square-foot building would be constructed next to the existing flight simulator building. This building would provide space for four additional tactical operational flight training systems and increase the overall amount of impervious surface at NAS Whidbey Island by 9,200 square feet.

Hangar 12 (Building 2737). An addition of up to 25,200 square-feet to Hangar 12 may be constructed. This construction would occur on an existing impervious surface.

Fewer officers and enlisted personnel would be required per EA-18G Growler squadron than are currently required per EA-6B Prowler squadron. The Naval Air Technical Training schoolhouse force structure is estimated to increase by five instructors and 20 additional students per year. The Electronic Attack Weapons School would add six officers and two enlisted personnel to fully staff the requirements.

Aircraft Operations

Ault Field includes both fixed- and rotary-wing aircraft operations. NAS Whidbey Island provides land-based support and training for all of the Navy's active duty EA-6B Prowler and EA-18G Growler aircraft squadrons and the Pacific Fleet P-3C (being replaced by P-8A MMA beginning in 2012). The air station serves as host to two air wings (Electronic Attack Wing Pacific and Patrol and Reconnaissance Wing Ten), a Fleet Logistics Support squadron, and NAS Whidbey Island Search and Rescue. The EA-18G and P-3C (to be replaced by P-8A MMA) aircraft platforms are the predominant aircraft flown at NAS Whidbey Island and are operated by Electronic Attack Wing Pacific and Patrol and Reconnaissance Wing Ten, respectively. The station also supports a Navy Reserve P-3C and C-9 squadron in addition to the air station's MH-60S search-and-rescue helicopters.

The airfield at Ault Field consists of two intersecting runways, Runway 07/25 and Runway 14/32. Both runways are 8,000 feet long and 200 feet wide. Ault Field is open 7 days per week, 24 hours per day. Runways 25 and 14 are the most frequently used runways at the station because of the prevailing wind direction and noise abatement procedures. Approximately 44 percent of the airfield operations are assigned to Runway 25, and 36 percent of the airfield operations are assigned to Runway 14. Runways 07 and 32 are used less frequently; 13 percent of the airfield operations are assigned to Runway 07, and 7 percent are assigned to Runway 32.

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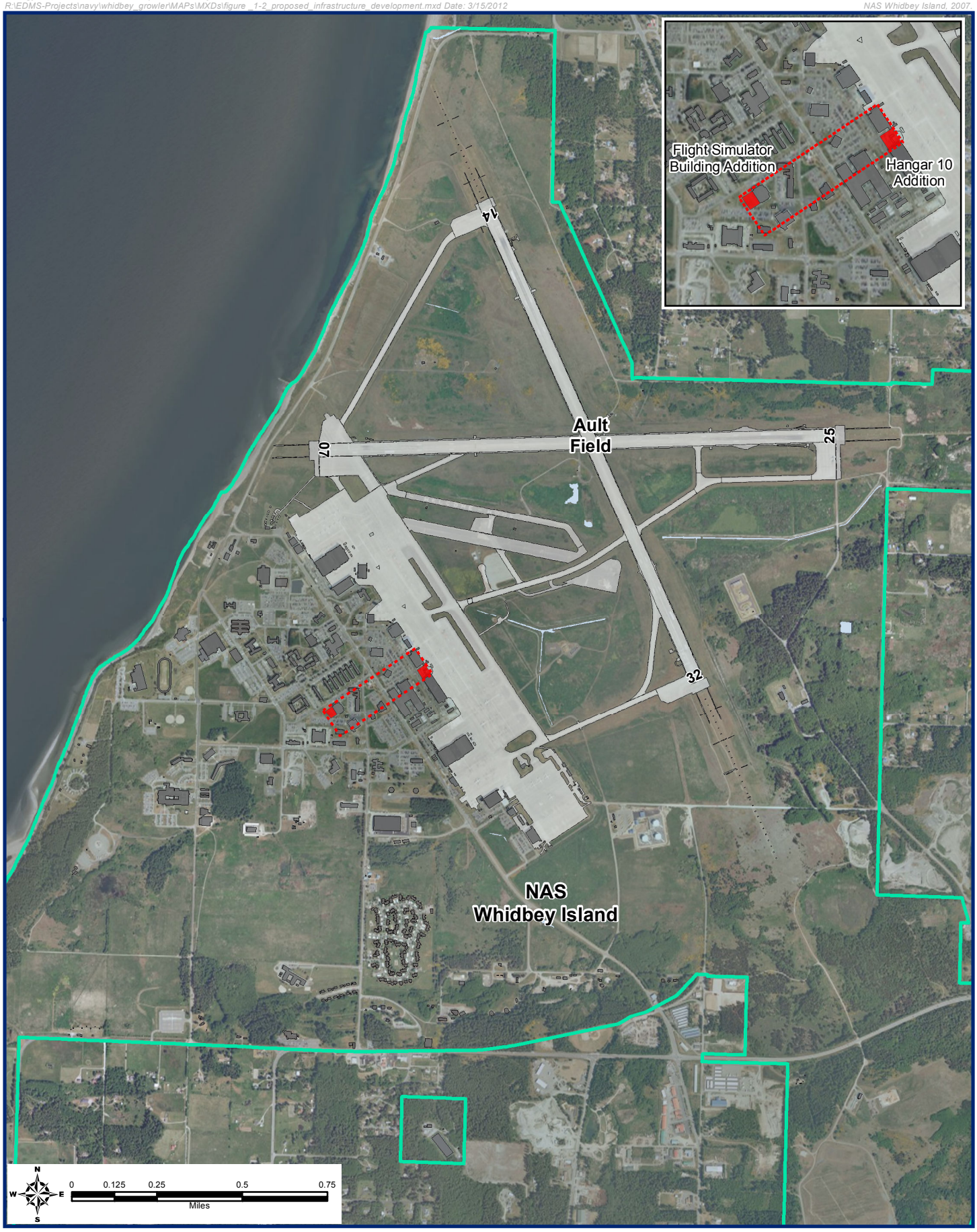
Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006;
NAS Whidbey Island, 2007.



Project Area
Construction
Runway and Airfield Surface Area
Building
NAS Whidbey Installation Area

Figure 1-2
Proposed Infrastructure Development Around Ault Field
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

In 2011, pilots performed approximately 70,600 aircraft operations (i.e., any takeoff or landing) annually at Ault Field (Wyle Laboratories, Inc. March 2012). Total operations performed by the transitioned and realigned expeditionary VAQ squadrons could increase the total annual operations at NAS Whidbey Island by about 3 percent, or approximately 2,180 EA-18G operations, once the installation has fully transitioned to the EA-18G, to a total of 72,735 aircraft operations. Of these total operations, approximately 19,000 currently conducted by EA-6B aircraft would be conducted by the EA-18G. However, there would be no change in the training syllabus or types of operations as currently conducted by the expeditionary VAQ squadrons (arrivals, departures, or pattern operations); the locations of aircraft operations (flight tracks over land or water); or the current ratio of daytime to nighttime aircraft operations at Ault Field.

Aircraft Noise

Noise exposure for military and commercial airfields is typically calculated using the day-night average sound level (DNL). The DNL noise metric is based on the number of operations that occur on an average annual day over a 24-hour period. The DNL metric includes a 10 dB penalty for nighttime operations (10:00 p.m. to 7:00 a.m.) because people are more sensitive to noise during normal sleeping hours, when ambient noise levels are lower. The DNL has been determined to be a reliable measure of community annoyance with aircraft noise and has become the standard metric used by many federal and state governmental agencies and organizations in the United States, such as the U.S. Environmental Protection Agency and the Federal Aviation Administration, for assessing aircraft noise. The DNL takes into account both the noise levels of all individual events that occur during a 24-hour period and the number of times those events occur. DNL noise zones have historically been used as the noise metric for NAS Whidbey Island.

The 24-hour averaged DNL noise zones are predominantly used to gauge noise impacts on the human environment. To better gauge impacts from single noise events on the natural environment, the SEL is used. SEL is an integrated noise metric representing all of the sound energy of a single noise event (in this case, a single aircraft overflight) but averaged to a duration of one second. Because it combines level and duration, SEL represents the best metric to compare noise levels from individual overflights.

In order to compare the representative noise of both the EA-6B and EA-18G, Table 1-1 shows representative SEL noise values for both aircraft for the four loudest types of operations and flight tracks at NAS Whidbey Island.

Table 1-1 Single-Event Sound Levels 500 Feet Offshore of NAS Whidbey Island

Aircraft Type	Closest Runway End	Distance from Shoreline (feet)*	Aircraft Altitude (ft MSL)	Example Flight Tracks	Description	Maximum SEL (dBA)
EA-6B	25	500	750	25D1	Standard Departure	133
			337	07G1	Arrival to Runway 07	128
	31	500	900	31D1	Standard Departure	130
			401	13TN2	Arrival to Runway 13	124
EA-18G	25	500	1,622	25D1	Standard Departure	115
			340	07G1	Arrival to Runway 07	127
	31	500	2,163	31D1	Standard Departure	110
			400	13TN2	Arrival to Runway 13	127

** on extended runway centerline*

EA-6B SELs range between 121 and 133 dB. EA-18G SELs range between 104 and 127 dB. For the arrival portions, the two aircraft are similar in SEL, as their differences are 3 dB or less, with the EA-18G having the greater SEL for arrivals from patterns to Runway 13. However, for departures from Runway 25 or 31, the EA-6B has SELs 18 to 23 dB greater than the EA-18G, primarily due to the lower altitude climb-out profile of the EA-6B.

The primary reason for the difference is that the EA-18G is a more powerful aircraft than the EA-6B, with a faster climb rate upon departure. Compared with the older EA-6B along the same flight track, the higher altitude of the EA-18G causes a reduction of between 18 to 23dB SEL upon departure. Even though the total operations would increase by 3 percent, the comparable overall noise exposure would decrease because on a single event basis the EA-18G SEL is on average 2 to 8 dB less than the EA-6B SEL for most types of operations.

A much smaller difference in sound exists during the approach phases of each aircraft. Upon arrival, the requirements for similar approach altitudes for both aircraft result in a much smaller differential in the SEL values. Since the flight profiles for both aircraft have similar altitudes for a given flight track, the EA-18G is between 1 dB SEL quieter, to 3 dB SEL louder, depending on the specific flight track (see Table 1-1).

How noises and human presence disturb nesting murrelets is not well known. There are few data concerning the murrelet's vulnerability to disturbance effects, except anecdotal researcher observations that indicate murrelets typically exhibit a limited, temporary behavioral response to noise disturbance at nest sites and are able to adapt to auditory stimuli (USFWS 2010). As such, the USFWS has previously evaluated the effects of sound-related disturbance in the terrestrial environment and determined that sea-based marbled murrelets could be adversely affected by sounds above 92 dBA.

As discussed in Section 1.2, during initial consultation with USFWS personnel, the agency requested that the Navy use the 92-dB SEL noise contour as the disturbance threshold for airborne noise for the marbled murrelet. Figure 1-3 shows the 92-dB SEL noise contours for the EA-18G for each of the representative flight tracks identified in Table 1-1. Both the EA-6B and EA-18G spend up to 20 seconds within the 92 dB SEL contour upon departure and up to 60 seconds upon arrival. The Proposed scenario would increase the number of average daily departure and arrivals exceeding 92 dB SEL by 20 percent (one event) to approximately six average daily events each. The Proposed scenario would not change the number of pattern flight operations exceeding 92 dB SEL by more than one event per day.

For a full discussion on air operations, flight tracks, and noise modeling please refer to Appendix A.

1.4 Impact Avoidance and Minimization Measures

Currently, take-off and landing flight tracks around Ault Field, particularly to the south-southeast, are over noise-sensitive areas (e.g., Oak Harbor). Accordingly, noise abatement procedures that dictate that "aircrews shall, to the maximum extent possible, employ prudent airmanship techniques to reduce aircraft noise impacts and to avoid noise sensitive areas" (U.S. Department of the Navy 2002) are implemented. When approaching Ault Field, weather depending, the EA-18G Growler ceiling is at least 2,300 feet agl at 3 miles visibility, although this may drop to 800 feet agl during cloud cover. And if necessary, when in a holding pattern, aircraft would be in pattern at 2,000 agl.

Aircraft departing from Ault Field typically require a rapid ascent at takeoff, with aircraft spending little time (up to approximately 10 seconds) in the 0 to 500 foot range (identified by the USFWS on December 2, 2010 as the highest potential elevation range for collision). Flight profiles for aircraft departing Runway 07 at NAS Whidbey Island indicate aircraft would reach 1,500 feet agl before passing over

marine waters (Wyle 2012). This noise abatement procedure would result in sound pressure levels for departing air operations from Ault Field to be less than 110 dB SEL in marine waters where murrelets occur.

Storm water discharges can transport sediment and contaminants that degrade water quality and adversely affect fish and other aquatic/marine species and their habitat. The proposed construction, renovation, and modifications would create approximately 9,200 square feet of new impervious surface (the addition to the flight simulator building), increasing storm water runoff in the project area by approximately 123,800 gallons of rainfall runoff per year. All other development would occur on existing impervious surface, and would thus not increase the current level of storm water runoff in the area.

Because of the relatively small increase in impervious surface compared with the currently existing impervious surface at the base, storm water runoff would be contained in existing detention facilities. Best management practices (e.g., the use of bioswales and on-site drainages) and use of the existing Ault Field drainage system, which includes oil/water separators throughout the airfield, would maintain the existing water quality. Construction activities would adhere to existing National Pollutant Discharge Elimination System (NPDES) requirements for storm water and sediment control. This would prevent degradation of water quality in marine waters surrounding the installation, thereby avoiding impacting aquatic habitat and ESA-listed species using these habitats. Because ESA-listed marine species, including fish and marine mammals, would not likely be directly or indirectly impacted by storm water, storm water is not discussed further.

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Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006;
NAS Whidbey Island, 2007.

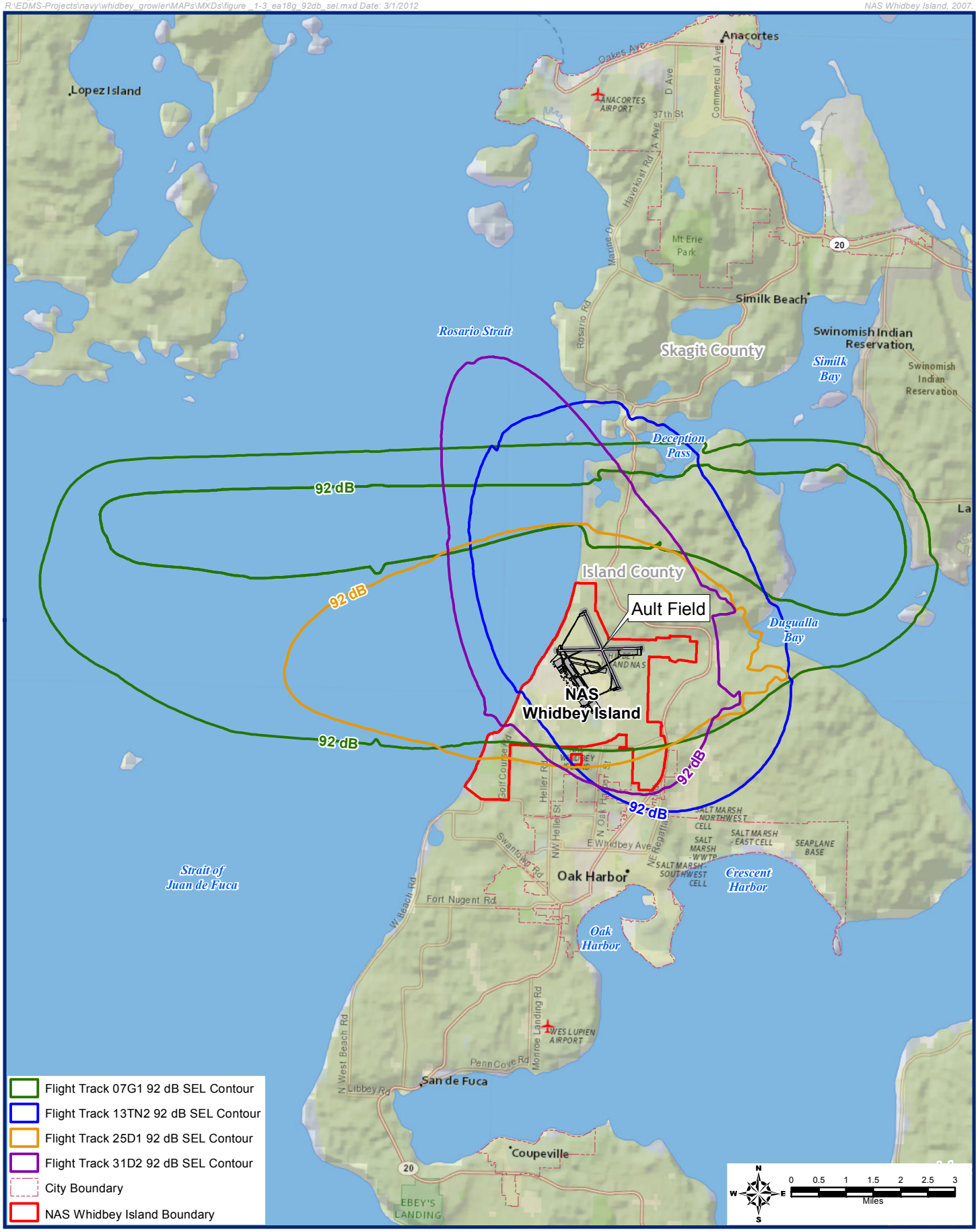

Figure 1-3
92 dB SEL Contours for Selected EA-18G Flight Tracks
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

1.5 Action Area

The action area is defined in the ESA as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). For this proposed Navy action, the action area is defined the 92 dBA SEL noise contour created by the EA-18G (Figure 1-4). This area includes the area of proposed construction, renovation, and modification of facilities; aircraft noise zones; and the imaginary surface between aircraft take-off and a 2,000-foot elevation.

The action area was estimated based on the following stressors:

- **Acoustic:** EA-18G Growler departures and approaches from and to NAS Whidbey Island would result in elevated sound levels (above-ambient conditions) below 2,000-feet elevation and within the 92 dB SEL threshold.

- **Strike Risk:** Changes in aircraft operations from aircraft departing and/or approaching NAS Whidbey Island below the 2,000-foot elevation may increase the potential for bird aircraft strike hazard, particularly with marbled murrelets.

The change in the types of aircraft operations could result in an increase in total annual operations of up to 3 percent over baseline conditions. Projected operations would consist primarily of direct arrivals and departures, with touch-and-go and ground control approach patterns the remaining operations.

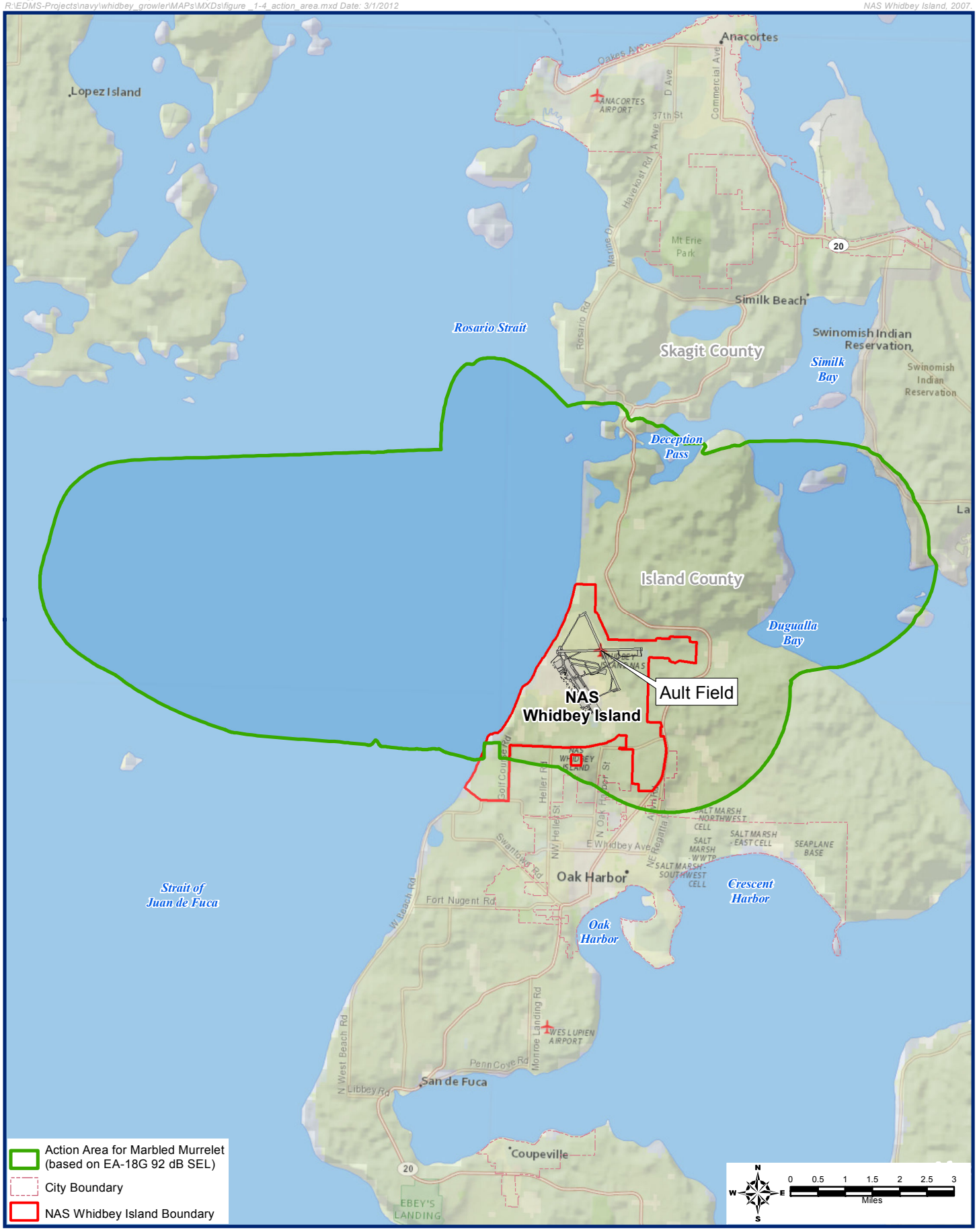

Figure 1-4
Action Area
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

2. Status/Presence of Listed Species and Designated Critical Habitat in the Action Area

2.1 Species and Critical Habitat(s) and Listing Status

According to the USFWS website[1], three listed species occur in Island County and may occur on or around NAS Whidbey Island: Golden Indian paintbrush (*Castilleja levisecta* [threatened]), marbled murrelet (*Brachyramphus marmoratus* [threatened]), and Coastal/Puget Sound distinct population segment (DPS) of bull trout (*Salvelinus confluentus* [threatened]) (USFWS 2011b).

Lists of threatened or endangered marine species that potentially occur within the action area were obtained from the NMFS website[2] (also see Appendix B). According to the NMFS, the following fish species may occur in the action area: Bocaccio DPS (*Sebastes paucispinis* [endangered]), canary rockfish DPS (*S. pinniger* [threatened]), yelloweye rockfish DPS (*S. ruberrimus* [threatened]), Puget Sound chinook salmon evolutionary significant unit (ESU) (*Oncorhynchus tshawytscha* [threatened]), Puget Sound steelhead ESU (*O. mykiss*[threatened]), southern eulachon DPS (*Thaleichthys pacificus* [threatened]), and the southern North American green sturgeon DPS (*Acipenser medirostris* [threatened]), humpback whale (*Megatera novaengliae* [endangered]), southern resident killer whale (*Orcinus orca*[endangered]), and the Steller sea lion (*Eumetopias jubatus* [threatened]).

No populations or individual occurrences of the golden Indian paintbrush have been identified on Ault Field. Furthermore, no suitable habitat to support the species occurs within the proposed construction area. Consequently, the proposed action would have no effect on this species, and it will not be discussed further in this document.

Aircraft overflights produce airborne noise, and some of this energy may be transmitted into the water. However, due to the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from entering the water column, as noise from atmospheric sources do not transmit well underwater (Richardson et al. 1995). Furthermore, the sound levels created by an aircraft would decline at increasing lateral distances from the aircraft's track or location and with increasing depth in the water. The underwater sounds, if any, propagated from the aircraft would decline rapidly after the aircraft has passed. It is unlikely that these airborne sound levels would cause physical damage or even behavioral effects on ESA-listed fish or marine mammals in waters off of Ault Field because these airborne sound levels have not been found to cause adverse effects on in-water species (Popper 2003; U.S. Department of the Navy 2008). Consequently, the proposed action would have no effect on these species, and they will not be discussed further in this document.

2.2 Marbled Murrelet

Of the ESA-listed species listed as occurring in and/or around Island County, the marbled murrelet is the only species that may be impacted by the proposed action.

Life History

This small alcid (less than 10 inches long) nests in either forested or rocky areas, depending on their location within its range. More specifically, the species breeds in forested areas on sea-facing slopes, cliffs on islands, and cliffs along the coast (Nelson 1997). During the breeding season, the murrelets are

[1] http://www.fws.gov/wafwo/speciesmap_new.html
[2] http://www.nwr.noaa.gov/Species-Lists.cfm

typically bound to their nesting sites. After breeding and during winter, marbled murrelets tend to disperse and move farther offshore. The highest concentrations of murrelets still tend to occur close to shore and within protected waters.

In Washington State, the marbled murrelet breeds exclusively in forested habitats (Nelson 1997). Within these habitats, the optimal habitat for the marbled murrelet includes:

- Greater number of potential nest platforms,
- Greater percentage of moss on dominant trees (trees 32 inches in diameter or larger),
- Lower density of moss on dominant trees (as compared to a randomly chosen site in the same habitat),
- Low elevation, and
- Presence of old-growth western hemlock (*Tsuga heterophylla*).

This species ranges from Alaska to western central California (Santa Cruz County), occurring mainly within 3 miles of shore. Distribution can vary due to coastline topography, river plumes, the presence of coastal forest, and season (Falxa et al. 2009). Presence of these birds within Washington State decreases with increasing stand elevation, distance inland, lichen cover, and canopy cover (Nelson 1997).

The marbled murrelet is considered an opportunistic feeder rather than a specialist, consuming prey that is most readily available at different times of the year. The marbled murrelet's foraging patterns vary seasonally. In the summer, it forages within 3 miles of the shore, generally preferring shallow water that is usually less than 200 feet deep. The foraging activity during this time is highest in areas of upwelling, shallow banks, mouths of bays, narrow passages between islands, over underwater sills, and within kelp beds. Winter foraging habitat is similar to summer foraging habitat. Murrelet individuals typically forage in stratified waters (e.g., tidal rips or river mouths) within 3 miles of the shore (Nelson 1997).

During summer, marbled murrelets in Puget Sound primarily forage on Pacific sand lance (*Ammodytes hexapterus*), Pacific herring (*Clupea pallasii*), and surf smelt (*Hypomesus pretiosus*) (Penttila 2007). In winter, their dominant prey includes krill (*Euphausia pacifica*), mysid shrimp (*Americamysis bahia*), amphipods, and Pacific herring (Nelson 1997).

Critical Habitat

Critical habitat was designated for the marbled murrelet in 1996, and includes approximately 1.5 million acres in Washington State. However, no lands/waters on or near Ault Field are designated as critical habitat.

Population Distribution in Washington State

There are two Conservation Zones for murrelets in Washington: Conservation Zone 1 includes the Strait of Juan de Fuca, Hood Canal, and the San Juan Islands; and Conservation Zone 2 includes the outer Washington coast. The proposed action would occur within Conservation Zone 1.

Marbled murrelets are distributed throughout the inland marine waters of Washington during the summer, with higher concentrations in the San Juan Islands, north Hood Canal, and the south coast of the Strait of Juan de Fuca. In the winter, there is a shift in concentration toward the more protected waters of the San Juan Islands, Hood Canal, Discovery Bay, Saratoga Passage, and Port Townsend (Strachan et al. 1995).

Presence at NAS Whidbey Island

According to a five-year review completed by the USFWS in 2009, the national marbled murrelet population has been declining (between 2.4 percent and 4.3 percent annually) (USFWS 2009). In the

Puget Sound region of northwest Washington State, the population estimate of marbled murrelets is 5,623 individuals (Falxa et al. 2009). This population has declined by 7.4 percent annually from 2001 to 2010 (WDFW 2011a). Previous monitoring data showed that the average density of marbled murrelets within the inland waters of Puget Sound was 11.78 per square mile in areas close to shore and 2.33 per square mile offshore (U.S. Department of Agriculture 2007).

Furthermore, surveys during the 2003 breeding season along the inner coastline of Whidbey Island (including Crescent Harbor) found that marbled murrelet densities were 3.7 per square mile (Miller et al. 2006), with marbled murrelets likely to occur in Crescent Harbor and Floral Point throughout the year because these alcids were also observed in these areas during winter (Nysewander et al. 2005; Falxa et al. 2009). Although this species has been observed foraging in the waters off Ault Field (U.S. Department of the Navy 2005), observations of murrelets at NAS Whidbey Island have been infrequent. This is further supported by the Washington Department of Fish and Wildlife's Priority Habitat and Species database, which indicated that marbled murrelets are not present in the action area (U.S. Department of the Navy 1996; WDFW 2011b).

Marbled murrelets preferred habitat type, old-growth coniferous forests near coastal areas, which only occurs in small patches at NAS Whidbey Island. None of these small patches have been identified as supporting marbled murrelet nesting (U.S. Department of the Navy 2005). Also, no marbled murrelet occupancy sites are currently known to be present at Ault Field.

3. Environmental Setting

3.1 Habitat Conditions in Action Area

As described in Section 1.5, the action area for this project area is defined the 92 dBA SEL noise contour created by the EA-18G, including the imaginary surface between aircraft take- off and a 2,000-foot elevation.

The flightline area at Ault Field contains paved surfaces, maintained lawn, and landscaped areas with a limited amount of suitable habitat for wildlife. Additional habitats at Ault Field include grasslands, wet meadows, forests, coastal bluffs, beaches, dunes, freshwater wetlands, and marine and riparian habitats. The grasslands at Ault Field have little structural diversity and provide little habitat niches for relatively few wildlife species. Similarly, the wet meadows at Ault Field lack structural diversity and the hydrologic regime necessary to provide surface water year-round and thus attracts fewer species than areas with more complex wetland systems and deeper marsh and open water components. Wildlife that would be present in the Ault Field habitats includes migratory waterfowl, neotropical migratory songbirds, raptors, small burrowing mammals, and reptiles.

The Ault Field drainage ditches are approximately 2 to 10 feet wide with similar depth ranges. The ditches are periodically maintained and a major dredging project was completed in the mid-1990s to remove accumulated sediment and vegetation. The drainage channels are presently lined with emergent wetland and riparian vegetation or have exposed soil substrate. Some larger vegetation and debris are also present but are generally restricted to sections of the channels away from the runways. Vegetation undertakes are removed to reduce habitat that would attract birds that present a bird-aircraft strike hazard. Channel profiles of the airfield ditch system are generally smooth but do include several culverts, oil/water separators, and concrete baffle barriers in locations throughout the airfield (PWA, Inc. 2008).

The highest diversity of wildlife species at Ault Field occurs in the southwest portion of the installation, in the vicinity of Rocky Point. This area contains stands of mature forest, coastal bluffs, beach strand, native dune vegetation, and a large freshwater wetland. The Washington Department of Natural Resources has identified an approximately 1-mile-long coastal spit with native vegetation in this area as a significant native terrestrial plant community. It is dominated by three communities: dune wildrye, big-headed sedge, and sea thrift (U.S. Department of the Navy 1996).

Most streams in Island County are small, short coastal tributaries that flow intermittently due to precipitation patterns, lack of snow accumulation, soil conditions, and topography. They tend to be shallow, with relatively low discharge and reduced flows during the summer when precipitation is low. Wetlands and groundwater springs provide the headwaters and base flows. Low flows can cause salmon to be stranded; limit or impede salmon migration; and contribute to a decrease in dissolved oxygen, an increase in water temperature, and an increase in the concentration of pollutants. Furthermore, culverts, tide gates, dikes, and dams along many of these streams impede or prevent fish passage. Low flows and temperature also function as barriers to fish passage during certain times of the years, particularly during the summer.

Marine habitats are located on the western boundary of Ault Field and comprise intertidal and subtidal areas. Numerous marine fishes, terrestrial and aquatic mammals, and invertebrates occur on beaches and in adjacent waters associated with these habitats; however, there is no access to freshwater spawning and rearing habitats along the shores of Ault Field for anadromous species (U.S. Department of the Navy 2007).

Land adjacent to NAS Whidbey Island within Island County is rural, with large tracts of undeveloped forestland, agricultural land, and scattered residential subdivisions. Two state parks are located within a 2-mile radius of NAS Whidbey Island. Deception Pass State Park is located approximately 1 mile to the north of NAS Whidbey Island. Habitat at this state park includes old-growth forests, wetlands, sand dunes, cliffs, and freshwater and saltwater shoreline (Washington State Parks and Recreation Commission 2011a). Joseph Whidbey State Park is adjacent to the southwest boundary of NAS Whidbey Island and contains saltwater shoreline and forest (Washington State Parks and Recreation Commission 2011b).

4. Effects of the Action

This section is based on procedures listed in the *Consultation Handbook: Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act* (U.S. Fish and Wildlife Service and National Marine Fisheries Service March 1998).

4.1 Determination of Effects

This section discusses potential beneficial actions, direct and indirect actions, interdependent and interrelated actions, and actions unrelated to the proposed action that may result in cumulative effect as a result of the proposed action. (For a more detailed discussion of types of effects, see U.S. Fish and Wildlife Service and National Marine Fisheries Service March 1998). These effects are defined as follows:

- **Beneficial** – Effects of an action that are wholly positive, without any adverse effects on a listed species or designated critical habitat. Determination that an action will have beneficial effects is a "may affect" situation.

- **Direct** – The direct or immediate effects of the project on the species or its habitat. Direct effects result from the agency action, including the effects of interrelated actions and interdependent actions.

- **Indirect** – Effects caused by or resulting from the proposed action that occur later in time and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action.

- **Interrelated and Interdependent** – Effects that result from an activity that is part of the proposed action and depends on the proposed action for its justification.

- **Cumulative** – Includes the effects of future, state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

The effects assessment is based on the following factors:

- The dependency of the species on specific habitat components
- Habitat abundance
- Population levels of the species
- The degree of habitat impact
- The potential for mitigation of an adverse effect.

4.2 Marbled Murrelet

The action area is within Puget Sound encompassed by the murrelet recovery zone (Conservation Zone 1), as designated and described in the *Recovery Plan for the Marbled Murrelet* (U.S. Fish and Wildlife Service 1997b). Potential impacts on murrelets from the proposed action could include airstrikes and reaction to acoustic changes in air created by the EA-18G.

4.2.1 Direct Effects

While murrelets are aggressive feeders during a typical, 30-minute foraging bout, spending up to 22 minutes (72 percent) foraging (submerged), they also spend time on top of the water (not foraging) in any given day (U.S. Fish and Wildlife Service 2010). It is during the non-foraging period that this species could be exposed to potential direct effects of the proposed action. It is assumed that the marbled murrelets flight behavior is predominantly associated with foraging and flights to nest sites.

Airstrike

The Navy conducted a 3-year study of bird strikes involving naval aircraft in several operational areas around the U.S., from 2002 through 2004. The study found that Navy aircrews experience approximately 596 wildlife/aircraft strike events annually in the U.S., with most encounters involving songbirds (32 percent), seabirds (22 percent), shorebirds (18 percent), and raptors (17 percent) (U.S. Department of the Navy 2008). These data suggest that murrelets can be considered at risk of airstrike, with the proposed increase in number of air operations and the occurrence of lower level aircraft over marine waters, particularly during landing operations.

The height at which murrelets fly and the speed of the aircraft are considered risk factors when assessing the likelihood of aircraft collision with murrelets. It can be inferred from previous studies that murrelets generally fly lower and at slower speeds in foraging/courtship habitat, where they are often flying closer to the water surface than when transiting to nesting habitat over land (Nelson and Hamer 1995, Hamer Environmental 2009 *as cited in* USFWS August 10, 2010). As marbled murrelets transition from marine habitat to nesting habitat, it is assumed they gain altitude as they fly over shoreline areas to achieve the necessary heights in a tradeoff between obstacle avoidance, predator detection, and energy expenditure.

Therefore, it is assumed that flight altitudes of murrelets over marine waters next to Ault Field would be low, as they descend to foraging sites. Alcid flight patterns in the marine environment are often closely associated with the surface of the water (USFWS August 10, 2010). Murrelets likely have adapted this behavior of low flight levels to optimize energy expenditure (increased lift from the interaction of air currents and wave action) or to remain close to the water to escape from aerial predators by diving. Although data are lacking, it is assumed that flight altitude of murrelets over water is generally less than 500 feet.

As such, the likelihood of collision between a marbled murrelet and an EA-18G on any given flight is largely determined by the aircraft's speed and the duration of the flight below 500 feet when over water. Unlike the EA-6B, the EA-18G departing from Ault Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B (less than 10 seconds) to pass through the 0 foot to 500 foot range of highest collision risk. For example, based on a standard departure, an EA-18G would reach 1,622 feet in altitude approximately 500 feet offshore, compared with the EA-6B, which, on the same flight track would only reach 750 feet in altitude. Given the very short duration of flight within less than 500 feet and the rapid ascent of the EA-18G, the collision risk would be expected to be low for departing flights and lower than current operations of the EA-6B.

The approach profiles for both the EA-6B and EA-18G are comparable, with similar air speed and decent rates for both aircraft. Approaching aircraft spend comparatively more time in murrelet airspace than departing aircraft as they descend on approach to Ault Field. Descending aircraft maintain lower flight altitudes and a more horizontal trajectory, resulting in a longer duration in murrelet airspace (up to 60 seconds). As a result, arriving aircraft could pose a greater strike risk to marbled murrelets than departing aircraft. However, since both the EA-6B and EA-18G have similar arrival flight profiles and operate at

similar speeds, altitudes, and decent rates while approaching Ault Field, the potential for bird strike upon arrival by either aircraft is also similar.

The intersection of murrelet flight with the EA-18G airspace is expected to be infrequent and brief, given the murrelet's low flight patterns in the marine environment and the rapid ascent of the EA-18G from Ault Field. Furthermore, intersections of the murrelet and the EA-18G during the murrelets flight to nesting habitat would be limited. While murrelets are known to transit between foraging and nesting habitat at higher altitudes, the EA-18G would rapidly be at much higher altitudes than the bird as they leave the vicinity of Ault Field.

The Navy provided the USFWS approximately three years of site-specific bird/aircraft strike hazard data (2008 to 2010) for Whidbey Island (including Ault Field) for the August 10, 2010 BO for the NWTRC. No murrelets were detected among the 63 recorded strikes (John Mosher, U.S. Navy, pers. comm., 2010 *as cited in* USFWS 2010). These data suggest strike risk for this species is low. While there still is potential for a marbled murrelet strike to occur, the risk would be low, even with the planned 3 percent increase in air operations associated with the transition from the EA-6B to EA-18G aircraft.

Acoustic

In 2006, the Navy completed a comprehensive review of the literature assessing the potential impacts of aircraft noise on waterfowl. The focus of this review was on peer-reviewed literature. Human activity around seabirds may generally result in a temporary change in behavior of a bird, change in internal state (e.g., increase heart/breathing rate), or temporary/permanent displacement (see Burger 1981, Dunnet 1977, and Jehl and Cooper 1980 *as cited in* Manci et al. 1988; Nimon et al. 1995; and Harms 1996).

It was reported that aircraft overflights stimulate a response from seabirds. Brown (1990) completed an experiment on Australia's Great Barrier Reef using pre-recorded aircraft noise, with peak overflight levels of 65 dBA to 95 dBA, to nesting sea bird colonies. Results indicated that the crested tern (*Sterna bergii*) prepared to fly or flew off at exposures to noise of more than 85 dBA. However, these seabirds were not habituated to such noise, whereas marbled murrelet in marine environment adjacent to Ault Field have been exposed to and are now habituated to increased noise levels generated by aircraft take-off and landing since the base was first developed in the 1940s.

Currently, there are no studies documenting behavioral responses of marbled murrelets to aircraft noise or if they are habituated to such noise. Studies assessing habituation of birds to aircraft noise have typically shown limited response of the birds to aircraft overflights. In the early 1980s, the effect of low-altitude military training flights on the establishment, size, and reproductive success of wading bird colonies in Florida was assessed. Based on indirect evidence of distribution and turnover rates in relation to jet training routes (<500 feet agl) and military operations areas, military activity had no demonstrated effect on colony establishment or size on a statewide basis (Black et al. 1984 *as cited in* Manci et al. 1988). Furthermore, the findings from the Navy's 2006 review indicated waterfowl respond to noise from helicopters more than to fixed-wing aircraft, and more to slower fixed-winged aircraft (e.g.,, propeller-driven planes) than from fast-winged aircraft, e.g., jets (Ward et al. 1987, 1988; Fleming et al. 1996).

In the early 1990s, behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) exposed to low-level flying military aircraft at Piney and Cedar islands, North Carolina, was assessed. Investigators determined that disruptions represented a low percentage of their time-activity budgets, only a small proportion of birds reacted to disturbance (approximately 2 percent), and the likelihood of resuming the activity disrupted by an aircraft disturbance event was high (64 percent) (Conomy et al. 1998a). Investigators concluded that recorded levels of aircraft disturbance were not adversely affecting the time-activity budgets of selected waterfowl species wintering at these islands.

A second study at the Piney and Cedar islands assessed whether habituation was a possible proximate factor influencing the low proportion of free-ranging ducks reacting to military aircraft activities in a training range in coastal North Carolina during winters 1991 and 1992. Captured, wild-strain American black ducks and wood ducks (*Aix sponsa*) were exposed to actual and simulated activities of jet aircraft. Investigators conclude that initial exposure to aircraft noise elicited behavioral responses from both black ducks and wood ducks, although with continued exposure of aircraft noise, black ducks became habituated. Wood ducks on the other hand did not exhibit the same pattern of response, suggesting that the ability of waterfowl to habituate to aircraft noise may be species specific (Conomy et al. 1998b).

The frequency, duration, and intensity of the murrelets exposure to the acoustic signature of the EA-18G aircraft depends upon the flight profile being performed. Depending on the flight operation, the 92 dB noise created by an EA-18G would be between 20 and 60 seconds in duration; the longer time period when aircraft are arriving at the airfield. This duration is comparable to that currently observed for the EA-6B operations.

Although the time an aircraft is transitioning the 92 dB SEL (or greater) contour is comparable between the two aircraft, due to the more powerful thrust of the EA-18G, it is more efficient reaching its desired altitude than the EA-6B. Introducing the EA-18G and removing the EA-6B from operation would significantly reduce (by 42 percent) the 92 dB noise contour area in the region. Reaching this desired altitude faster would thereby reduce the potential regional noise impact on the marbled murrelet population (Figure 4-1). The density of marbled murrelets per kilometer (km) next to NAS Whidbey Island is low (less than 5 birds per km). Furthermore, within the EA-6B 92 dB noise contour, the density of murrelets could range from 0 to 3 birds per km. Reducing noise contours by introducing the EA-18G, would further reduce the potential noise impacts on murrelets as their densities range from 0 to fewer than 1 bird per km in this noise contour (Marbled Murrelet Effectiveness Monitoring Module 2008; Flaxa et al. 2011).

While unable to definitively describe the magnitude of the acoustic effect from the EA-18G landing and take-off on individual murrelets, it is expected that the additive effect of the EA-18G's flight operations may result in "allostatic loading" (i.e., the cumulative wear and tear on an individual murrelets body as the adrenal hormones, neurotransmitters, or immuno-cytokines are released in response to an event). An allostatic load may come in the form of behavioral avoidance of continued exposure to the noise from the aircraft taking off or landing; or alternatively, such a stressor may induce a response that produces changes in heart rate, blood pressure, and gastrointestinal activity (Buchanan 2000; McEwen and Wingfield 2003; Korte et al. 2005).

Individual marbled murrelets repeatedly exposed to the noise of the EA-18G taking off and landing could be expected to suffer the incremental, deleterious effects as adrenal hormones, neurotransmitters, or immuno-cytokines are released in response to this stressor. However, regardless of the response, it would be for a relatively short duration (up to 60 seconds) and habituation, combined with other ongoing air operations at the station makes it unlikely that the noise would have a significant long-term effect on an individual's fitness.

Therefore, as population numbers of marbled murrelets are very low (less than 1 bird per square kilometer) within the 92dB noise contour of the EA-18G, individual marbled murrelets may be affected by this action; however, the action would not have community or population-level effect.

Ecology & Environment, Inc. GIS Department Project:
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Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006;
NAS Whidbey Island, 2007.

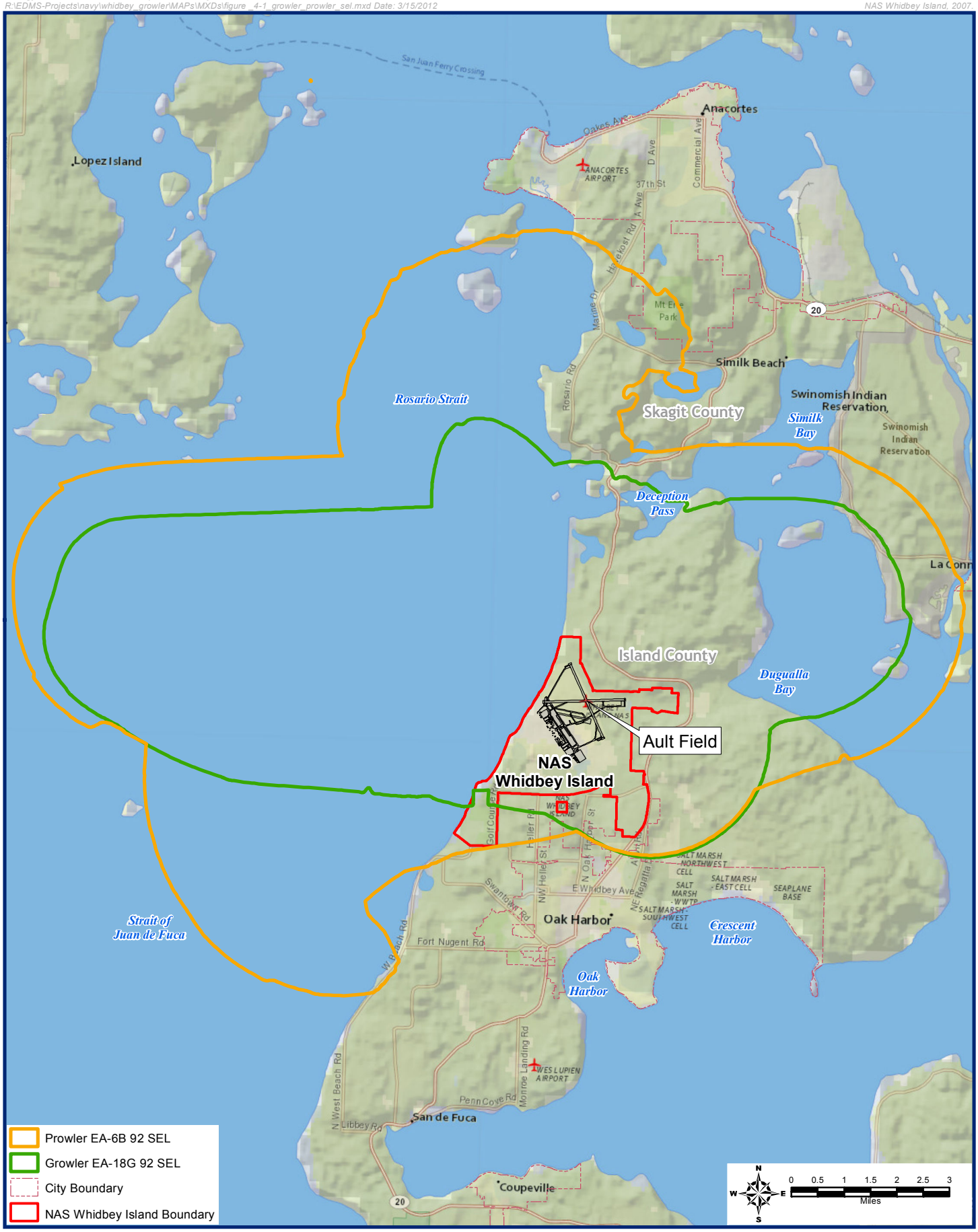

Figure 4-1
Comparison of the 92 dB SEL Contours for the EA-6B and the EA-18G
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

4.2.2 Indirect Effects

Replacement of the EA-6B Prowler with the EA-18G Growler, along with the increase in aircraft operations would not be expected to measurably change the existing underwater environment in the action area. Due to the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from the water column because noises from atmospheric sources do not transmit well under water (Richardson et al. 1995). Furthermore, the sound levels created by the EA-18G would decline at increasing lateral distances from the aircraft's flight track or location and any underwater sounds propagated from the aircraft would decline rapidly after the aircraft has passed. Therefore, there would be no indirect effect on foraging habitat or reduction in the primary food stocks of marbled murrelets.

4.2.3 Effects of Interrelated and Interdependent Actions

The introduction of the EA-18G Growler at NAS Whidbey Island would require constructing additional facilities for realignment of the squadrons. Marbled murrelets are found on the marine waters around Whidbey Island, spending approximately 80 percent of their time on the water, with the remaining time nesting in old growth forests. There is no habitat that supports this species at the proposed construction and renovation sites. Therefore, this species would not be affected by construction activities and there would be no interrelated and interdependent effects.

4.2.4 Determination of Effects

The above analysis indicates that the project **may affect but is not likely to adversely affect** the threatened marbled murrelet in the marine waters adjacent to Ault Field at NAS Whidbey Island.

4.3 Cumulative Effects

Under the ESA, cumulative effects are defined as effects of future local, state, or private (not federal) actions that are unrelated to the proposed project but that are reasonably certain to occur within the project action area.

Historically, seabird populations in Puget Sound, including the marbled murrelet, have sustained numerous impacts from pollution and human activities. Urban development is reasonably certain to occur within the action area and will likely result in increased stormwater and wastewater discharges. The murrelet's prey species in the action area may be negatively affected as a result of degraded water quality from these discharges. The severity of effects to murrelets will depend on the amount and concentration of contaminants discharged, which is determined by many factors (e.g., existence of stormwater Best Management Practices and time between rain events) and is likely to be more severe in urbanized areas. This type of human activity is expected to increase in the future. For example, Island County, which is part of the action area, is expected to increase in population by 40 percent between 2005 and 2030 (Washington Office of Financial Management 2010).

Continued expansion of commercial and private aircraft and ocean-going vessels near NAS Whidbey Island may also cause measurable effects. Small commercial and private aircraft may fly at low levels in the action area when the cloud ceiling is low. This may negatively impact murrelets in the area, causing them to startle or flush. A similar response may occur when small, recreational boats move through the action area.

5. Conclusions

The Navy proposes to transition up to four EA-6B Prowler squadrons and related personnel to EA-18G Growler squadrons; add up to 11 EA-18G Growler aircraft to the FRS; increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide space for the new personnel and aircraft. The number of operations is projected to be greater than the baseline, with aircraft operations potentially increasing by up to 3 percent annually. However, there would be no change in the training syllabus or types of operations as currently conducted by the expeditionary VAQ squadrons (arrivals, departures, or pattern operations) or the locations of aircraft operations (flight tracks over land or water) at Ault Field. The change in aircraft would result in a net noise decrease during aircraft operations.

Underwater sound increases generated from the overflight of the EA-18G, combined with the ongoing aircraft operations originating from NAS Whidbey Island, would be negligible. Due to the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from the water column (Richardson et al. 1995). Therefore, the transition of the EA-18G Growler squadrons would not impact fish or marine mammals in the action area.

Based on the information provided in this BA, the Navy concludes that the proposed action is not likely to jeopardize the continued existence of the ESA-listed species in the action area. There would be **no effect** on the golden paintbrush, bull trout, boccaccio, canary rockfish, yelloweye rockfish, chinook salmon, steelhead, green sturgeon, southern eulachon, humpback whale, southern resident killer whale, or Steller sea lion. There would be **no effect** on any designated critical habitat.

The height at which murrelets fly above water and the speed of the aircraft are perhaps the most important risk factors to consider when assessing the likelihood of aircraft collision with murrelets. It is assumed that flight altitudes of murrelets over marine waters next to Ault Field would be low as they descend foraging sites. Alcid flight patterns in the marine environment are often closely associated with the surface of the water (U.S. Fish and Wildlife Service 2010). Although data are lacking, it is assumed that the murrelet flight altitude over water is generally less than 500 feet.

As such, the likelihood of collision between a marbled murrelet and an EA-18G on any given flight is largely determined by jet speed and the flight duration within 500 feet of the water. Unlike the EA-6B, the EA-18G departing from Ault Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B (assumed to be less than 20 seconds) to pass through the 0 foot to 500 foot range of highest collision risk. Approaching aircraft spend comparatively more time in murrelet airspace than departing aircraft as they descend on approach to Ault Field. Descending aircraft maintain lower flight altitudes and a more horizontal trajectory, resulting in a longer duration in murrelet airspace (up to 60 seconds). As a result, arrival could pose more of a strike risk to marbled murrelets than departures.

The expected intersection of murrelet flight with the EA-18G airspace is expected to be infrequent and brief, given the murrelets low flight patterns in the marine environment and the rapid ascent of the EA-18G from Ault Field. While there is potential for a marbled murrelet strike to occur, the risk is very low, even with the planned increase in air operations associated with the change from the EA-6B to EA-18G aircraft. Therefore, there is an extremely low likelihood of murrelet exposure to aircraft strikes and the overall risk of a strike can be discounted.

Currently, there are no studies documenting behavioral responses of marbled murrelets to aircraft noise or if they are habituated to such noise. Studies that have assessed the response of other waterfowl to aircraft noise have typically shown limited response. Investigators concluded that selected waterfowl species

exposed to low-level flying military aircrafts were not adversely affecting the time-activity budgets when wintering at Piney and Cedar islands, North Carolina. A second study at the Piney and Cedar islands evaluated habituation as a possible proximate factor influencing the low proportion of free-ranging ducks reacting to military aircraft activities. Investigators found that one species, the American black duck, became habituated to the aircraft noise over time.

Individual marbled murrelets repeatedly exposed to the noise of the EA-18G taking off and landing would be expected to suffer incremental, deleterious effects as adrenal hormones, neurotransmitters, or immuno-cytokines are released in response to this noise stressor. However, regardless of the response, it would be for a relatively short duration (up to 60 seconds) and because individuals in the area are habituated to the noise and other ongoing air operations at the station, the introduction of the EA-18G is unlikely to have a significant long-term effect on an individual's fitness.

Based on the information provided in this BA, the Navy concludes that the proposed action is not likely to jeopardize the continued existence of the threatened marbled murrelet in the action area; therefore, the project **may affect, but is not likely to adversely affect** the marbled murrelet in the marine waters next to Ault Field at NAS Whidbey Island.

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Appendix A
EA-18G Growler Noise Study

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Appendix B
Species Lists from USFWS and NMFS

Other ESA-Listed Species

Under the jurisdiction of NOAA Fisheries that may occur off Washington & Oregon:

- distinct population segment, or DPS, of bocaccio *(Sebastes paucispinis)* (E) in Puget Sound
- distinct population segment, or DPS, of canary rockfish *(Sebastes pinniger)* (T) in Puget Sound
- distinct population segment, or DPS, of yelloweye rockfish *(Sebastes ruberrimus)* (T) in Puget Sound
- southern distinct population segment, or DPS, of eulachon (Columbia River smelt) *(Thaleichthys pacificus)* (T)
- southern distinct population segment, or DPS, of north American green sturgeon (*Acipenser medirostris*) (T), listed in the NOAA Fisheries Southwest Region

(E) = Endangered
(T) = Threatened

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ESA-Listed Marine Mammals

Under the jurisdiction of NOAA Fisheries that may occur:

off Washington & Oregon

- Southern Resident killer whale (*Orcinus orca*) (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- blue whale *(Balaenoptera musculus)* (E)
- fin whale (*Balaenoptera physalus)* (E)
- sei whale (*Balaenoptera borealis)* (E)
- sperm whale (*Physeter macrocephalus)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

in Puget Sound

- Southern Resident killer whale *(Orcinus orca)* (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

(E) = Endangered
(T) = Threatened

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Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated July 1, 2009)

Species[1]			*Current Endangered Species Act Listing Status*[2]	*ESA Listing Actions Under Review*
Sockeye Salmon (*Oncorhynchus nerka*)	1	Snake River	***Endangered***	
	2	Ozette Lake	***Threatened***	
	3	Baker River	*Not Warranted*	
	4	Okanogan River	*Not Warranted*	
	5	Lake Wenatchee	*Not Warranted*	
	6	Quinalt Lake	*Not Warranted*	
	7	Lake Pleasant	*Not Warranted*	
Chinook Salmon (*O. tshawytscha*)	8	Sacramento River Winter-run	***Endangered***	
	9	Upper Columbia River Spring-run	***Endangered***	
	10	Snake River Spring/Summer-run	***Threatened***	
	11	Snake River Fall-run	***Threatened***	
	12	Puget Sound	***Threatened***	
	13	Lower Columbia River	***Threatened***	
	14	Upper Willamette River	***Threatened***	
	15	Central Valley Spring-run	***Threatened***	
	16	California Coastal	***Threatened***	
	17	Central Valley Fall and Late Fall-run	***Species of Concern***	
	18	Upper Klamath-Trinity Rivers	*Not Warranted*	
	19	Oregon Coast	*Not Warranted*	
	20	Washington Coast	*Not Warranted*	
	21	Middle Columbia River spring-run	*Not Warranted*	
	22	Upper Columbia River summer/fall-run	*Not Warranted*	
	23	Southern Oregon and Northern California Coast	*Not Warranted*	
	24	Deschutes River summer/fall-run	*Not Warranted*	
Coho Salmon (*O. kisutch*)	25	Central California Coast	***Endangered***	
	26	Southern Oregon/Northern California	***Threatened***	
	27	Lower Columbia River	***Threatened***	• Critical habitat
	28	Oregon Coast	***Threatened***	
	29	Southwest Washington	*Undetermined*	
	30	Puget Sound/Strait of Georgia	***Species of Concern***	
	31	Olympic Peninsula	*Not Warranted*	
Chum Salmon (*O. keta*)	32	Hood Canal Summer-run	***Threatened***	
	33	Columbia River	***Threatened***	
	34	Puget Sound/Strait of Georgia	*Not Warranted*	
	35	Pacific Coast	*Not Warranted*	
Steelhead (*O. mykiss)*	36	Southern California	***Endangered***	
	37	Upper Columbia River	***Threatened***	
	38	Central California Coast	***Threatened***	
	39	South Central California Coast	***Threatened***	
	40	Snake River Basin	***Threatened***	
	41	Lower Columbia River	***Threatened***	
	42	California Central Valley	***Threatened***	
	43	Upper Willamette River	***Threatened***	
	44	Middle Columbia River	***Threatened***	
	45	Northern California	***Threatened***	
	46	Oregon Coast	***Species of Concern***	
	47	Southwest Washington	*Not Warranted*	
	48	Olympic Peninsula	*Not Warranted*	
	49	Puget Sound	***Threatened***	• Critical habitat
	50	Klamath Mountains Province	*Not Warranted*	
Pink Salmon *(O. gorbuscha)*	51	Even-year	*Not Warranted*	
	52	Odd-year	*Not Warranted*	

1 The ESA defines a “species” to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or “ESU,” a “species” under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated distinct population segments (DPSs) for consideration as “species” under the ESA.

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN
IN ISLAND COUNTY
AS PREPARED BY
THE U.S. FISH AND WILDLIFE SERVICE
WASHINGTON FISH AND WILDLIFE OFFICE

(Revised August 1, 2011)

LISTED

Bull trout *(Salvelinus confluentus)* – Coastal-Puget Sound DPS [marine waters]
Marbled murrelet *(Brachyramphus marmoratus)* [marine waters]

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Castilleja levisecta (golden paintbrush)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for bull trout

PROPOSED

None

CANDIDATE

None

SPECIES OF CONCERN

Bald eagle *(Haliaeetus leucocephalus)*
Long-eared myotis *(Myotis evotis)*
Long-legged myotis *(Myotis volans)*
Northern goshawk *(Accipiter gentilis)*
Northern sea otter *(Enhydra lutris kenyoni)*
Olive-sided flycatcher *(Contopus cooperi)*
Pacific lamprey *(Lampetra tridentata)*
Pacific Townsend's big-eared bat *(Corynorhinus townsendii townsendii)*
Peregrine falcon *(Falco peregrinus)*
River lamprey *(Lampetra ayresi)*
Western toad *(Bufo boreas)*
Aster curtus (white-top aster)