FINDING OF NO SIGNIFICANT IMPACT

Construction of Vertical Axis Wind Turbines

Alaska Peninsula/Becharof and Izembek National Wildlife Refuges

The U.S. Fish and Wildlife Service (Service) has prepared an environmental assessment (EA) that evaluates the proposed installation of eleven vertical axis wind turbines (VAWTs) on administrative lands at Alaska Peninsula/Becharof in King Salmon, Alaska and Izembek National Wildlife Refuges (NWRs) in Cold Bay, Alaska. The Service is mandated under Executive Order 13423 (Strengthening Federal Environmental, Energy, and Transportation Management), to "lead by example in advancing the nation's energy security and environmental performance" by achieving a number of goals, including increased purchases of renewable power sources and increased usage of renewable power. Executive Order 13514 (Federal Leadership in Environmental, Energy, and Economic Performance) builds on and expands the energy reduction and environmental requirements of Executive Order 13423 by making "reductions of greenhouse gas emissions a priority of the Federal government and by requiring agencies to develop sustainability plans focused on cost-effective projects and programs." Federal agencies are required to set a 2020 greenhouse gas emissions reduction target.

To meet the mandate of reducing greenhouse gasses and the use of renewable energy, the Service was awarded funding through the American Recovery and Reinvestment Act to design and construct the VAWT project. Both refuges currently use diesel fuel to heat buildings on administrative lands. To offset the use of diesel and subsequent greenhouse gas emissions, the Service proposes to install a total of eleven 5-10 kilowatt (kW) VAWTs at both Alaska Peninsula/Becharof and Izembek NWRs (Figure 1). The installation of these turbines is expected to reduce the amount of fuel used to provide heat for the refuges.

The two alternatives considered in the EA are: (A) to install VAWTs at both refuges; and (B) to not install VAWTs. The Service's preferred alternative is Alternative A.

Each turbine will be mounted on a free-standing, monopole unsupported by guy wires. At Alaska Peninsula/Becharof Refuge, two VAWTs will be placed at Refuge Headquarters (Figure 2) and two VAWTs will be placed at Quarters 1 and Quarters 2 (Figure 3), located in King Salmon, Alaska. These towers will be no more than 65 feet tall with a concrete base of 24 feet by 24 feet At Izembek NWR; seven VAWTs will be placed within the Refuge Headquarters area in Cold Bay, Alaska (Figure 4). These turbines will be no more than 25 feet high requiring a 24 feet by 24 feet concrete base. Transmission lines will be buried from the turbines to the respective buildings. Construction of the project is anticipated to begin in summer 2010. A complete description of the proposal and other information is included in the EA for the *Construction of Vertical Axis Wind Turbines – Alaska Peninsula/Becharof, King Salmon, Alaska and Izembek National Wildlife Refuges, Cold Bay, Alaska, January 2010 (http://alaska.fws.gov/nwr/planning/nepa.htm).*

The key issues identified in the EA are: 1) The clearing of 24 feet by 24 feet sections of vegetation that will be removed to provide the base for the turbines at each location;

2) Endangered and threatened species: Steller's eider may use the adjacent wetlands, rivers, and bays associated with the turbine placement at Cold Bay. They may be affected by the turbine construction and operation. Spectacled eider are not documented in the vicinity of the VAWT placement at either refuge; 3) Migratory and residential birds may be affected by the construction and operation of the turbines; 4) Noise from heavy equipment during construction and operation of the turbines; and 5) VAWTs may disrupt the viewshed.

Project mitigation measures include:

1) A permanent loss of approximately 24 feet by 24 feet of vegetation may occur at some VAWT locations. To reduce the impacts to the vegetation, all footings will be dug by hand and materials (soils/dirt) removed for footing installations would be scattered outside the installation footprint. Cabling will need to be buried at each turbine location but this loss of vegetation will not be permanent. Vegetation would be cut by hand and folded back in sections for the length of the power corridor. The powerline would be laid on the humus layer and the vegetation mat restored to its original position. The vegetation mat should resume growing naturally within one summer;

2) Both refuges must comply with the Alaska Wind Turbine Guidelines and conduct post-construction surveys around the VAWTs. These surveys would help reduce uncertainty regarding potential adverse effects to listed species. Both refuges would notify the Ecological Services office immediately if any Endangered Species Act-listed species are found during the post-construction mortality surveys and would consult with them regarding the need for any additional measures;

3) The Service has published interim guidelines for wind power projects to minimize the potential risks of bird fatalities due to collisions. Many of these guidelines pertain to siting considerations and are more pertinent to much larger projects. However, the following recommendations would be implemented: a) Anti-perching devices would be placed on each VAWTs nacelle (if necessary) to discourage perching or nesting on the VAWTs, which could greatly increase the potential for bird collisions; b) Anti-perching devices (if applicable) would be installed on electric poles in adjacent areas to discourage perching and reduce the potential for electrocution, especially for bald eagles. The VAWTs would not have external ladders or other structures that would allow birds to perch anywhere near the VAWT; c) Structures with guy wires would be avoided. The VAWT would be self-supporting monopoles; d) Any electric transmission lines from the VAWT to the electrical box would be buried below ground; e) No lighting will be used on the VAWT towers (limited to what is necessary for aviation safety), unless otherwise determined by FAA; f) A post-construction monitoring plan would be implemented for a minimum of two years, starting immediately after construction, to determine if birds are killed by collisions with the VAWT;

4) Daily VAWT operation is expected to generate residual noise impacts. However, based on data collected by manufacturers of VAWT, the noise levels would be low to residents nearby the installed VAWTs and would be considered to have minor impact;

5) The VAWTs would create residual visible impacts from numerous points in the both King Salmon and Cold Bay communities. However, VAWTs are not the tallest structures in either area. Therefore, the visual impacts are considered minimal.

The public was informed of the project through public scoping meetings at each refuge in November 2009. The EA was circulated to the public for review and comment on January 22, 2010. The Service received one comment regarding the noise of the wind turbines. The comment was addressed via a phone call on February 22, 2010.

The Service completed intra-Service Endangered Species Act Section 7 consultations for the with the Endangered Species office on the Steller's eider and Spectacled eider. The Endangered Species office determined that the project may affect, but is not likely to adversely affect, either species or their critical habitats.

The Service consulted with the Service's Regional Historic Preservation Officer (RHPO) on cultural resources in the area of the placement of the VAWTs. The RHPO determined that there are no cultural resources known to exist at either refuge's administrative locations.

The Service will consult with both the Department of Defense (DOD), including the Department of the Air Force, and the Federal Aviation Administration (FAA) prior to construction of the VAWTs.

The Service finds the wind turbine project at both Alaska Peninsula/Becharof and Izembek NWRs to be fully consistent with policies of the Alaska Coastal Management Program.

Based on a review and evaluation of the information contained in the supporting references listed below, I have determined that the project of the installation, operation and maintenance of eleven vertical axis turbines on refuge administrative lands at both Alaska Peninsula and Izembek NWRs, is not a major federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2) (C) of the National Environmental Policy Act of 1969. The Environmental Assessment conducted by the U.S. Fish and Wildlife Service (Reference 1) supports the conclusion that, with the stipulated mitigation, the impact does not exceed a threshold of significance. Accordingly, the preparation of an environmental impact statement on the proposed action is not required.

Supporting document:

1. Environmental Assessment, *Construction of Vertical Axis Wind Turbines – Alaska Peninsula/Becharof, King Salmon, Alaska and Izembek National Wildlife Refuges, Cold Bay, Alaska, January 2010.*

Approved: _____ 3/2/10

Regional Director, Alaska Region — Date

1011 East Tudor Road, Anchorage, AK 99503

Figure 1. An Example of a Vertical Axis Wind Turbine.

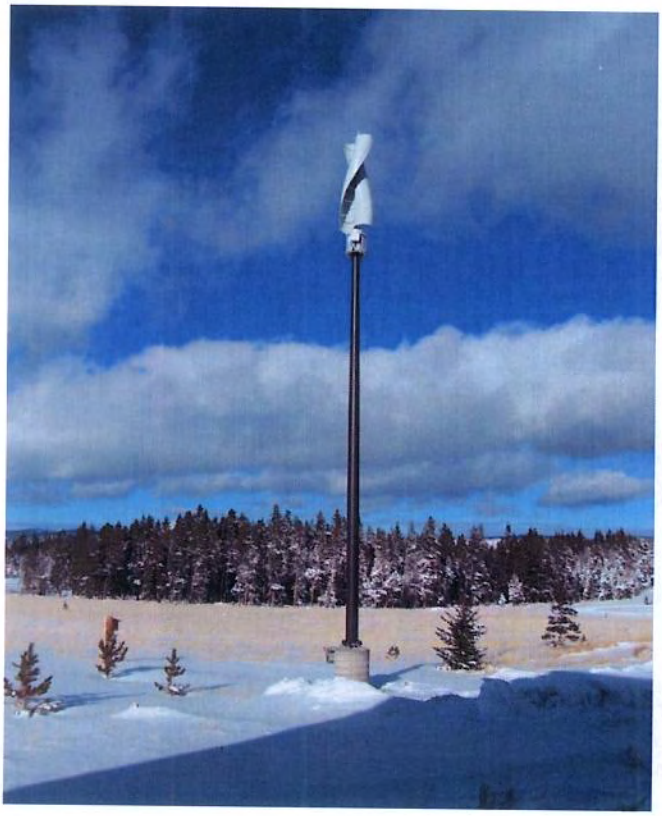

Figure 2. Location of VAWTs at Alaska Peninsula/Becharof NWR Headquarters, King Salmon, AK.

Figure 3. Location of VAWTs at Alaska Peninsula/Becharof NWR, Quarters 1 and 2, King Salmon, Alaska.

Figure 4. Location of VAWTs at Izembek NWR Refuge Headquarters, Cold Bay, Alaska.

Date: February 25, 2010
U.S. Fish and Wildlife Service
Environmental Assessment for the Construction of Vertical Axis Wind Turbines – Alaska Peninsula/Becharof and Izembek National Wildlife Refuges
King Salmon and Cold Bay, Alaska

Prepared by:
United States Department of the Interior
U.S. Fish and Wildlife Service
King Salmon, Alaska

Title: Environmental Assessment, U.S. Fish and Wildlife Service, Construction of Vertical Axis Wind Turbines – Alaska Peninsula/Becharof and Izembek National Wildlife Refuges

Lead Agency: U.S. Fish and Wildlife Service, Region 7, Alaska

Preparer: Stephanie Brady
U.S. Fish and Wildlife Service
Division of Conservation Planning and Policy
PO Box 277
King Salmon, AK 99613

Date: February 25, 2010

Abstract: The U.S. Fish and Wildlife Service Alaska Peninsula/Becharof and Izembek National Wildlife Refuges are proposing the installation of eleven vertical axis wind turbines on refuge administrative lands, four at Alaska Peninsula/Becharof and seven at Izembek NWR. Funding for this project is available from the American Recovery and Reinvestment Act. The installation of these turbines will meet the objective put forth to reduce greenhouse gas emissions for federal buildings as well as reduce costs at the two refuges. The two alternatives considered in this document are: (A) to install helical vertical axis turbines at both refuges; and (B) to not install the turbines. The preferred alternative of the U.S. Fish and Wildlife Service is Alternative A.

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Figure 3. Location of VAWTs at Alaska Peninsula/Becharof NWR, Quarters 1 and 2, King Salmon, Alaska.

Figure 4. Location of VAWTs at Izembek NWR Refuge Headquarters, Cold Bay, Alaska.

Figure 5. Location of Alaska Peninsula/Becharof and Izembek NWR Refuge Headquarters.

1.0 INTRODUCTION

The U.S Congress passed a bill to allow funding for federal projects under the American Recovery and Reinvestment Act. Through these available funds, the U.S. Fish and Wildlife Service's (USFWS or Service) Alaska Peninsula/Becharof and Izembek National Wildlife Refuges (NWR) are proposing the installation of a total of 11, vertical-axis wind turbines (VAWTs) on refuge administrative lands. The funding of this project constitutes a federal action, therefore the Service is required to evaluate the potential environmental impacts in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ), Department of Interior (DOI) NEPA implementing regulations as well as USFWS NEPA policy. In compliance with NEPA (42 United States Code [U.S.C.] § 4321 et seq.) and the DOI NEPA implementing regulations (46 Code of Federal Regulations [CFR] Part 46) and procedures, this Environmental Assessment (EA) examines the potential environmental impacts of the Services' Proposed Action and No Action Alternative.

1.1 National Environmental Policy Act and Related Procedures

In accordance with the NEPA implementing regulations, the Service is required to evaluate the potential environmental impacts of Service facilities, operations, and related funding decisions. In compliance with these implementing regulations and procedures, this EA:

- Examines the potential environmental impacts of the proposed project, as well as a No Action Alternative;
- Identifies unavoidable adverse environmental effects of the Proposed Action;
- Describes the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and
- Characterizes any irreversible and irretrievable commitments of resources that would be involved should the proposed action be implemented.

These requirements must be met before a final decision is made to proceed with any proposed federal action that could cause adverse impacts to human health or the environment. This EA is intended to meet DOI regulatory requirements under NEPA and provide the Service with the information needed to make an informed decision associated with the installation of the proposed wind power generation system.

This EA evaluates the potential individual and cumulative effects of the Proposed Action. No other action alternatives are analyzed. For purposes of comparison, this EA also evaluates the impacts that would occur if the Service did not support the installation of the wind power generation system (the No Action Alternative).

1.2 Background

In January 2009, the Service applied for funding for this project through the American Recovery and Reinvestment Act. The bill was signed into law on February 17, 2009.

The funding for the wind turbine project was approved on May 15, 2009. Both refuges currently use diesel fuel to heat the headquarters and living quarters. To offset the use of diesel and subsequent greenhouse gas emissions, the Service proposed the wind power project. The Service proposes to install a total of 11, 5-10 kilowatt (kW), VAWTs at both Alaska Peninsula/Becharof NWR (4) and Izembek NWR (7) (Figure 1). Rather than producing electricity, the VAWTs will tie into the thermal heating units and may reduce the use of fuel oil at each refuge.

VAWTs are the preferred small-scale, renewable electrical power source over more conventional propeller-driven wind generators, based on comparable performance, 25-year reliable history of operation in cold climates, proven viability and favorable environmental and operational characteristics. The use of VAWT compared to horizontal-axis wind turbines (HAWTs) decreases impacts to wildlife, particularly birds and bats (Helix Wind http://www.helixwind.com/en/index.php)

VAWTs have an axis of rotation that is vertical to the ground and almost perpendicular to the wind stream. A significant advantage of VAWTs is convenience; the generator and gearbox can be installed at ground level, which makes these turbines easier to service and repair HAWTs. In addition, unlike HAWTs, which must face the wind to achieve maximum output and must be equipped with a yaw mechanism (used to turn the wind turbine rotor against the wind), VAWTs can use wind from any direction, making them suitable for areas with fast changes of wind direction. Depending on the design of the VAWT, these turbines can be propelled using lift or drag from the wind. Turbines operating via drag are considered to be somewhat less efficient than those that function via lift as they extract less of the wind's power than similarly sized lift-type turbines. As such, they are often used when reliability, durability, or aesthetics is more important than efficiency.

Wind power correlates directly with wind speed and swept-area (power output of a wind turbine is directly related to the swept area of its blades. The larger the diameter of its blades, the more power the turbine will produce). Although VAWTs don't necessarily produce more kilowatt hours (kW·h) than conventional wind generators, they can produce more kW·h per year than horizontal axis generators of equal swept-area because they harvest wind over a much broader spectrum of wind speeds (i.e., 6.44–193.12 kilometers per hour (KPH)) and can harvest wind from any direction.

1.3 Purpose and Need

Under the mandate of Executive Order 13423 (Strengthening Federal Environmental, Energy, and Transportation Management), the Service is required to "lead by example in advancing the nation's energy security and environmental performance" by achieving a number of goals, including increased purchases of renewable power sources and increased usage of renewable power. Executive Order 13514 (Federal Leadership in Environmental, Energy, and Economic Performance) builds on and expands the energy reduction and environmental requirements of Executive Order 13423 by making "reductions of greenhouse gas emissions a priority of the Federal government and by

requiring agencies to develop sustainability plans focused on cost-effective projects and programs". Federal agencies are required to set a 2020 greenhouse gas emissions reduction target. To meet these objectives, funding was received from the American Reinvestment Act to install a total of 11 VAWTs at both Alaska Peninsula/Becharof (4) and Izembek (7) NWRs.

Figure 1. An Example of a VAWT.

The Service is committed to a reduction in greenhouse gas emissions by implementing renewable energy sources, such as solar and wind generation, as appropriate. The Proposed Action would provide a cost effective and clean source of thermal energy (heating fuel) for both refuges, reduce overall diesel fuel consumption, and decrease air emissions associated with the consumption of diesel fuel, thereby, reducing the greenhouse gas emissions from both refuges.

In addition to reducing greenhouse gas emissions, the turbines will reduce the fuel costs to the Service. Therefore, there are both environmental and economic objectives for this project.

1.4 Public Scoping and Consultation

Federal, state, borough, tribal, and adjacent land owners were contacted regarding the Proposed Action and NEPA review process by letter, television/web reader board, and flyers (Appendix A). Alaska Peninsula/Becharof NWR held an Informational Open House on November 17 at the King Salmon Visitor Center. Staff at Alaska Peninsula/Becharof Refuge sent out 15 invitation letters to various parties throughout King Salmon and Naknek. In addition, the refuge enclosed an interested party postcard for individuals to indicate that they were interested in remaining on our mailing list to receive the EA when completed. Unfortunately, no one participated in the open house. However, the refuge did receive three interested party postcards as well as one written comment from the King Salmon Tribe stating that they did not have a problem with the installation of VAWTs on refuge lands or around King Salmon. Alaska Peninsula/Becharof Refuge followed up with the individuals by providing the fact sheet that was developed for the open house.

Izembek NWR held an Informational Open House on November 18 at the Cold Bay Community Center. Eight invitations were sent out to local constituents. Three people attended the open house and provided several comments that are addressed below.

The primary comments regarding the wind turbine project in Cold Bay were from the electrical utility, G&K, Inc. Cold Bay Electric. These comments included concerns regarding inter-connection and net-metering among others. Since the time of the meeting, the Service modified the scope of the project so that the proposed turbine projects at each refuge will be providing thermal energy generation, offsetting fuel consumption rather than tying into the grid and offsetting electrical load. Therefore, the concerns of the electrical utility are no longer relevant to this proposed action and are therefore, not addressed in this EA.

On January 22, 2010, the Service published the EA on the Planning website (http://alaska.fws.gov/nwr/planning/nepa.htm) and distributed hard copies to interested parties as well as the public scoping mailing list. The comment period closed on February 25, 2010 with one comment received on the VAWT project. The commenter, Mr. Richard Kampeter, is an adjacent land owner to Alaska Peninsula/Becharof NWR headquarters complex. Mr. Kampeter had a concern regarding the noise of the VAWTs.

Stephanie Brady returned his call on Monday, February 22, 2010 and discussed the noise data that was available for VAWTs. Mr. Kampeter was satisfied with the discussion and had not further comments regarding the project.

The Service consulted with federal and state agencies regarding the potential environmental impacts associated with the Proposed Action. Specifically, the Service completed intra-section 7s for the Service's Endangered Species office; consulted with the Service's Regional Historic Preservation Officer on cultural resources in the area of the placement of the turbines; and the Service will consult with both the Department of Defense (DOD), including the Department of the Air Force, and the Federal Aviation Administration (FAA). The Service finds the wind turbine project at both Alaska Peninsula/Becharof and Izembek NWRs to be fully consistent with policies of the Alaska Coastal Management Program. (Appendix B).

Based on public scoping and input from Service staff, we identified the following issues:

- Vegetation and soils – what will be the effect on soils and vegetation from the construction of the VAWTs;
- Threatened and endangered species – will there be any adverse effects of listed species, especially Steller's eider and spectacled eider;
- Other birds – what will be the effects on other birds species from the construction and operation of the VAWTs;
- Noise – what will be the level of noise during construction and operation of the VAWTs;
- Visual environment or viewshed - how visible will the VAWTs be and what will be the effect of the viewshed.

2.0 ALTERNATIVES

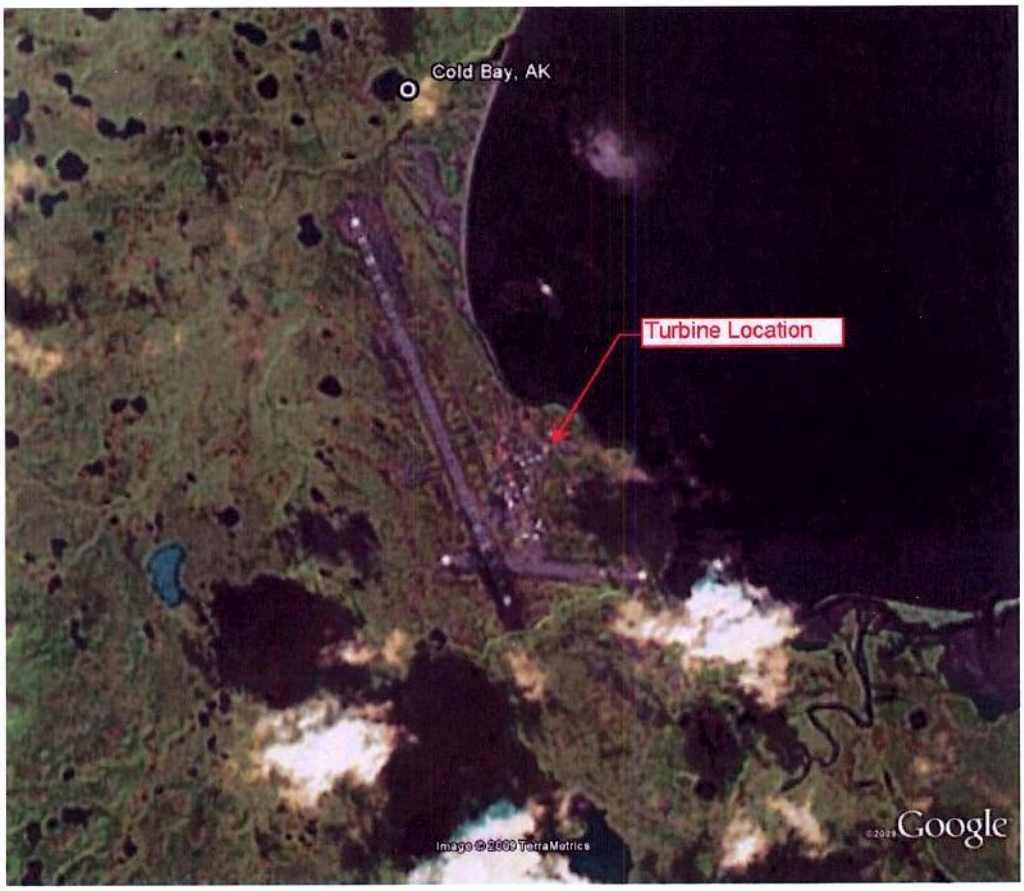
2.1 Proposed Action

The Service is proposing the installation of 11, 5-10 kW VAWTs on administrative lands at Alaska Peninsula/Becharof and Izembek NWRs. Each turbine will be mounted on a free-standing, monopole unsupported by guy wires. At Alaska Peninsula/Becharof Refuge, two turbines will be placed at Refuge Headquarters (Figure 2) and two turbines will be placed at Quarters 1 and Quarters 2 (Figure 3), located in King Salmon, AK. These towers will be no more than 65 feet tall with a concrete base of 24' x 24'. At Izembek NWR, seven turbines will be placed within the Refuge Headquarters area in Cold Bay, AK (Figure 4). These turbines will be no more than 25 feet high requiring a 24' x 24' concrete base. Transmission lines will be buried from the turbines to the respective buildings.

Figure 2. Location of VAWTs at Alaska Peninsula/Becharof NWR Headquarters, King Salmon, AK.

Figure 3. Location of VAWTs at Alaska Peninsula/Becharof NWR, Quarters 1 and 2, King Salmon, Alaska.

Figure 4. Location of VAWTs at Izembek NWR Refuge Headquarters, Cold Bay, Alaska.



2.2 Project Location

Alaska Peninsula/Becharof National Wildlife Refuge

The administrative headquarters for Alaska Peninsula/Becharof Refuge is located in King Salmon, Alaska, on the northern end of the Alaska Peninsula (Latitude 58. 68° N., Longitude 156.66 ° W.; Sec.23, T017S, R045W, Seward Meridian) about 284 miles southwest of Anchorage (Figure 5). King Salmon is situated in the Nushagak-Bristol Bay lowland; a broad, low-relief piedmont characterized by arcuate belts of morainal topography and numerous small lakes and bogs (Wahrhaftig, 1965). The Naknek River is the principal drainage in the area.

The King Salmon area has a climate that is transitional between maritime and continental (Hartman and Johnson, 1984). The region is strongly influenced by cyclonic storms that originate in the Aleutians (Selkregg, 1976; Moritz, 1979) and the region experiences cool, cloudy, wet summers, and moderately cold winters (National Oceanic and Atmospheric Administration, 1980). Mean monthly summer temperatures range from 50.8 ° to 54.3° F. Mean monthly temperatures in winter range from 15.5° to 17.3° F. Mean annual precipitation is 19.7 inches per year. Average annual snowfall is about 45.8 inches.

The wind regime at King Salmon is characterized by moderate southeasterly and easterly winter winds (October through March) that are associated with high pressure over northern Alaska and low pressure over the southern Bering Sea or Gulf of Alaska (Keegan, 1958; Moritz, 1979). Summer winds (June through September) are primarily from the south and southeast, and usually result from a blocking ridge of high pressure that extends into Alaska from the southeast and cyclonic storm activity over interior Alaska (Reed and Kunkel, 1960; Streten, 1974; Moritz, 1979). Late winter and early spring winds (February through April) are primarily from the north and northeast. These spring winds also result from high pressure over northern Alaska and low pressure over the Gulf of Alaska (Moritz, 1979).

The locations of the VAWTs proposed for Refuge Headquarters are adjacent to state, residential and commercial areas, approximately 150-250 feet the Naknek River, and 2.1 miles west of the King Salmon airport. This location is accessible via a local service road that leads to refuge administrative buildings.

The locations of the VAWTs proposed for Quarters 1 and 2 are adjacent to largely undeveloped land. These VAWTs are approximately 1/3 mile from the Naknek River and are located six miles from King Salmon. The location is accessible via the driveway for each residence.

Socioeconomic Description

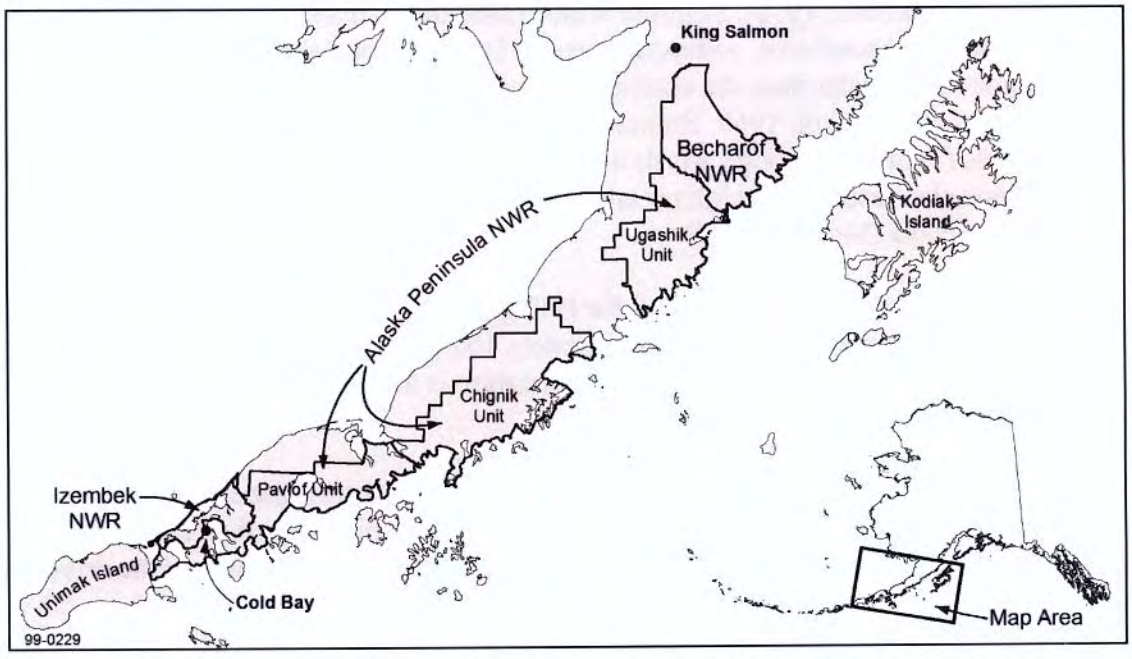
Approximately 442 people live in the greater King Salmon area (U.S. Census Bureau, 2000). The community has become an important regional center for government, transportation, and commercial fishing. The King Salmon Air Force Station is located in

King Salmon and it shares a large runway with commercial and charter airlines. Over the past several years, the base has been downsized and is now operated by a small civilian staff. The Alaska Peninsula Highway connects King Salmon with the village of Naknek on the Kvichak Bay coast. The town of King Salmon consists of one and two storied structures that serve as private residences, businesses, or support facilities for the Air Force and other Federal and State agencies. The Bristol Bay Borough is the local governmental entity.

Izembek National Wildlife Refuge

The administrative headquarters for Izembek NWR is located in Cold Bay, Alaska (Latitude 55.18° N. and Longitude 162.72° W.; Sec. 25, T057S, R089W, Seward Meridian), at the western end of the Alaska Peninsula, approximately 634 miles southwest of Anchorage (Figure 5). Cold Bay lies in the maritime climate zone (Hartman and Johnson, 1984). Climatic conditions are influenced by the Bering Sea and the North Pacific and are characterized by small temperature variations, high humidity, heavy precipitation and frequent foggy periods. Cold Bay has one of the highest percentages of cloud cover in the United States. Cyclonic storms with high winds, low ceilings, and poor visibility occur frequently. Mountains rise more than 5, 906 feet, about nine miles south-southwest of Cold Bay. These mountains provide protection from approaching

Figure 5. Location of Alaska Peninsula/Becharof, King Salmon and Izembek NWR, Cold Bay, Refuge Headquarters.



southwesterly and southeasterly winds and precipitation. Mean monthly summer temperatures range from 45.9° to 51.6° F. Mean monthly winter temperatures range from 28.2° to 30.2° F. Mean annual precipitation is 38 inches per year. Average annual snowfall is about 62 inches.

Cold Bay has topography similar to the nearby Aleutian Islands. The topography is characterized by rolling, treeless tundra with scattered lakes. The City of Cold Bay is on the south shore of Cold Bay, an embayment of the Pacific Ocean.

A total of seven VAWTs are proposed for Izembek Refuge. The VAWTs will be located within the developed area of the Refuge headquarters complex (Figure 4). The VAWTs will be adjacent to both residential and administrative structures and are approximately 0.15 mile from coastal waters. The VAWTs will be 0.5 mile northeast of the north-south runway of the Cold Bay airport. This location is accessible via a local service road that leads to the Refuge headquarters complex.

Socioeconomic Description

Eighty-eight people live in the greater Cold Bay area (U.S. Census Bureau, 2000). State and Federal government and airline support services provide the majority of local employment. Because of its central location and modern airport, Cold Bay serves as a regional center for air transportation on the Alaska Peninsula. Cold Bay also provides services and fuel for the fishing industry and is part of the Aleutians East Borough.

2.3 Overview of Proposed Wind/Thermal Hybrid System

The variability in wind energy is defined in terms of *wind penetration* and that fraction of energy produced by wind compared with the total available generation capacity by the following – instantaneous penetration is the sum of wind power output (kW) divided by primary electric load (kW). Average penetration is the sum of wind energy produced (KwH) divided by primary energy demand (kWh).

Wind-generated power is a variable resource, and the amount of wind-generated electricity produced at any given point in time by a given wind plant will depend on wind speeds and turbine characteristics (among other factors).

Since wind speed is not constant, the wind farm's annual energy production is never as much as the sum of the generator nameplate ratings multiplied by the total hours in a year. The ratio of actual productivity in a year to this theoretical maximum is called the *capacity factor*. Typical capacity factors are 20–40%, with values at the upper end of the range in particularly favorable sites such as Cold Bay. For example, a 1 kw turbine with a capacity factor of 35% will not produce 8760 KWh in a year, but only 0.35 x 24 x 365 = 3,066KWh, averaging to 0.35 KW.

In a low wind penetration grid connect scheme, systems are typically the easiest to integrate with the lowest capital cost but result in only modest savings in electric energy consumption.

The low to medium wind penetration scheme usually consists of installed/integrated secondary loads such as larger electric hot water tanks, requires more complexity in supervisory controls and has a higher capital cost.

The primary benefits of the USFWS hybrid wind energy model are displacement of fossil fuels and their associated emissions and carbon dioxide production, and reduced exposure to fuel oil price uncertainty and volatility. For example, in the low to medium wind penetration model for Cold Bay, all wind energy at the USFWS head quarters building is used to displace heating fuel with little to no net benefit off-setting electric energy consumption. Other outlying buildings will benefit from electric wind energy offsetting fuel oil with excess wind energy used to offset electric energy usage. To further off-set electric energy consumption, additional turbines would be required.

Wind energy performs poorly if it is used in a way that cannot exploit its full potential. Connecting the wind turbines to the load side of the facility meter with "Smart Dispatch Controls" allows for non-firm wind energy to be connected and distributed throughout the facility seamlessly to the occupants. Electricity demand including the need for space heating increases and decreases over a 24 hour period depending on the occupant's habits. There are predictable periods during the day when demand increases dramatically, called peak periods. At night, the facilities are subjected to the lowest demand.

The Alaska Peninsula/Becharof and Izembek NWRs wind projects will benefit from the strong wind resource and the optimized Smart Dispatch Controls to optimize system economics through a significant offset of heating fuel consumption and the facilities electric energy consumption.

In the low to medium penetration design, it is anticipated that total wind generating capacity may meet the facility peak power demand and heating fuel requirements. Through such a configuration, the wind turbines will provide a significant heating fuel off-set by supplementing the thermal requirements, converting wind electric energy to thermal energy.

In a typical grid connected wind energy system, the electric utility must continue to supply energy regardless of wind speed and wind energy contribution. Here, the wind generator(s) operate in constant parallel with the utility, which serves to reduce the electric load at the facility. This configuration produces no cogenerated by-product such as hot water, as there is no excess energy. By integrating wind turbine generating capacity to achieve energy conservation as an aggregate of all energy, electric energy use and electric hot water for space heating, the conceptual design is anticipated to produce far greater total energy savings and operating efficiencies. Accordingly, this conceptual design focuses on the low to medium penetration model with thermal electric integrating thermal storage nodes as its first priority use for wind generated energy. Secondarily, excess wind generated energy will be used to off-set electric energy consumption. The amount of electrical energy produced will be low; therefore, the amount produced will not affect the utility.

The primary building blocks of the Service's hybrid wind system include the wind generation equipment, microprocessor based sensors (that simultaneously monitor instantaneous load and wind speed) and specialized controls. The wind system controls allow for seamless operation between the facilities use of electricity, and thermal electric

hot water storage tank. Therefore, the there will not be a co-generated component (NET metering) or the flow of electric wind energy back to the grid with either electric utility in Cold Bay or King Salmon.

2.4 ELECTRIC THERMAL STORAGE

Integrated space/water heating systems combine the residential and headquarters heating requirements with the domestic hot water needs, saving money on total system installation. Typically, these systems employ an insulated external storage tank with a high-efficiency low-mass boiler to heat the water, which then passes through a fan coil or heat exchanger. The system then circulates the heat around the building through a warm air distribution system, like a conventional furnace or through hydronic base-board radiant heat.

For integrated systems that do not use high efficiency boilers, the initial cost saving is soon eliminated by very low seasonal efficiency. The heater is sized to produce enough heat to warm a house on the coldest winter day. However, in the summer months, when no heating is required, the same heater heats domestic hot water. The effect is an oversized water heater that operates for several months of the year with a low heating demand – and low efficiency, as a result.

The electrical thermal storage (ETS) central boiler consists of an on-demand heating equipment, a storage medium, (thermal core node [TCN]) and controls, which detect when it is necessary to accumulate a charge during turbine operation. Elements within the storage core heat ceramic bricks or similar media to a high temperature to provide the heating requirements for the on-peak period.

When the thermostat calls for heat, a pump circulates water or coolant through the thermal storage unit. The heated water is then distributed to either a heat exchanger connected in parallel with the existing boiler or to liquid in an air exchanger for fan distribution of heat throughout the room as a centrally-ducted ETS system for whole house heating.

All the performance levels related to the heating system rely on one key feature, the ability and efficiency of heat transfer. This applies when heat is transferred from the TCN into the heat transfer fluid (water). This also applies when heat is transferred from the convectors into the facilities.

Permits and Authorizations

2.5.1 Air Safety Determination

Due to the proximity of the local airport, the FAA and the DOD will be contacted for comments and approvals.

2.5.2 Endangered Species

Both refuges completed an intra-Service Section 7 with the Services Endangered Species office on the Steller's eider (*Polysticta stelleri)* and Spectacled eider (*Somateria fischeri*) (Appendix C).

2.5.3 Compatibility Determination

The National Wildlife Refuge System Improvement Act of 1997 requires that refuge managers determine whether proposed uses of refuge lands are compatible with the purposes for which the refuge was established and with the mission of the refuge system. The mission of the refuge system is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." Preserving the ecological integrity of refuge lands is a key component of the mission. Any use that might be expected to fragment or reduce the quality or quantity of habitat would not be compatible.

A compatible use is one that does not "materially interfere with or detract from" the ability of the refuge to carry out its purposes or fulfill the mission of the refuge system. The compatibility determination is a written determination, based on sound professional judgment, signed and dated by the Refuge Manager and Regional Chief. Consistent with the National Wildlife Refuge System Improvement Act, the Refuge Manager provides an opportunity for the public review and comment on the proposed action. The proposed VAWTS are to be placed in the administrative area of the refuges, within office and housing developments. Therefore, a compatibility determination does not need to be completed.

3.0 AFFECTED ENVIRONMENT

This chapter describes the environment of the area to be affected by the Proposed Action and the No Action Alternative.

3.1 Environmental Resources Analyzed but Not Discussed Further in this Environmental Assessment

3.1.1 Land Use

The VAWTs will be installed on administrative sites of both refuges. These lands have been previously disturbed with development of refuge offices and refuge living quarters. Therefore, the Service has determined that an analysis of land use does not need to be explored.

3.1.2 Air quality

The proposed construction of the wind power system would result in a small quantity of exhaust emissions from construction equipment and fugitive dust from exposed soils

during the short construction phase of the project. This temporary source of air emissions would not require any permits or affect the ability of the two refuges to meet all clean air standards. King Salmon and Cold Bay are currently in attainment for all EPA criteria pollutants (Alaska Department of Environmental Conservation [DEC], 2009). Fugitive dust would be minimized by watering the exposed bare solid surface of the construction site during periods of dry weather. The Proposed Action would decrease diesel fuel consumption, therefore, reducing emissions proportionally. Air quality was not identified as an issue during the scoping process.

3.1.3 Climate

The operation of the VAWTs would result in less greenhouse gas emissions due to the displacement of diesel fuel by renewable wind energy. Reduction of greenhouse gas emissions could have a positive residual impact on the regional climate. However, the potential impact of an incremental change in emissions from one point source is likely to be negligible and cannot be estimated at this time.

3.1.4 Water resources (including wetlands)

There are no surface water sources such as streams or drainage channels that are located on the proposed project sites or that could be affected by the construction and operation of the VAWTs. The proposed project would have no components that could alter or affect groundwater flows or quality.

The areas where the VAWTs are to be placed are highly developed. No wetlands are in the vicinity of the VAWT sites. There would be no placement of fill in jurisdictional wetland on any of the VAWT sites.

3.1.5 Geology

An analysis of the geology at each location of the VAWTs is important to ensure that the substrate is stable and will support the base and monopole. King Salmon is situated in a lowland that is bounded by the northeastern Aleutian Range on the east, the southern Kuskokwim Mountains on the north, and the Ahklun Mountains on the west. Bedrock outcrops occur mainly in the vicinity of Naknek Lake, where deep glacial erosion has stripped surficial deposits from the underlying bedrock. Scattered outcrops northwest of Naknek Lake and northeast of King Salmon consist of plugs, dikes, and lava flows of basaltic composition and subordinate lava flows and breccia of dacitic to andesitic composition (Church et al. 1989). At King Salmon, water wells drilled to 213 feet depth did not reach bedrock, and bedrock is not exposed in bluffs along the Naknek River at King Salmon (Muller, 1952).

Most of the landscape in the Cold Bay area was formed in the last 1 to 2 million years as a result of volcanism and glaciations (McLean, 1979). The distribution of volcanic rocks and surficial deposits are indicated on geologic maps of the area by Wilson et al. (1992).

Surficial deposits are of glacial, volcanic and coastal origin (Wilson et al. 1992). Moraines and other glacial deposits cover most of the lowland near Cold Bay. These deposits are exposed in nearby bluffs and consist of mixed sand and gravel. Rock fragments within the glacial deposits are mostly volcanic (Waldron, 1961). The thickness of glacial drift is unknown. Fine volcanic ash was deposited on exposed glacial deposits as evidenced by several layers of dark reddish-brown and black course-grained ash that are up to 5 inches thick (Waldron, 1961). Coastal deposits are composed of interlayered marine and alluvial deposits with grain sizes ranging from mud to boulders. No permafrost exists in the area of Cold Bay (Ferrians, 1965).

The installation of VAWTs would have no effect on the geology of the area and no issues were identified for geology during the scoping process.

3.1.6 Cultural resources

In accordance with 36 CFR 800.3(a)(1) an agency has no further obligations under section 106 of the National Historic Preservation Act if a project has no potential to cause effects. Debora Corbett, the USWFS, Alaska Regional Historic Preservation Officer, reviewed both projects and determined that the VAWT project will have no potential to cause effects (Appendix D).

3.1.7 Coastal Zone Management

The Service finds the VAWT project at both Alaska Peninsula/Becharof and Izembek NWRs to be fully consistent with policies of the Alaska Coastal Management Program.

3.1.8 Mammals

There are a number of terrestrial mammals that occur at both installation locations, including Arctic ground squirrel (*Spermophilus parryii*), red fox (*Vulpes vulpes*), moose (*Alces alces*), and brown bear (*Ursus arctos*), as well as other native populations of smaller species. However, habitat loss due to the project would be negligible for all mammal species based on the small area affected and abundance of similar habitat in the vicinity of Refuge headquarters and living quarters within King Salmon and Cold Bay. Wright (2008) reported a bear chewing through wires in False Pass during the installation of a wind tower. In response, the installers raised the data logger on the monopole to 25 feet to prevent repeat damage to the wires. Therefore, bear prevention measures will be required as King Salmon has high densities of brown bear. No further adverse effects for terrestrial mammals are likely from the construction and operation of the VAWTs.

Little is known about bats in southwestern Alaska. The little brown bat (*Myotis lucifugus*) is known to occur in King Salmon, but not in Cold Bay. In the contiguous United States, bat mortality has been documented in association with HAWT. Data indicate that danger to bat populations by HAWT is caused by the drop in air pressure behind the large sweep of the rotor area due to blade tip vortices and the aerodynamics of propeller type airfoil rotors (Cryan and Barclay 2009). VAWTs do not develop the same

vortices or low pressure areas, as they do not utilize airfoils to develop rotation, but instead employ compressive moment at the front or concave surface of the rotor. Therefore, no adverse effects to bats as a result of this VAWT project are anticipated.

The following sections describe the baseline (present) conditions in the area of the Proposed Actions. These environmental resources have been selected for further analysis due to their relevance to the Proposed Actions:

- Vegetation and soils
- Threatened and endangered species
- Birds
- Noise
- Visual environment or viewshed

3.1.9 Vegetation and Soils

The majority of the vegetation found on and around the administrative sites of the Alaska Peninsula refuge is dwarf and low shrub, tall shrub, or mixed forest. The dwarf and low shrub is mainly composed of crowberry (*Empetrum nigrum.*), Labrador tea (*Ledum palustre*), kinnikinnick berry (*Arctostaphylos uvi-ursa*), willow (*Salix* spp.), and dwarf birch (*Betula nana*). Taller shrubs include alder (*Alnus viridis*), several species of willows (*Salix* spp.), and Kenai and paper birch (*Betula kenaica* or *B. papyrifera*). Species composition of mixed forest includes: white and black spruce (*Picea glauca* and *P. mariana*), birch, and cottonwood (*Populus balsamifera*). Sedges (Family Cyperaceae), forbs, mosses, lichens, and a variety of native and non-native grasses grow throughout the area and provide ground cover. Several non-native forbs inhabit the administrative area. The area is highly disturbed.

Vegetation around the administrative site of the Izembek Refuge is primarily dwarf to low shrub and forb meadow. The shrubs include salmonberry (*Rubus spectabilis*) and the forbs are a rich assortment including orchids (*Piperia* spp.), monkshood (*Aconitum noveboracense*) and wild strawberry (*Fragaria vesca*). The area is highly disturbed. Except for a few Sitka spruce trees (*Picea sitchensis)*, which are non-native, the area is essentially treeless.

3.1.10 Threatened and Endangered Species

The Endangered Species Act (ESA) protects federally-listed threatened and endangered plant and animal species and their designated critical habitat. Endangered species are those that are in danger of extinction throughout all or a significant portion of their range. Threatened species are those that are likely to become endangered in the near future throughout all or a significant portion of their range.

The Alaska breeding population of the Steller's eider (*Polysticta stelleri*) is currently federally listed as threatened. Steller's eider are highly dependent on eelgrass beds that are dependent on the health of lagoons and bays that promote the growth of eelgrass beds.

Eelgrass communities are among the most diverse and productive ecosystems in the world, providing food and nursery areas for fish, crabs, and many other invertebrates. The invertebrates, in turn, provide an essential food base for Steller's eider and other species (USFWS, 2003).

Steller's eider may use the Naknek River, adjacent to the installation of the VAWTs at Alaska Peninsula/Becharof NWR. Biologists from Alaska Peninsula/Becharof Refuge surveyed the Naknek River from 1991 to 2007 from mid-March to mid-May but did not document Steller's eider in the vicinity of the administrative area. However, a Steller's eider was found injured in 2003, possibly from striking a power line nearby (Appendix E). Steller's eider are infrequently (less than once every three years) observed upstream or downstream of the administrative site in King Salmon.

Steller's eider regularly occur on Izembek NWR with Izembek and Nelson lagoons among their most important molting areas (USFWS 2003). These areas are designated critical habitat for the Steller's eider (66 FR 8849 8884). Refuge staff have reported a total of 44 Steller's eider striking various structures throughout Cold Bay from 1975 to 1983(Appendix F). In 1983, a total of 38 birds were found on December 30, killed by a radar screen at Grant Point. This installation was approximately 8 miles from the project area and was subsequently removed in 1998.

Spectacled eider (*Somateris fischeri*) nest primarily in three areas, the coastal fringe of the Yukon-Koskukwim Delta, the Arctic Coastal Plain of Alaska and the eastern Arctic Coastal Plain of Russia. Important late summer and fall molting areas have been identified in eastern Norton Sound and Ledyard Bay in Alaska, and in Mechigmenskiy Bay and an area offshore between the Kolyma and Indigirka River deltas in Russia. Wintering flocks of spectacled eider, believed to represent the entire worldwide population, have been observed in the Bering Sea between St. Lawrence and St. Matthew islands (USFWS 2006).

Spectacled eiders have not been documented at the Alaska Peninsula/Becharof Refuge administrative site. However, a spectacled eider was sighted on the Naknek River at King Salmon in May, 1995. In addition, two spectacled eiders were found dead, one near the King Salmon control tower and one in the Naknek vicinity (1987 and 1988 respectively).

Spectacled eiders have only very rarely been documented near the Izembek NWR administrative site. A subadult male was observed off the Cold Bay dock in December 2005 and a pair was reported in the 1960's on Izembek Lagoon (Incidental Observation file at INWR). An adult male was observed in Herendeen Bay southeast of Nelson Lagoon in April 1992.

3.1.11 Other Birds

Although no formal surveys have been completed for Alaska Peninsula/Becharof NWR headquarters or Quarters 1 and 2, several species of birds have been documented at

refuge headquarters. Bald eagle (*Haliaeetus leucocephalus*) are commonly observed in the vicinity of refuge headquarters. They are protected under the Bald and Golden Eagle Protection Act of 1940. This act prohibits anyone, except under permit from the Secretary of the Interior, from "taking" bald eagles, their eggs, nests, or any other parts of the birds. The Act defines "take" as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." In addition, black-billed magpie (*Pica hudsonia*) and common raven (*Corvus corax*) use the area. Tree swallow (*Tachycineta bicolor*) nesting boxes are in the vicinity of refuge headquarters. Several species of passerines nest in the area including: American robin (*Turdus migratorius*), golden-crowned sparrow (*Zonotrichia atricsapilla*) black-capped and boreal chickadee (*Poecile atricapilla* and *Poecile hudsonica*), and several species of warbler. Spotted sandpiper (*Actitus macularia*) and semipalmated plover (*Charadrius semipalmatus*) nests have been documented on or very near the headquarters area. Several species of ducks, such as pintail (*Anas acuta*), mallard (*Anas platyrhynchos*) and American wigeon (*Anas americana)* use the immediate area of the river in front of the refuge (Appendix G). Merlin (*Falco columbarius*) have been documented nesting in a woodlot adjacent to the refuge headquarters. The same species of birds use the Quarters 1 and 2 area.

No formal surveys have been conducted for the administrative site at Izembek NWR around the project site. However, bald eagle, black-billed magpie, common raven and other bird species use the area.

3.1.12 Noise

The most common unit of measure used to describe the magnitude of sound levels is the decibel (dB). Sound levels are often stated in terms of decibels on the A-weighted scale (dBA), which is weighted to reflect the sound frequency range of human hearing. The dBA scale is used extensively in the United States (U.S.) to measure community and transportation sound levels, which decrease with distance from the source. Typical sound levels include about 110 dBA for construction noise, 90 dBA for a heavy truck accelerating, 60 dBA for a conversation, and 50 dBA for a quiet office.

Currently, no baseline noise data exists for King Salmon. However, the area surrounding the proposed locations for both refuges can be exceptionally noisy. Summer use of float planes on the Naknek River adjacent to refuge headquarters at Alaska Peninsula/Becharof Refuge and the year around use of airplanes at the King Salmon airport create loud, intermittent noise. At Izembek NWR, the year around use of airplanes at Cold Bay airport can cause loud, intermittent noise.

3.1.13 Visual Environment

The proposed VAWTs would be located in areas already developed with buildings. At refuge headquarters at Alaska Peninsula/Becharof NWR, the VAWT is proposed to be 65 feet tall. This VAWT will be located adjacent to three communication towers, one of which is 67 feet tall. The turbine located at Quarters 1 and 2 will be the highest structures found at that site.

At Izembek NWR headquarters, the VAWTs are proposed to be 25 feet tall. These VAWTs will not be as high as the existing four communication towers (50 feet tall) located adjacent to the headquarters building. Therefore, the VAWTs will not be the tallest structure in the headquarters complex.

4.0 ENVIRONMENTAL CONSEQUENCES

The Proposed Action would install VAWTs on previously disturbed sites within the administrative boundaries of both refuges. No adverse direct or indirect effects of the Proposed Action or of the No Action Alternative on physical or human resources are anticipated. Short-term, construction-related impacts at the site would be mitigated by using best management practices and construction standards to minimize stormwater run-off, noise, fugitive dust, and other typical effects of construction. The operation of the VAWTs may have an effect on birds using the area. Therefore, the Service is implementing the Alaska Wind Guideline protocols to reduce these potential effects. The Proposed Action will benefit both Refuges by reducing their greenhouse gas emissions and may reduce their utility bills.

This chapter provides additional information related to the following resources and the probable impacts of each alternative on these resources:

Table 4.1. A comparison of the likely environmental impacts between the alternatives are summarized below.

Issues	Alternative A (Install Turbines)	Alternative B (No Action)
Vegetation/Soils	At some VAWT locations, a 24' by 24' section of vegetation will be removed to provide the base for the turbines at each location	No impacts
Endangered and Threatened species	Steller's eider may use the adjacent wetlands, rivers, and bays associated with the turbine placement at Cold Bay. They may be affected but are unlikely to be adversely affected by the turbine construction and operation. Spectacled eider are not documented in the vicinity of the VAWT placement at either refuge.	No impacts
Birds	Migratory and residential birds may be affected by the construction and operation of the turbines.	No impacts
Noise	Noise from heavy equipment operation and operation of the turbines.	No impacts
Visual Environment	The turbines may be visible from some locations.	No impacts

4.1 Vegetation and Soils

4.1.1 No Action Alternative

Under the No Action Alternative, the Service would not install the VAWT. Therefore, there would be no federal action. There would be no additional impacts to vegetation or soils at the proposed VAWT sites as a result of the No Action Alternative.

4.1.2 Proposed Action

Under the Proposed Action, at some locations but not all, vegetation may have to be cleared or disturbed by the construction and installation of the VAWTs. Much of the vegetation is non-native grass or forbs, or secondary growth from previous disturbance. Any native habitat that would be affected by this action is neither rare nor unique to the

area and does not contain any critical habitat for any federally listed threatened or endangered species. The area affected by the VAWT foundations would be 24' by 24' for each VAWT.

4.2 Endangered and Threatened Species

4.2.1 No Action Alternative

Under the No Action Alternative, the Service would not install the VAWTs. Therefore, there would be no federal action and there would be no impacts to ESA-listed species or their critical habitat as a result of the No Action Alternative.

4.2.2 Proposed Action

Steller's and Spectacled eider are considered rare in King Salmon. However, Steller's eider have been documented molting and wintering in adjacent Bristol Bay and along the Pacific Coast of Alaska Peninsula and Becharof Refuge.

With the small number of Steller's and spectacled eider sighted in the King Salmon area, the ES office of the Service has determined that the project may affect but is not likely to adversely affect either species.

Steller's eider adults use Izembek and Nelson lagoons for molting. However, these lagoons are approximately 5.5 and 80 miles from the project sites respectively. Steller's eider also use portions of Cold Bay during winter, some areas being less than 0.5 miles from the project site. However, these birds have never been documented flying over the project site area. Therefore, the Service has determined that the project may affect but is not likely to adversely affect either species or their critical habitat.

Both refuges consulted with the ES office. A term and condition in their respective intra-Service Section 7 permit was to ensure that all transmissions lines from the turbines be underground. Both refuges will adhere to this term and condition.

4.3 Bird Impacts

4.3.1 No Action Alternative

Under the No Action Alternative, the Service would not install the VAWTs. Therefore, there would be no federal action and there would be additional impacts to birds as a result of the No Action Alternative.

4.3.2 Proposed Action

Both the construction and operation of the VAWTs at both Refuges may disturb birds and may alter their use patterns in the immediate vicinities of the VAWTs. However, due the low use of birds in the vicinity of the VAWTs, the Service has determined that there will

be little or no impact to existing bird use. However, both Refuges will be implementing post construction surveys and adhering to the Alaska Wind Turbine Guidelines.

The Bureau of Land Management (BLM) recently completed a Programmatic Environmental Impact Statement on wind power development in the western states, excluding Alaska (BLM, 2005). No similar document has been prepared for Alaska. These data represent analysis of HAWTs not VAWTs. However, the BLM document compared bird abundance and postconstruction mortality studies at numerous existing wind farms across the country and found that there was little correlation between species that are present in an area and those that are killed in collisions with wind turbines. The document concluded that not all species are prone to collisions at wind farms, probably through a combination of their typical flight patterns, their abilities to perceive the turbines, and their abilities to avoid the turbines. The BLM document notes that no bald eagles have been reported to be killed at any wind power farm in the western states. Corvids (ravens, crows, and magpies) are also apparently able to avoid collisions judging by their common frequency of occurrence versus their rare frequency of mortality. Erickson et al. (2001) also compared bird mortality rates at various wind developments and found a similar pattern: no bald eagles killed and relatively few ravens killed. According to manufactures of VAWTs (Helix Wind; Tangarie Alternative Power), VAWTs appear to be safe for wildlife because they spin at much lower speeds than horizontal turbines and appear as a solid mass rather than a sharp blurring blade that a bird or bat cannot see or detect. The compact design may also reduce harm to wildlife.

4.4 Noise

4.4.1 No Action Alternative

Under the No Action Alternative, the Service would not install the VAWTs. Therefore, there would be no federal action and there would be no additional noise impacts at the project site as a result of the No Action Alternative.

4.4.2 Proposed Action

During construction of the VAWTs, sound frequencies and levels would depend on the specific construction equipment used, the amount of equipment operating simultaneously, and hours of operation. It is anticipated that typical construction equipment would be used and that the hours of operation would occur only during normal working hours. In addition, it is anticipated that the construction activities would occur over a relatively short period.

When operating, HAWTs produce a "swishing" or "whooshing" sound as their rotating blades encounter turbulence in the passing air, as well as some sounds from the mechanical parts such as the gearbox, generator, and cooling fans. At a distance of approximately 600 to 900 feet, the sounds generated by a wind turbine are frequently masked by the "background noise" of winds blowing through alders and brush or moving around obstacles. Wind turbines are typically quiet enough for people to hold a normal

conversation while standing at the base of the tower. Helixwind conducted an assessment of noise from a VAWT. At low wind speeds (<14 mph) it was difficult to measure any quantifiable difference in noise levels between the turbine running and stopped. Above 14 mph measurements varied between 0 and 4 dBA between operating and stopped. In both cases, the ambient noise levels with the VAWT stopped varied by 5 to 10 dBA (www.helixwind.com).

There are three structures or areas where people are often or consistently gathered and that may be affected by chronic sound levels that would have potential impacts from the Proposed Action. At Alaska Peninsula/Becharof refuge, one location is the refuge office area. This area can be used by 25 refuge staff plus any persons staying at the duplex. The other VAWT is located adjacent to refuge quarters, where five people reside. At Izembek NWR, VAWTs are proposed for Refuge headquarters and living quarters. At any one time, five people could be around the VAWTs. Noise from VAWTs has been documented between 0 and 4dBA and may be considered back ground noise due to the wind velocities at both refuges. However, whether or not this additional sound from the VAWT is considered an annoyance is subjective.

4.5 View shed

4.5.1 No Action Alternative

Under the No Action Alternative, the Service would not install the VAWTs. Therefore, there would be no federal action and there would be no additional visual impacts to the project site as a result of the No Action Alternative.

4.5.2 Proposed Action

The VAWTs at Alaska Peninsula/Becharof Refuge headquarters area would be visible. However, it would be shorter than the communication tower mounted adjacent to the area by the State of Alaska. As stated before, there are three existing communication towers adjacent to the refuge administrative lands. These towers range in height from approximately 60 feet to 67 feet. The addition of two VAWTs at refuge headquarters would not be the tallest structure visible. The VAWTs proposed for Quarters 1 and 2 would be visible from the Alaska Peninsula highway. They would be the tallest structures in the area.

At Izembek NWR, the VAWTs will not be the tallest structures. These VAWTs will not be as high as the existing four communication towers (50' tall) located adjacent to the headquarters building. Therefore, the installation of the VAWTs will not disrupt the view shed in Cold Bay.

5.0 Mitigation Measures

5.1 Vegetation and Soils

A permanent loss of approximately 24 ft by 24 ft of vegetation may occur at some VAWT locations. Not all installation locations have vegetation that will need to be removed. The loss is due to the installation of the base of the VAWT. The remainder of the affected area would be maintained by mechanical cutting of vegetation to keep it low in order to facilitate documentation of bird collision mortality. To reduce the impacts to the vegetation, all footings will be dug by hand and materials (soils/dirt) removed for footing installations would be scattered outside the installation footprint. Cabling will be buried at each turbine location but this loss of vegetation will not be permanent. Vegetation would be cut by hand and folded back in sections for the length of the power corridor. The powerline would be laid on the humus layer and the vegetation mat restored to its original position. The vegetation mat should resume growing naturally within one summer.

5.2 Threatened and endangered species

Both Refuges have consulted with the Service's ES office. The Service has determined that the construction of the VAWTs may affect, but not likely adversely affect, either species of eider or their critical habitat. However, the refuges must comply with the Alaska Wind Turbine Guidelines and conduct post-construction surveys around the VAWTs. These surveys would help reduce uncertainty regarding potential adverse effects to listed species. The refuges would notify the ES office immediately if any ESA-listed species are found during the post-construction mortality surveys and would consult with them regarding the need for any mitigation measures. However, with the VAWTs, the Service is not expecting any take of listed species.

5.3 Other Bird Impacts

HAWTs are known to cause some degree of mortality to individual birds. The national average collision-related mortality for birds at wind farms is low (<3 birds/turbine/yr; Erickson et al., 2001). Collision mortality rate for birds based on rotor sweep area (RSA) for western and midwestern wind farms is 1.1 to 5.6 birds/3,000 m2 and as measured by megawatt (MW) of the turbines, the collision mortality rate ranges from 0.9 to 4.7 birds/MW (Erickson, 2003). Data for VAWTs has not been published; however the manufactures of VAWTs cite the solid shape of the turbines as a deterrent for bird strikes (HelixWind, Tangerie).

Based on the locations of these turbines, the low occurrence of birds in the general area, and the low susceptibility to collision-related morality for the common birds that use the area (i.e. bald eagles, corvids and other passerines - especially in the summer), avian collision mortality as a result of the Proposed Action is expected to be low and not adversely affect any local bird populations. With the VAWTs, the Service is not expecting any impacts to birds.

The Service has published interim guidelines for wind power projects to minimize the potential risks of bird fatalities due to collisions (USFWS, 2009). Many of these guidelines pertain to siting considerations and are more pertinent to much larger projects. The monitoring along with overall project evaluation will help the Service determine if we should place similar wind turbines at other administrative sites in rural Alaska. However, the following recommendations would be implemented:

1) Anti-perching devices would be placed on each VAWTs nacelle (if necessary) to discourage perching or nesting on the VAWTs. These activities would greatly decrease the potential for bird collisions.

2) Anti-perching devices (if applicable) would be installed on electric poles in adjacent areas to discourage perching and reduce the potential for electrocution, especially for bald eagles. The VAWTs would not have external ladders or other structures that would allow birds to perch anywhere near the VAWT.

3) Structures with guy wires would be avoided. The VAWT would be self-supporting monopoles.

4) Any electric transmission lines from the VAWT to the electrical box would be buried below ground.

5) No lighting will be used on the VAWT towers (limited to what is necessary for aviation safety), unless otherwise determined by FAA.

6) A post-construction monitoring plan would be implemented for a minimum of two years, starting immediately after construction, to determine if birds are killed by collisions with the VAWT. The post-construction monitoring plan will be developed by Refuge staff biologists, but at the very least, they would sample for potential seasonal variations in bird collisions, with an emphasis on the fall and spring migration seasons when bird activity is expected to be highest. Carcass searches would be conducted at a frequency that minimizes the potential for bias from scavengers that may include searching the VAWT locations on a daily basis during the spring and fall migration. The following elements would be incorporated into the post-construction monitoring plan:

a) Surveys would be conducted by trained observers who would record their name, date, time, and standard weather variables.

b) Each survey would include a search for dead or injured birds beneath each VAWT, conducted on foot by slowly walking transect lines. To date, survey methods for VAWT have not been developed. However, methods do exist for HAWT (California Energy Commission and California Department of Fish and Game [CEC/CDFG], 2007). Therefore, Refuge biologists will develop appropriate methods to survey VAWT based on existing methods.

c) If any bird is found, data would be collected on the following: its position relative to the VAWT; species (if possible); condition of the carcass; and evidence of scavenging. Refuge staff would establish a file for all search results, including records for searches when no birds were found.

6.0 RESIDUAL IMPACTS

6.1 Bird Collisions

The Service recognizes that there may be some bird collisions with VAWT even if all of their wind guidelines are followed (USFWS, 2009). Given the relatively low numbers of birds that have been observed using the project areas, the potential for future bird fatalities as a result of the Proposed Action is considered to be very low. The actual level of collision related mortalities would be monitored by conducting a post-construction monitoring study at the VAWTs to determine the numbers and species of birds killed by collisions with the VAWTs. If post-construction monitoring indicates that bird collision rates are higher than expected or occur under particular conditions or seasons, additional measures would be taken by the Service to reduce residual effects. For instance, shut down the VAWTs if several birds are found dead in the immediate vicinity of the VAWT.

6.2 Noise

Manufactures of construction equipment are required to adhere to noise standards. These standards make it unlikely that excessive noise would be generated from the construction operations. All construction operations would occur during normal working hours. No other measures are recommended at this time.

Daily VAWT operation is expected to generate residual noise impacts. However, based on data collected by manufacturers of VAWT, the noise levels would be low near the VAWTs and would be considered to have minor impacts.

6.3 View shed

The construction and operation of the Proposed Action would comply with all required regulatory statutes set forth by federal, state, and local regulatory agencies, including FAA Advisory circular 70/7460-1K. No additional measures or monitoring is recommended at this time.

The VAWTs would create residual visible impacts from numerous points in the both King Salmon and Cold Bay communities. However, this issue did not come up in public scoping. The residual visual impacts are therefore considered minimal.

6.4 Irreversible And Irretrievable Commitments Of Resources

An irreversible and irretrievable commitment of resources is defined as a permanent reduction or loss of a resource that, once lost, cannot be regained. The primary

irretrievable and irreversible commitment of resources for the Proposed Action would be the labor, materials, and energy expended in clearing the site and constructing the 11 VAWTs. Other commitments include the loss of productivity of the sites (primary production and wildlife habitat) and the loss of an unknown number of birds due to collision with the VAWTs. These commitments of resources would extend for the duration of the project. The Service is considering a five year maintenance contract with the VAWT contractor to ensure performance of the VAWT.

7.0 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts associated with the Proposed Action include:

1) Long-term loss of approximately 0.1 acres of vegetation resulting from the construction of VAWT foundations.

2) Increase in noise levels during construction of the foundations and erecting of the VAWTs.

3) Increase in noise levels to employees and residents working/living close to the VAWT sites.

4) Addition of 11 vertical elements into the existing King Salmon and Cold Bay viewshed.

5) Potential direct impacts to birds from collision with the VAWTs. These impacts are both temporary, in the case of the construction noise, and long-term in regards to the visual impacts and impacts to birds from potential collisions. Overall, impacts of the Proposed Action on the environment are considered negligible.

8.0 CUMULATIVE IMPACTS

Cumulative impacts result from the incremental impacts of an action that is added to other past, present, and reasonably foreseeable future actions (RFFAs), regardless of who is responsible for such actions. Cumulative impacts may result from individually minor, but collectively significant, actions occurring over a period of time (40 CFR 1508.7). The process of assessing cumulative effects therefore requires the agency to put the potential impacts of the proposed project into the context of the existing baseline conditions and projected impacts from other RFFAs. The baseline conditions for both King Salmon and Cold Bay and the potential impacts of the project are described in Chapters 1, 2, and 3 of this document. Past and present actions that have contributed to effects on birds have included the three towers that are co-located near refuge headquarters at Alaska Peninsula/Becharof NWR; the communication tower adjacent to Quarters 1 and 2; the powerlines adjacent to refuge headquarters and quarters 1 and 2; the existing four communication towers (50' tall) located adjacent to Refuge headquarters building at Cold Bay. The Service is unaware of any other RFFAs within the general project area that could contribute to any cumulative impacts.

The analysis of environmental consequences in Chapter 4 indicates that, relative to the existing baseline conditions, the proposed project would have minimal impacts on land use, coastal zone resources, vegetation and soils, threatened and endangered species, noise, and visual landscape. The Proposed Action would have negligible contribution to the overall cumulative effect. Past and present actions that have contributed to collision hazards for birds include the old communication towers and power lines. The Proposed Action would contribute to any cumulative effect on bird collision mortality; however, the overall cumulative effect would be nominal.

In conclusion, Alternative A, the installation and operation of 11 VAWTs would have a negligible long-term negative effect on refuge resources. The level of impact to natural resources from Alternative A would not result in impairment of refuge resources that fulfill specific purposes identified in the refuges enabling legislation or that are essential to the natural and cultural integrity of the refuges.

REFERENCES CITED

Alaska Department of Environmental Conservation (DEC), 2009. Air Non-Point and Mobile Services. Available online: www.dec.state.ak.us/air/anpms/comm/comm.htm

Alaska Energy Authority (AEA), 2009. Alternative Energy and Energy Efficiency Assistant Plan, p. 3.Available online: http://www.akenergyauthority.org/programsalternative(2).html

Bureau of Land Management. 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. Prepared by Argonne National Laboratory for BLM, Washington, D.C.,

CEC/CDFG (California Energy Commission and California Department of Fish and Game). 2007. California guidelines for reducing impacts to birds and bats from wind energy development. California Energy Commission and California Department of Fish and Game, Report No. CEC-700-2007-08-CTF. 125 pp.

Church, S.E., Bailey, E.A., and Riehle, J.R., 1989, Geochemical map showing the distribution of selected elements determined in stream sediments from the Mount Katmai and parts of the Afognak and Naknek Quadrangles, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-2021-A, 1:250,000 scale.

Cryan, P.M. and Barclay, R. M. R. 2009. Caused of Bat Fatalities at Wind Turbines; Hypotheses and Predictions. Journal of Mammalogy, 90(6):1330-1340.

Detterman, R.L., 1986, Glaciation of the Alaska Peninsula, *in* Hamilton, T.D., Reed, K.M., and Thorson, R.M. eds., Glaciation in Alaska--The geologic record: Anchorage, Alaska Geological Society, p. 15 1-170.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, K.J. Sernka, and R.E. Good, 2001. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States. prepared by Western EcoSystems Technology, Inc., Cheyenne, Wyo., for the National Wind Coordinating Committee, Washington, D.C.

Erickson, W.P., 2003. Updated information regarding bird and bat mortality and risk at new generation wind projects in the west and Midwest. Presentation to the National Wind Coordination Committee meeting, "How is Biological Significance determined when Assessing Possible Impact?" Washington, D.C. November 17-18, 2003.

Ferrians, O. J., Jr. 1965. Permafrost map of Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations. Map I-445, 1 sheet, scale 1:*250,000.*

Hartman, C.W., and Johnson, P.R., 1984, Environmental atlas of Alaska: University of Alaska Fairbanks, Institute of Water Resources/Engineering Experiment Station, 95 p.

HelixWind. http://www.helixwind.com/en/index.php

McLean, H. 1979, Observations on the geology and petroleum potential of *the* Cold Bay-False Pass area, Alaska Peninsula: U.S, Geological Survey Open-File Report 79-1 60534 p.

Moritz, R.E., 1979, Synoptic climatology of the Beaufort Sea Coast of Alaska: University of Colorado, Institute of Arctic and Alpine Research Occasional Paper No. 30, 176 p.

Muller, E.H., 1952, The glacial geology of the Naknek district, the Bristol Bay region, Alaska: Champaign, Ill., University of Illinois, Ph.D. dissertation, 98 p.

National Oceanic and Atmospheric Administration, 1980, Climates of the States: Detroit, Gale Research Company. 1.

Reed, R.J., and Kunkel, B.J., 1960, The arctic circulation in summer: Journal of Meteorology, v. 17, p. 489-506.

Selkregg, L., 1976, Alaska regional profiles--southwest region: University of Alaska, Arctic Environmental Information
and Data Center, 3 13 p.

Streten, N.A., 1974, Some features of the summer climate of interior Alaska: Arctic, v. 27, p. 273-286.

Tangarie – Gale Wind. http://www.tangarie.com/

U.S. Census Bureau. 2000. http://www.census.gov/main/www/cen2000.html

United States Fish and Wildlife Service (USFWS), 2009. Izembek National Wildlife Refuge website: www.fws.gov/refuges/profiles/WildHabitat.

United States Fish and Wildlife Service (USFWS). 2009. Guidelines for Building and Operation Wind Energy Facilities in Alaska. Alaska Region.

United States Fish and Wildlife Service (USFWS). 2003. Sea Duck Information Series: Steller's Eider.

United States Fish and Wildlife Service (USFWS). 2006. Sea Duck Information Series: Spectacled Eider.

United States Fish and Wildlife Service (USFWS). 2001. Final Determination of Critical Habitat for the Alaska-Breeding Population of Steller's Eider; Final Rule.

Wahrhaftig, C., 1965, Physiographic divisions of Alaska: U.S. Geological Survey Professional Paper 482, 52 p.

Waldron, H.H. 1961. Geological reconnaissance of Frosty Peak volcano and vicinity, Alaska: U.S. Geological Survey Bulletin 1028-T p. 677-708.

Wilson, F.H., Miller, T.P. and Detterman, RL. 1992. Preliminary geologic map of the Cold Bay and False Pass quadrangles, Alaska Peninsula: U.S. Geological Survey Open-File Report 92-56, 10 p.

Wright, B. and Fredenberg, C. 2008. Wind Energy Development in the Aleutian Pribilof Islands. Presentation.

LIST OF PREPARERS

The following persons were primarily responsible for preparation of this EA:

Stephanie Brady, USFWS, Natural Resource Planner, King Salmon, AK

Bruce Casler, USFWS, Wildlife Biologist, Izembek NWR, Cold Bay, AK

Susan Savage, USFWS, Wildlife Biologist, Alaska Peninsula/Becharof NWR, King Salmon, AK

Dominique Watts, USFWS, Wildlife Biologist, Alaska Peninsula/Becharof NWR, King Salmon, AK

Appendix A. Public Scoping Documents from Alaska Peninsula/Becharof and Izembek NWRs.

U.S. FISH AND WILDLIFE SERVICE

ALASKA PENINSULA/BECHAROF NATIONAL WILDLIFE REFUGE

INFORMATION SHEET

PLACEMENT OF THREE VERTICAL AXIS TURBINES ON REFUGE ADMINISTRATIVE LANDS

The U.S. Fish and Wildlife Service (USFWS) Alaska Peninsula/Becharof National Wildlife Refuge is considering placing three vertical axis wind turbines (VAWT) on refuge administrative lands. The funding for this project is provided by the American Recovery and Reinvestment Act.

The installation of wind turbines will help reduce the refuge's greenhouse gas emissions and save the federal government money by decreasing utility costs. The USFWS is under the mandate of Executive Order 13423, (Strengthening Federal Environmental, Energy, and Transportation Management), requiring federal agencies to "lead by example in advancing the nation's energy security and environmental performance" by achieving a number of goals, including increased purchases of renewable power sources and increased usage of renewable power. Thus, the installation of turbines will reduce the use of diesel at the refuge.

The Service is proposing the placement of three turbines on lands administered by the refuge. The locations are: Headquarters Duplex (Quarters 5); Quarters 1 and Quarters 2.

These turbines are the preferred small-scale, renewable electrical power source over more conventional propeller-driven wind generators, based on comparable performance, 25-year reliable history of operation in cold climates, proven viability and favorable environmental and operational characteristics.

Wind power correlates directly with wind speed and swept area. Vertical axis wind turbines don't produce more power than conventional wind generators but they can produce more kilo-watt

An example of a Vertical Axis Wind Turbine.

hours (kWh) per year than horizontal axis generators of equal swept area because they harvest wind over a much broader spectrum of wind speeds (4 miles per hour (mph) to 120 mph). Individual turbines will be rated between 5 and 10kWh each. These turbines are approximately 60

feet above ground and will take up eight feet by eight feet of surface area on the ground.

The Service will evaluate the proposed wind turbine project through the National Environmental Policy Act (NEPA) compliance process. The NEPA process is designed to involve the public and gather and analyze the best available information before the Service makes a decision. We are currently in the process of preparing an Environmental Assessment (EA) on the wind turbine project.

The EA will identify potential impacts that the proposed wind turbine installation project could have on the environment, as well as identify measures to mitigate these impacts. As the lead agency, the USFWS is responsible for the development of the EA, which includes:

- A process for public participation
- Identifying project issues and concerns
- Identifying the purpose and need for the proposed action
- Describing the affected environment
- Developing alternatives
- Evaluating the effects of the alternatives for the proposed project

The schedule for the proposed EA is as follows:

Public Scoping	November 2009
Public Comment on EA	January 2010
Final EA	April 2010

We are requesting input from federal and state agencies, local governments, private organizations, refuge users, and the public to help identify the issues associated with the proposed project. Public scoping comments can be submitted to the USFWS using the following methods:

- Electronically through the USFWS Alaska Peninsula/Becharof Refuge Manager Bill Schaff at bill_schaff@fws.gov
- Mail comments to:

  Refuge Manager – Bill Schaff
  Alaska Peninsula/Becharof NWR
  P.O. Box 277
  King Salmon, AK 99613

- Fax comments to: (907)246-6696

This is not the only opportunity you will have to comment on this project. When the EA has been prepared and distributed, you will have an opportunity to make further comments. If you would like to be kept informed about this project, please complete and return the "Interest Response Form" and you will be placed on the mailing list.

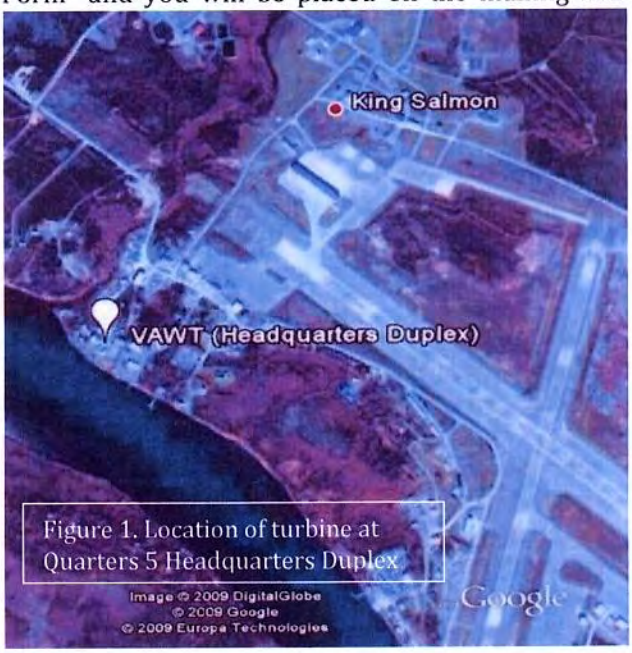


Figure 1. Location of turbine at Quarters 5 Headquarters Duplex

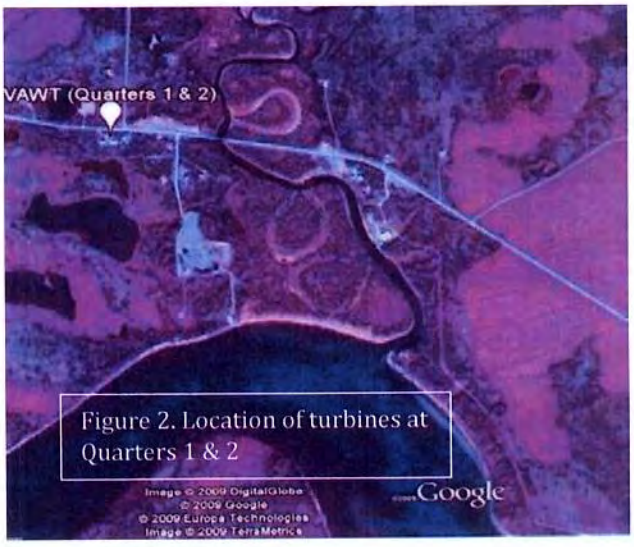


Figure 2. Location of turbines at Quarters 1 & 2

U.S. FISH AND WILDLIFE SERVICE

IZEMBEK
NATIONAL WILDLIFE REFUGE

INFORMATION SHEET

PLACEMENT OF SIX VERTICAL AXIS TURBINES ON REFUGE ADMINISTRATIVE LANDS

The U.S. Fish and Wildlife Service (USFWS) Izembek National Wildlife Refuge is considering placing six vertical axis wind turbines (VAWT) on refuge administrative lands. The funding for this project is provided by the American Recovery and Reinvestment Act.

The installation of wind turbines will help reduce the refuge's greenhouse gas emissions and could save the federal government money by decreasing utility costs. The USFWS is under the mandate of Executive Order 13423, (Strengthening Federal Environmental, Energy, and Transportation Management), requiring federal agencies to "lead by example in advancing the nation's energy security and environmental performance" by achieving a number of goals, including increased purchases of renewable power sources and increased usage of renewable power. Thus, the installation of turbines will reduce the use of diesel at the refuge.

The Service is proposing the placement of six turbines on lands administered by the refuge. The locations are: Headquarters and Duplex building.

These turbines are the preferred small-scale, renewable electrical power source over more conventional propeller-driven wind generators, based on comparable performance, 25-year reliable history of operation in cold climates, proven viability and favorable environmental and operational characteristics.

Wind power correlates directly with wind speed and swept area. Vertical axis wind turbines don't produce more power than conventional wind generators but they can produce more kilo-watt hours (kWh) per year than horizontal axis generators of equal swept area because they harvest wind over a much broader spectrum of wind speeds (4 miles per hour (mph) to 120 mph). Individual turbines will be rated between 5 and 10kWh each. These turbines are approximately 60

An example of a Vertical Axis Wind Turbine.

feet above ground and will take up eight feet by eight feet of surface area on the ground.

The Service will evaluate the proposed wind turbine project through the National Environmental Policy Act (NEPA) compliance process. The NEPA process is designed to involve the public and gather and analyze the best available information before the Service makes a decision. We are currently in the process of preparing an Environmental Assessment (EA) on the wind turbine project.

The EA will identify potential impacts that the proposed wind turbine installation project could have on the environment, as well as identify measures to mitigate these impacts. As the lead agency, the USFWS is responsible for the development of the EA, which includes:

- A process for public participation
- Identifying project issues and concerns
- Identifying the purpose and need for the proposed action
- Describing the affected environment
- Developing alternatives
- Evaluating the effects of the alternatives for the proposed project

The schedule for the proposed EA is as follows:

Public Scoping	November 2009
Public Comment on EA	January 2010
Final EA	April 2010

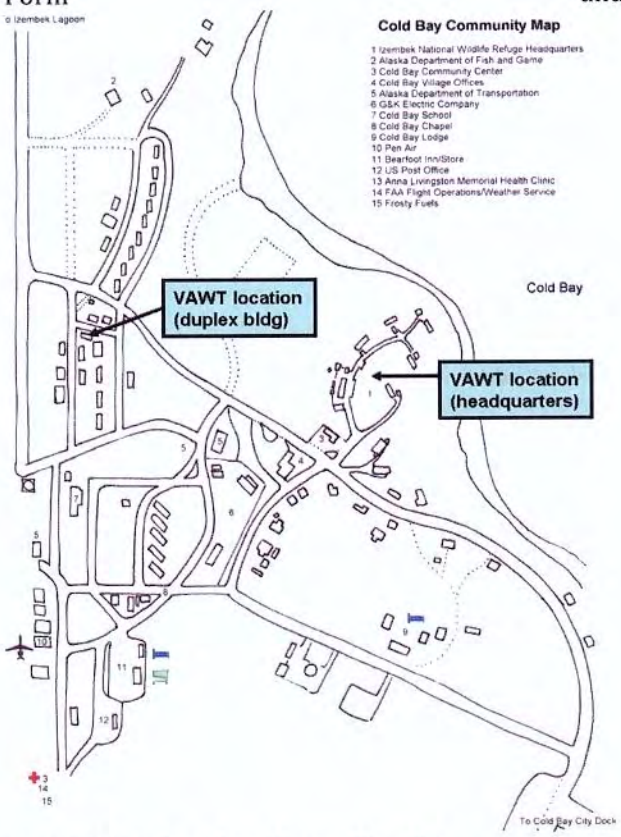
We are requesting input from federal and state agencies, local governments, private organizations, refuge users, and the public to help identify the issues associated with the proposed project. Public scoping comments can be submitted to the USFWS using the following methods:

- Electronically through the USFWS Izembek Refuge Manager Nancy Hoffman nancy_hoffman@fws.gov
- Mail comments to:

  Refuge Manager – Nancy Hoffman
  Izembek NWR
  P.O. Box 127
  Cold Bay, AK 99571

- Fax comments to: (907)532-2549

This is not the only opportunity you will have to comment on this project. When the EA has been prepared and distributed, you will have an opportunity to make further comments. If you would like to be kept informed about this project, please complete and return the "Interest Response Form" and you will be placed on the mailing list.



Appendix B – Consistency with the Alaska Coastal Management Program

Section 307© of the Coastal Zone Management Act of 1972, as amended (PL 92-583), states that 'each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved State coastal management programs."

The Alaska Coastal Management Act of 1977, as amended, and the Alaska Coastal Management Program set forth general policies to be used for the review of projects. The Bristol Bay Borough encompasses the Alaska Peninsula/Becharof NWR administrative lands. The Aleutians East Borough encompasses Izembek NWR administrative lands.

The U.S. Fish and Wildlife Service finds the proposed vertical axis wind turbine project to be fully consistent with policies of the Alaska Coastal Management Program, the Bristol Bay Borough Coastal Management Plan and the Aleutians East Borough Coastal Management Plan.

Appendix C. Intra-Section 7 Consultations from Alaska Peninsula/Becharof and Izembek NWRs.

Intra-Service Section 7 Biological Evaluation Form

Region 7

Originating Person: Nancy Hoffman Date Submitted: 1/19/2010

Telephone Number: 907-532-2445

I. **Service Program and Geographic Area or Station Name**:

Izembek National Wildlife Refuge; Cold Bay, Alaska

III. **Species/Critical Habitat**: List federally-listed, proposed, and candidate species and designated or proposed critical habitat that occur or may occur within the action area:

Steller's eider (*Polysticta stelleri*)
Spectacled eider (*Somateria fischeri*)

IV **Location**: Location of the project including County, State, and section, township, & range. Attach map(s) if appropriate. Include any information that will assist in evaluating potential effects (e.g., location of specie/habitat, distance and direction to nearest town, etc.):

Aleutians East Borough; Cold Bay, Alaska (see Map 1)
Sec. 25, T057S, R089W

Refuge Headquarters building, (see Figure 1)
Living Quarters 1 – 4 and Bunkhouse (see Figure 1)

I. **Project Description:** Describe proposed project or action or, if referencing other documents (e.g. the Grant Proposal), prepare an executive summary containing the pertinent information (attach additional pages as needed):

The proposed activity is to install (3-4) vertical axis wind turbines (VAWT) in Cold Bay, AK on refuge administrative lands. All three VAWTs are proposed to be installed in the developed area at refuge headquarters/living quarters area. The VAWT proposed is designed by Tangerie Alternative Power and is a drag turbine system. The turbines will be affixed to a monopole, with no guy wires, and will be approximately 25 feet in height, transmission lines will be underground. Funding for this project was granted through the American Recovery and Reinvestment Act. The primary purpose of this project is to reduce refuges greenhouse gas emissions as required by Executive Order 13423 and 13514. In addition, this project will reduce the refuges use of heating fuel.

VI. **Determination of Effects:**

(A) Description of Effects: Describe the effects of the action(s) on the species and critical habitats listed in item III. For each section 7 determination made below, attach an explanation of such determination for all applicable species or critical habitat. Documentation should include a brief discussion of each of the following: 1) species status both within and outside the action area - population trends, distribution in and around the action area, 2) habitat status - critical or noncritical; species use such as breeding, sheltering, and feeding in and around the action area, and 3) impacts of the action - how the proposed action will affect species/critical habitat (consider direct, indirect, and cumulative effects). Beneficial and adverse effects, as well as actions to avoid or minimize adverse effects, should be identified (attach additional pages as needed).

Steller's eider regularly occur on Izembek NWR in the winter, with Izembek and Nelson lagoons among the most important molting areas. Both of these lagoons are designated critical habitat for the Steller's eider. However, these lagoons are approximately 5.5 and 70 miles from the project site, respectively. Steller's eider also utilize portions of Cold Bay during winter, some areas being less than 0.5 miles from the project site. While these birds use the bay and coastal areas, they have never been documented flying over the project site area.

Spectacled eiders have only very rarely been documented near Izembek NWR administrative lands. A subadult male was observed off the Cold Bay dock (12/30/2005) and a pair was reported in the 1960's on Izembek Lagoon. An adult male was also observed in Herendeen Bay southeast of Nelson Lagoon on 4/7/1992.

The turbine location at refuge headquarters is near the waters of Cold Bay (see Map 1) but it is not in an area where ducks are known to fly across land. Additionally, three 40 foot tall communications towers stand adjacent to the proposed turbine location. Two of these towers include guy wires between them and to the ground. There are no documented bird strikes related to these towers. The turbines will be approximately 600-800 feet from the waters edge of Cold Bay.

The VAWT was chosen by the Service because these types of turbines do not have a similar plane of sweep to intersect the flight path of birds. Additionally, the rotor structure is of solid material that inhabits a defined space at all times of rotation; so the perception of sight influenced wildlife would be of a solid object. It would consist of a six foot VAWT affixed to monopole, with no guy wires, standing vertical adjacent to refuge headquarters or adjacent to existing residences, transmission lines will be underground.

VI. **Determination of Effects** (continued):
(B) Determination: Determine the anticipated effects of the proposed project on species and critical habitats listed in item III. Check all applicable boxes and list the species associated with each determination.

	Response requested
G *"No Effect"* This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) a listed/proposed/candidate species or designated/proposed critical habitat of such species. List species applicable to this determination (or attach a list):	_____ Concurrence
G *"May Affect but Not Likely to Adversely Affect species/critical habitat"* This determination is appropriate when the proposed project is not likely to adversely impact a listed species or designated critical habitat of such species. List species applicable to this determination (or attach a list):	__X___ Concurrence Steller's eider Spectacled eider
G *"May Affect and Likely to Adversely Affect species/critical habitat"* This determination is appropriate when the proposed project is likely to adversely impact a listed species or designated critical habitat of such species. List species applicable to this determination (or attach a list):	_____ Formal Consultation
G *" Not Likely to Jeopardize candidate or proposed species/critical habitat"* This determination is appropriate when the proposed project is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. List species applicable to this determination (or attach a list)	____ Concurrence Informal Conference optional
G *"Likely to Jeopardize candidate or proposed species/critical habitat"* This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. List species applicable to this determination (or attach a list):	____ Formal Conference

Signature
Nancy Hoffman, Refuge Manager

20 January 2010
Date

Reviewing Ecological Services Office Evaluation (check all that apply):

A. **Concurrence** X **Nonconcurrence** _____

Explanation for nonconcurrence:

B. Formal consultation required _____
List species or critical habitat unit

C. Conference required _____
List species or critical habitat unit

E. W. i — 1/21/10

Signature [Reviewing ES Office Supervisor] Date

Name of Reviewing ES Office

Consultation # 2010-0054

Intra-Service Section 7 Biological Evaluation Form
Region 7

Originating Person: Michael Brady Date Submitted: 1/11/2010

Telephone Number: 907-246-1201

I. **Service Program and Geographic Area or Station Name:**

Alaska Peninsula/Becharof National Wildlife Refuge

III. **Species/Critical Habitat**: List federally-listed, proposed. and candidate species and designated or proposed critical habitat that occur or may occur within the action area:

Steller's eider (*Polysticta stelleri*)
Spectacled eider (*Somateria fischeri*)

IV **Location**: Location of the project including County, State, and section, township, & range. Attach map(s) if appropriate. Include any information that will assist in evaluating potential effects (e.g., location of specie/habitat. distance and direction to nearest town, etc.):

Headquarters building, 4 Bear Road. King Salmon AK, 99613 (see Map 1)
Quarters 1 and 2. located on at Mile 6, Peninsula Highway (see Map 2)

I. **Project Description:** Describe proposed project or action or, if referencing other documents (e.g. the Grant Proposal), prepare an executive summary containing the pertinent information (attach additional pages as needed):

The proposed activity is to install (2) vertical axis wind turbines (VAWT) in King Salmon. AK on refuge administrative lands. One VAWT is proposed to be installed in the developed area at refuge headquarters and one VAWT is proposed to be installed behind Quarters 1 and 2. The VAWT proposed for both locations is designed by We Power and is a lift turbine system. The turbines will be affixed to a monopole. with no guy wires. and will be approximately 60 feet in height. transmission lines will be underground. Funding for this project was granted through the American Recovery and Reinvestment Act. The primary purpose of this project is to reduce refuges greenhouse gas emissions as required by Executive Order 13423 and 13514. In addition. this project will reduce the refuges use of heating fuel.

VI. **Determination of Effects:**

(A) Description of Effects: Describe the effects of the action(s) on the species and critical habitats listed in item III. For each section 7 determination made below, attach an explanation of such determination for all applicable species or critical habitat. Documentation should include a brief discussion of each of the following: 1) species status both within and outside the action area - population trends. distribution in and around the action area, 2) habitat status - critical or noncritical; species use such as breeding, sheltering, and feeding in and around the action area. and 3) impacts of the action - how the proposed action will affect species/critical habitat (consider direct, indirect, and cumulative effects). Beneficial and adverse effects. as well as actions to avoid or minimize adverse effects. should be identified (attach additional pages as needed).

The Steller's and Spectacled eider are considered rare in King Salmon. However. the Steller's eider does molt and winter in adjacent Bristol Bay and along the Pacific Coast of Alaska Peninsula and Bechaorf NWR in good numbers.

There has been a total of (7) sighting of Steller's eider within the vicinity of King Salmon and Naknek, since 1969. Five of the sightings of Steller's eider have occurred near Naknek and one bird was collected at Rapids Camp in 2003, stunned by a powerline nearby. Bird strikes have been documented at Rapids Camp due to powerlines. Ducks flying over the land with the tendency to fly low, are subject to striking the power lines.

There has been a total of (3) sighting of Spectacled eider within the vicinity of King Salmon and Naknek, since 1969. Two sightings occurred near Naknek and one bird was found dead near the King Salmon Control Tower in 1987.

The turbine location at refuge headquarters is adjacent to the Naknek River (see Map 1) but the area is on a straightway, not in an area where ducks would fly across land to reach water. Additionally, a 30 foot tall building stands adjacent to the proposed turbine location. The turbine will be approximately 150-250 feet from the waters edge. The location of Quarters 1 and 2 is approximately 0.6 miles from the Naknek River.

The VAWT was chosen by the Service because these types of turbines do not have a similar plane of sweep to intersect the flight path of birds. Additionally, the rotor structure is of solid material that inhabits a defined space at all times of rotation; so the perception of sight influenced wildlife would be of a solid object. (see Photo 1). It would consist of a six foot VAWT affixed to monopole, with no guy wires, standing vertical adjacent to an existing 2-story building or adjacent to existing residences, transmission lines will be underground.

VI. **Determination of Effects** (continued):
(B) Determination: Determine the anticipated effects of the proposed project on species and critical habitats listed in item III. Check all applicable boxes and list the species associated with each determination.

	Response requested
G *"No Effect"* This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) a listed/proposed/candidate species or designated/proposed critical habitat of such species. List species applicable to this determination (or attach a list):	_____ Concurrence
G *"May Affect but Not Likely to Adversely Affect species/critical habitat"* This determination is appropriate when the proposed project is not likely to adversely impact a listed species or designated critical habitat of such species. List species applicable to this determination (or attach a list):	__x___ Concurrence Steller's eider Spectacled eider
G *"May Affect and Likely to Adversely Affect species/critical habitat"* This determination is appropriate when the proposed project is likely to adversely impact a listed species or designated critical habitat of such species. List species applicable to this determination (or attach a list):	_____ Formal Consultation
G *" Not Likely to Jeopardize candidate or proposed species/critical habitat"* This determination is appropriate when the proposed project is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. List species applicable to this determination (or attach a list)	____ Concurrence Informal Conference optional
G *"Likely to Jeopardize candidate or proposed species/critical habitat"* This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. List species applicable to this determination (or attach a list):	____ Formal Conference

Signature

1/15/2010

Michael Brady, Deputy Refuge Mgr
[for Bill Schaff, Refuge Mgr]

Date

Reviewing Ecological Services Office Evaluation (check all that apply):

A. **Concurrence** X **Nonconcurrence** ____

Explanation for nonconcurrence:

B. Formal consultation required _____
List species or critical habitat unit

C. Conference required _____
List species or critical habitat unit

Signature [Reviewing ES Office Supervisor] Date

Name of Reviewing ES Office

Consultation #2010-0053

Appendix D. USFWS NHPA Section 106 review of Deferred Maintenance Projects.

Memorandum

To: John Stricklan, BIM,
Susan Alexander, BIM,
Tracey Fischbach
Jeffrey Brooks, Planning, ms 231
Mike Milhollin, Engineering, ms 131
Charles Grant, Engineering, ms 131
Davis Bales, Engineering, ms 131
Harland Anderson, Engineering, ms 131
Art Tovar, Kenai NWR, ms 519
Doug Staller
Jimmy Fox

From: Regional Historic Preservation Officer

Subject: NHPA Section 106 review of Deferred Maintenance Projects for 2008

I have reviewed the list of ARRA projects for refuges. As provided for in 36 CFR 800.3(a)(1) if a project has no potential to cause effects then the agency official has no further obligations under section 106 of the National Historic Preservation Act. I have determined the following projects have no potential to cause effects:

	Unit/Facility	Project Number	Project Title (100 characters max)
Facility Projects			
Kenai - Replace Flammable and Hazmat Storage Bldg			
	Kenai NWR	2006492900	Replace Flammable Materials Storage Building
Replace Fuel Storage Tanks [AKM, Kodiak & Arctic]			
	Kodiak Office	2006492216	Replace HQ Annex Fuel Oil Tank
	Arctic NWR	2006506330	Replace Avgas Fuel Tank at Galbraith Lake
	Alaska Maritime NWR	2007728919	Replace Heating Oil Tank Adak Fourplex 145D
	Alaska Maritime NWR	2007728941	Remove Replace Tank Adak Triplex 146C
	Alaska Maritime NWR	2007728921	Replace Heating Oil Tank Adak Fourplex 145A
	Alaska Maritime NWR	2007728916	Replace Heating Oil Tank at Adak Triplex 146A
Kenai - Repair HQ/Shop/Bunkhouse Security Gates			
	Kenai NWR	2006495724	Repair HQ/Shop/Bunkhouse Security Gates
Kenai - Install Solar Powered Water Pump			
	Kenai NWR	2008863135	Provide Solar Powered Panel for Water Pump - Skilak Wildlife Recreation Area
Solar PV & DHW Systems - Togiak Hangar & Kanuti Residence & Bunkhouse			
	Togiak NWR	2009924011	Replace Hot Water Heater at Hangar with Solar Powered Model
	Kanuti NWR	2008863610	Install renewable energy components in residence at Bettles

Kanuti NWR	2008863608	Install renewable energy components in bunkhouse at Bettles
Wind Turbines - Alaska Pennisula and Izembek		
Alaska Penn NWR	2009924027	Quarters #5(HQ Duplex) Install Vertical Wind Turbine
Izembek NWR	2009924013	Bunkhouse Install Vertical Wind Turbine
Izembek NWR	2009924017	FAA Duplex Bunkhouse Install Vertical Wind Turbine
Izembek NWR	2009924018	Quarters #1 Install Vertical Wind Turbine
Izembek NWR	2009924019	Quarters #2 Install Vertical Wind Turbine
Izembek NWR	2009924020	Quarters #3 Install Vertical Wind Turbine
Izembek NWR	2009924021	Quarters #4 Install Vertical Wind Turbine
Selawik - Residential Renovation Kotzebue AS		
Kotzebue AS	2006406921	Rehabilitate Residence Foundation #480
Kotzebue AS	2006498840	Rehabilitate Residence #480 Entry Way
Residential Renovations - Togiak and Alaska Pennisula Bercharof		
King Salmon AS	2008861131	Replace wood decks Quarters 27
King Salmon AS	2008857586	Replace wood decks Quarters 29
King Salmon AS	2008861123	Replace wood decks Quarters 28
King Salmon AS	2008861135	Replace wood decks Quarters 26
King Salmon AS	2008857716	Replace kitchen cabinets and counter tops in Residence 28
King Salmon AS	2008862880	Replace kitchen cabinets and counter tops in Residence 29
King Salmon AS	2008858853	Rehab Floors (Q154)
King Salmon AS	2008858878	Replace Flooring in Quarters 148
King Salmon AS	2008858924	Replace Flooring in Quarters 146
King Salmon AS	2008858925	Replace Flooring in Quarters 155
King Salmon AS	2008858926	Replace Flooring in Quarters 142
King Salmon AS	2008858927	Replace Flooring in Quarters 152
King Salmon AS	2008857580	Rehab Floors and Cabinets (Q26)
King Salmon AS	2008858824	Replace Floors and Cabinets (Q27)
Dillingham AS	2124278	Rehabilitate Four-Plex
Innoko - Residential Foundation and Utilities (FAA Houses)		
Innoko NWR	2009924026	Reconstruct Residence Foundation (FAA House B-4)
Innoko NWR	2009924024	Reconstruct Residence Utilities (FAA House B-4)
Innoko NWR	2009924025	Reconstruct Residence Foundation (FAA House B-2)
Innoko - Snow House Renovation		
McGrath AS	2008862874	Renovate Snow House Utility Room
Koyukuk Nowitna - Rehab Floating Dock and Wall		
Galena Administrativ	2006499392	Rehabilitate Float Dock & Retaining Wall Behind Qtrs #3
Kodiak - Maintenance Shop Exhaust and Door Replacement		
Kodiak Office	2006494454	Replace Main/Shop Exhaust System

	Kodiak Office	5137528	Replace the Four Spring-Track Doors to Maintenance Shop Building
Kodiak - Repair Headquarter's Office Road System & Parking Lots			
	Kodiak Office	5137531	Repair Headquarter's Office Road System & Parking Lots
Kenai - Visitor Center Replace HVAC System & Control			
	Kenai NWR	2006492948	Visitor Center Replace HVAC System & Controls
Non Facility Projects			
Alaska Maritime - Restore habitats for nesting seabirds on isolated oceanic islands			
	Alaska Maritime NWR	N/A	Restore habitats for nesting seabirds on isolated oceanic islands (via contract or temporary hires)
Problem Projects			
Kenai - Rehabiltate Skilak Lookout Trail			
	Kenai NWR	105504	Rehabilitate Skilak Lookout Trail
Yukon Delta - Residential Renovations/Hangar Heating System & Door			
	Bethel Administrativ	1118407	Rehabilitate Residence #50
	Bethel Administrativ	1118408	Rehabilitate Residence #55
	Bethel Administrativ	2006400385	Rehabilitate Residence # 51
	Bethel Administrativ	2006400523	Rehabilitate Residence # 52
	Bethel Administrativ	2006400546	Rehabilitate Residence # 53
	Bethel Administrativ	2006400572	Rehabilitate Residence # 54
	Bethel Administrativ	2006400674	Rehabilitate Residence #56
	Bethel Administrativ	2006400683	Rehabilitate Residence #57
	Bethel Administrativ	5137359	Replace Heating System and Door in Aircraft Hangar
	Bethel Administrativ	2006400689	Rehabilitate Residence #58
Alaska Maritime - Remove Heating Oil Tank at Generator Shed			
	Alaska Maritime NWR	2006394777	Remove Heating Oil Tank at Generator Shed
Selawik - Wind Turbines (Quarters)			
	Selawik NWR	2009924009	Quarters #481 Install Vertical Wind Turbine
	Selawik NWR	2009924010	Quarters #482 Install Vertical Wind Turbine

For the following projects I need additional information before I can assess potential affects:

Refuge	Project Number	Project title	RHPO needs
Kenai	91105350	Rehabilitate waysides at Rainbow Lake	Description and map
Kenai	2007725936	Caribou Island Cabin	Work plan
Kenai	2007725940	Doroshin Bay Cabin	Work Plan
Kenai	2007725935	Big Indian Creek Cabin	Work plan
Yukon Delta	2007734709	Replace Old Chevak HQ	Work plan, map
Kenai	N/A	Skilak Fire Vegetation treatment	Map, project description

Arctic	2005257645	Remove wrecked aircraft and debris	Description of project, photos, maps
Arctic	92105569	Remove wrecked aircraft and debris	Description of project, photos, maps
Yukon Delta	1118367	Remove BIA warehouse	Description of building,map
Yukon Delta	1118368	Remove BIA shop	Description of building
Yukon Delta	1118369	Remove BIA steel tower	Description of building
Yukon Delta	1118370	Remove warehouse tower	Description of building
Yukon Delta	1118371	Remove BIA water utility	Description of building
Region	N/A	YCC, SCA, Temporary	What will they be doing!

Thank you for pulling this information together and getting it to me for review.

Appendix E. Observations of Steller's Eider in the King Salmon/Naknek Vicinity from 1987 - 2009. Phenology records represent the first of any number of records for a calendar year (see notes). Naknek Spring Waterfowl Survey captures all sightings from approximately mid March to Mid May 1992 - 2007 along 19 survey points on the Naknek River.

Species	Source of Data	Date	Count	Location	Observer	Notes
Spectacled Eider	Russell's Incidental Notes	04/12/87	1 male	King Salmon Control Tower	Dykema/ Russell	Found Dead
Spectacled Eider	Russell's Incidental Notes	04/02/88	1	Naknek Area	Sellers/Russel l	Found Dead
Spectacled Eider	Russell's Incidental Notes	05/02/95	1	Naknek River @ King Salmon	Moore	
Spectacled Eider	Naknek River Spring Waterfowl Survey	1992-2007		No Records		
Spectacled Eider	King Salmon Phenology Records	1992-2009		No Records		
Steller's Eider	Naknek River Spring Waterfowl Survey	04/18/92	1 male	Naknek River mouth	Cook	
Steller's Eider	Naknek River Spring Waterfowl Survey	04/21/94	1 male	Naknek River, Grassy Point	MacGowan	
Steller's Eider	Naknek River Spring Waterfowl Survey	4/27-29/199 5	4 males	Naknek River, USFWS Doc	Moore	
Steller's Eider	Naknek River Spring Waterfowl Survey	04/12/99	1	Naknek River at Rapids Camp	Kirk	
Steller's Eider	Naknek River Spring Waterfowl Survey	04/14/99	1	Naknek River at Paradise Point	Kirk	
Steller's Eider	Russell's Incidental Notes	05/04/99	1 female	Naknek Sewage Lagoon Tailing Piles	Russell	this female was present for several days and observed by others
Steller's Eider	King Salmon Phenology Records	11/21/00	no count	Naknek River mouth	Russell	no other observations
Steller's Eider	King Salmon Phenology Records	03/12/01	no count	Naknek River at Leader Creek	Adler, Blush	RC: one male, Naknek Beach - 8/12/01
Steller's Eider	Naknek River Spring Waterfowl Survey	04/17/01	2	Naknek River at Eskimo Creek	Oligschlaeger	
Steller's Eider	King Salmon Phenology Records	08/11/02	4 males	Kvichak Bay near Monsen Creek	Cyr	no other observations
Steller's Eider	Injured Bird Reports	04/12/03	1 male	Rapids Camp Road	Banach	this bird was sent to Bird Treatment & Learning Center and subsequently to Alaska SeaLife Center
Steller's Eider	King Salmon Phenology Records	08/10/03	1	Kvichak Bay near mouth of Monson Creek	Russell	no other observations
Steller's Eider	Naknek River Spring Waterfowl Survey	04/12/04	1	Naknek River mouth	Schuster, Jehle	
Steller's Eider	Naknek River Spring Waterfowl Survey	04/13/04	1	Naknek River mouth	Schuster	
Steller's Eider	King Salmon Phenology Records	10/01/05	1 female	Kvichak Bay, Monsen Cr.	Russell	RR: two females, Lake Camp 10/07; last obs 10/28 at Lake Camp; RC 6 birds Kvichak Bay @ Monsen Creek
Steller's Eider	King Salmon Phenology Records	08/10/06	1 female	Kvichak Bay near Monsen Cr.	Russell	no other obs
Steller's Eider	King Salmon Phenology Records	10/05/07	1	Kvichak Bay near Monsen Cr.	Russell	RR: another bird 11/5/07, Cyr had 4 on 11/20
Steller's Eider	King Salmon Phenology Records	04/03/08	3 males, 1 female	Lake Camp, Naknek River	Russell	no other observations
Steller's Eider	King Salmon Phenology Records	04/19/09	1 male	Kvichak Bay	Cyr	no other observations

Appendix F. Bird Strikes at Izembek NWR*, Cold Bay, and reports from nearby locations

Date	Species	Location	Notes	Tower Collision	Lighted Structure
1/29/1966	Crested Auklet	Refuge housing	nocturnal collision		Yes
1/1/1993	Cassin's Auklet	Ship collision	specimen collection		Yes
10/11/1974	Northern Shrike	IFSS building			?
9/2/1951	Wilson's Warbler	Nocturnal wire strike-OPS	nocturnal collision	Yes	
9/3/1951	Wilson's Warbler	4 nocturnal strikes at OPS window			
9/5/1993	Rough-legged Hawk	Struck by PenAir Navajo	remains in collection		
3/22/2004	Willow Ptarmigan	Struck OM bunker? Predator strike?			
10/26/1976	Brant	King Cove-Struck ship rigging and cannery	About 150 casualties, mostly brant		Yes
10/26/1976	Emperor Goose	King Cove-Struck ship rigging and cannery	About 150 casualties, mostly brant	Yes	Yes
4/5/1975	Steller's Eider	Adult male struck wire at State Shop	specimen collection	Yes	?
12/5/1982	Steller's Eider	Adult male struck FAA antenna at airport		Yes	
12/5/1982	Steller's Eider	2 Adult females struck Pen Hair hanger lights	nocturnal collision		Yes
12/6/1994	Steller's Eider	Struck N. side of MAR radar dome	nocturnal collision		?
2/6/1992	Steller's Eider	Struck NWS balloon launch building	nocturnal collision		?
12/30/1983	Steller's Eider	38 STEI killed by radar screen at DEW Line Site	nocturnal collision		?
1/3/1949	King Eider	Adult male hit building at airport	nocturnal collision		Yes
3/26/1962	King Eider	6 strike becon tower	nocturnal collision	Yes	?
2/28/1963	King Eider	Adult male hit Volcano Club	nocturnal collision		Yes
12/7/1981	King Eider	Unknown collision location	specimen collection		
1/20/1983	King Eider	Adult male & female hit FWS hanger	nocturnal collision		Yes
3/8/1984	King Eider	Adult male struck antenna at GP USAF Site	nocturnal collision	Yes	Yes
1/31/1996	Green-winged Teal	Adult male struck USCG-DGPS antenna	Predator fencing compromised	Yes	?
5/31/1983	Red Phalarope	3 adult females strike CB School			Yes
10/19/1987	Bar-tailed Godwit	9 strikes at MAR Site	nocturnal collision	Yes	Yes
10/18/1982	Leach's Storm Petrel	Collision with hanger	specimen collection		Yes
4/12/1993	King Eider	Collision with FSS Bldg/Antenna	nocturnal collision, blowing snow	Yes	Yes
1/9/1994	King Eider	Collision with FSS Bldg/Antenna	nocturnal collision, blowing snow	Yes	Yes
3/29/1995	King Eider	Russell Creek Hatchery	nocturnal collision, blowing snow	Yes	?
11/3/1999	Leach's Storm Petrel	NWS balloon launch building	recovered-released		Yes
6/15/2003	Leach's Storm Petrel	Struck pier or Tustamena in fog	recovered-released		Yes
5/13/2004	Fork-tailed Storm Petrel	Airport taxiway. Plane strike?			
9/29/2003	Storm Petrel (?)	Pen Air hanger	recovered-released		Yes
10/5/2003	Fork-tailed Storm Petrel	Pen Air hanger	recovered-released		Yes
6/7/1983	Tree Swallow	Unknown collision location	specimen collection		
10/7/2004	Gyrfalcon	Plane strike.	Sent to NAES for contaminant testing		
5/13/2003	Fork-tailed Storm Petrel	Airport ramp	Dead, probable strike	?	?
8/14/2009	Yellow Warblers	AEB Cold Bay Airport Terminal Building	Had about 3 window strikes at about noon		Yes
8/21-23/09	Yellow Warblers	AEB Cold Bay Airport Terminal Building	Had about 12 window striked between 3:00-7:00 a.m.; lights on in building		Yes

* Recorded in memos, wildlife observation cards, and on specimens

Appendix G. List of bird species likely to be encountered in the vicinity of Refuge Headquarters in King Salmon and quarters near Paul's Creek

Common Name	Scientific Name
Greater White-fronted Goose	*Anser albifrons*
Brant	*Branta bernicla*
Cackling Goose	*Branta hutchinsii*
Canada Goose	*Branta canadensis*
Tundra Swan	*Cygnus columbianus*
Gadwall	*Anas strepera*
Eurasian Wigeon	*Anas penelope*
American Wigeon	*Anas americana*
Mallard	*Anas platyrhynchos*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Greater Scaup	*Aythya marila*
Steller's Eider	*Polysticta stelleri*
Black Scoter	*Melanitta nigra*
Bufflehead	*Bucephala albeola*
Common Goldeneye	*Bucephala clangula*
Barrow's Goldeneye	*Bucephala islandica*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Spruce Grouse	*Falcipennis canadensis*
Red-throated Loon	*Gavia stellata*
Pacific Loon	*Gavia pacifica*
Common Loon	*Gavia immer*
Yellow-billed Loon	*Gavia adamsii*
Red-necked Grebe	*Podiceps grisegena*
Fork-tailed Storm-Petrel	*Oceanodroma furcata*
Double-crested Cormorant	*Phalacrocorax auritus*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Northern Goshawk	*Accipiter gentilis*
Merlin	*Falco columbarius*
American Coot	*Fulica americana*
Sandhill Crane	*Grus canadensis*
Semipalmated Plover	*Charadrius semipalmatus*
Spotted Sandpiper	*Actitis macularius*
Greater Yellowlegs	*Tringa melanoleuca*
Hudsonian Godwit	*Limosa haemastica*
Least Sandpiper	*Calidris minutilla*
Short-billed Dowitcher	*Limnodromus griseus*
Wilson's Snipe	*Gallinago delicata*
Red-necked Phalarope	*Phalaropus lobatus*
Bonaparte's Gull	*Chroicocephalus philadelphia*
Mew Gull	*Larus canus*
Glaucous-winged Gull	*Larus glaucescens*

Common Name	Scientific Name
Arctic Tern	*Sterna paradisaea*
Common Murre	*Uria aalge*
Great Horned Owl	*Bubo virginianus*
Boreal Owl	*Aegolius funereus*
Belted Kingfisher	*Megaceryle alcyon*
Downy Woodpecker	*Picoides pubescens*
Alder Flycatcher	*Empidonax alnorum*
Northern Shrike	*Lanius excubitor*
Gray Jay	*Perisoreus canadensis*
Black-billed Magpie	*Pica hudsonia*
Common Raven	*Corvus corax*
Tree Swallow	*Tachycineta bicolor*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
Boreal Chickadee	*Poecile hudsonicus*
Gray-cheeked Thrush	*Catharus minimus*
American Robin	*Turdus migratorius*
Varied Thrush	*Ixoreus naevius*
Orange-crowned Warbler	*Vermivora celata*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*Dendroica coronata*
Blackpoll Warbler	*Dendroica striata*
Northern Waterthrush	*Seiurus noveboracensis*
Wilson's Warbler	*Wilsonia pusilla*
American Tree Sparrow	*Spizella arborea*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Lincoln's Sparrow	*Melospiza lincolnii*
White-crowned Sparrow	*Zonotrichia leucophrys*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Dark-eyed Junco	*Junco hyemalis*
Lapland Longspur	*Calcarius lapponicus*
Snow Bunting	*Plectrophenax nivalis*
Rusty Blackbird	*Euphagus carolinus*
Pine Grosbeak	*Pinicola enucleator*
White-winged Crossbill	*Loxia leucoptera*
Common Redpoll	*Acanthis flammea*
Hoary Redpoll	*Acanthis hornemanni*
Pine Siskin	*Spinus pinus*

Source: Alaska Peninsula/Becharof Wildlife Biologist Savage