NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE07

FINAL

February 2012

Avian Risk Assessment for a Proposed Wind Project at Naval Station Newport, Rhode Island

Prepared for:
Naval Facilities Engineering Command – Mid Atlantic
9742 Maryland Avenue, Bldg. Z-144
Norfolk, Virginia 23511

Prepared by:
Tetra Tech, Inc.
2200 Wilson Blvd., Suite 400
Arlington, VA 22201

NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE07
FINAL

Avian Risk Assessment for a Proposed Wind Project at Naval Station Newport, Newport, Rhode Island

February 2012

Tetra Tech, Inc.
2200 Wilson Blvd., Suite 400
Arlington, VA 22201

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Project Overview 1
1.2 Risk Assessment 1
1.3 Regulatory Drivers 1
1.3.1 Endangered Species Act 4
1.3.2 Migratory Bird Treaty Act 4
1.3.3 Bald and Golden Eagle Protection Act 4
1.3.4 Coastal Zone Management Act 4
1.3.5 Lacey Act 4
2.0 PRE-CONSTRUCTION WILDLIFE ASSESSMENTS AND SITING 5
2.1 Preliminary Site Screening 5
2.2 Pre-construction Field Studies 5
2.3 Fall 2009 Avian Point Counts and Bat Acoustic Surveys 8
2.4 2010 Avian Point Counts and Bat Acoustic Surveys 10
2.5 Fall 2010 Avian Radar Survey 19
2.6 Spring 2011 Avian Radar Survey 20
2.7 Spring/Summer 2011 Bat Acoustic Survey 21
2.8 Fall 2011 Avian Radar Survey 22
3.0 AVIAN RISK ASSESSMENT 24
3.1 Risk Assessment Methodology 24
3.2 General Threats to Birds 25
3.3 Potential Risk to Birds 28
3.3.1 Rare, Threatened, and Endangered Species 28
3.3.2 Raptors 28
3.3.3 Waterfowl 29
3.3.4 Wading/Marsh Birds 29
3.3.5 Seabirds 30
3.3.6 Shorebirds 30
3.3.7 Passerines 31
3.3.8 Nocturnal Migrants 32
3.3.9 Diurnal Migrants 32
3.3.10 Game Birds 32
3.3.11 Introduced Species 33
3.4 General Risk Summary to Birds 33
3.5 General Threats to Bats 34
3.6 Potential Risk to Bats 35
3.6.1 Migratory Tree Bats 35

3.6.2 Local Bats 36
3.6.3 Bats 36
3.7 General Risk Summary to Bats 37
4.0 CONCLUSIONS 38
5.0 MITIGATION MEASURES 41
6.0 LITERATURE CITED 43
APPENDIX A – SPECIES LIST 51

LIST OF FIGURES

Figure 1-0. Location of Naval Station Newport, Rhode Island. 2
Figure 1-1. Proposed turbine layout at Naval Station Newport, Rhode Island. 3
Figure 2-0. Bird and bat survey locations 2009–2011 at Naval Station Newport, Rhode Island. 7
Figure 2-1. Observations of birds by point location at Naval Station Newport, fall 2009. 8
Figure 2-2. Observations of bird flights heights by point location at Naval Station Newport, winter 2010. 13
Figure 2-3. Observations of bird flights heights by point location at Naval Station Newport, spring 2010. 14
Figure 2-4. Observations of bird flight heights by point count location at Naval Station Newport, 2010 breeding bird surveys. 15
Figure 2-5. Observations of bird flights heights by point location at Naval Station Newport, summer 2010. 16
Figure 2-6. Observations of bird flights heights by point count location at Naval Station Newport, fall 2010. 18
Figure 2-7. Radar flight direction data for Naval Station Newport, 30 September–18 October 2011. 23

LIST OF TABLES

Table 2-0. Bird and bat survey effort summary for the proposed wind project at Naval Station Newport. 6
Table 2-1. Summary of bat acoustic monitoring survey effort by detector at Naval Station Newport, 1 October–10 December 2009. 9
Table 2-2. Summary of bat acoustic monitoring survey effort by detector at Naval Station Newport, 1 October–10 December 2009. 10
Table 2-3. Summary of avian surveys at Naval Station Newport, 2010. 11
Table 2-4. Summary of bat acoustic monitoring effort by detector at Naval Station Newport, 2010. 18
Table 2-5. Summary of Index of Activity by bat species recorded at Naval Station Newport, 2010. 19
Table 2-6. Summary of bat acoustic monitoring effort by detector at Naval Station Newport, 2011. 21
Table 2-7. Radar summary statistics of land and water target passage rates at the proposed Naval Station Newport wind project site for the two biological periods (day and night), 30 September–18 October 2011. 23
Table 3-0. Evaluation criteria for assessing risk to birds and bats by the proposed wind project at Naval Station Newport. 24
Table 3-1. Summary of general threats posed to birds by the proposed wind project at Naval Station Newport. 33
Table 3-2. Summary of general threats posed to bats by the proposed wind project at Naval Station Newport. 37

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

The U.S. Department of the Navy (Navy) is proposing to construct a wind energy facility within Naval Station Newport located in Newport, Rhode Island, on the north shore of Rhode Island Sound and approximately 3–5 kilometers (km) north and inland of the mouth of Narragansett Bay (Project Area; Figure 1-0). The proposed facility would include installation of turbines at up to 12 potential locations along an 8 km stretch of the Bay's shoreline of the Bay (Figure 1-1). All infrastructures, including transmission lines and substation facilities, would be constructed on previously developed land on base property. While most of the turbines are expected to be located within 30 meters (m) of the shoreline, no construction or disturbance below the tidal line is anticipated.

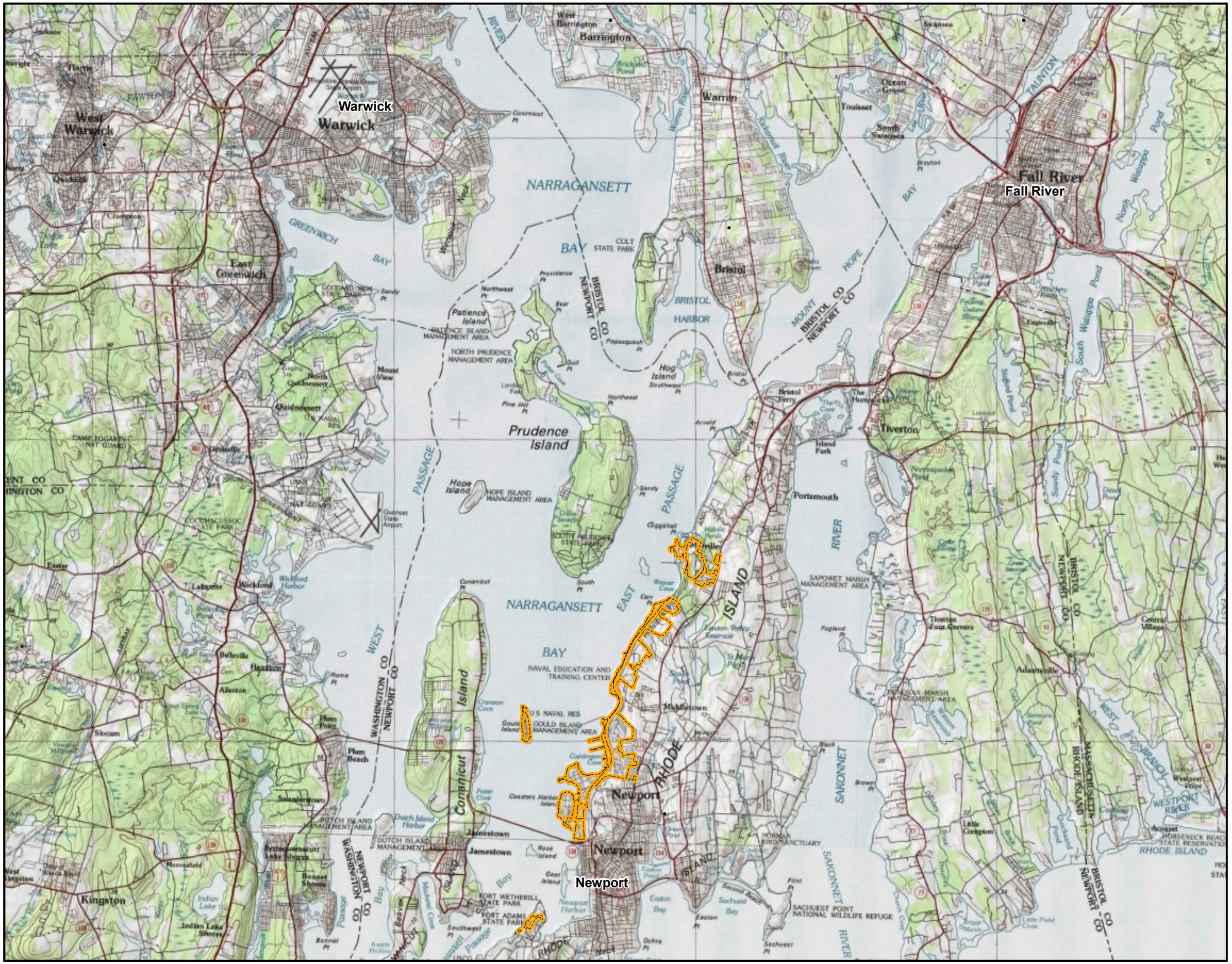
Birds and bats are known to be negatively affected by wind turbines. Impact levels often depend on a variety of factors including location and wind turbine height. To assess potential impacts and allow for avoidance and minimization planning, pre-construction bird and bat studies were implemented to assess the potential risk to birds and bats found in the Project Area (area between turbines 1 through 11). As a follow-on to these studies, Tetra Tech, Inc. (Tetra Tech) was contracted to synthesize the pre-construction data and prepare an avian risk assessment for Naval Station Newport. The following avian risk assessment is based on data collected at Naval Station Newport from fall 2009 to fall 2011.

1.2 RISK ASSESSMENT

This avian risk assessment is a summary of pre-construction bird and bat studies conducted onsite, as well as an assessment of potential risk to birds and bats resulting from the proposed wind turbines. The document is organized into bird and bat specific sections and follows standard reporting methods for wind energy projects. If necessary, this document is designed to be incorporated into a Bird and Bat Conservation Strategy (BBCS) for the Project Area. The U.S. Fish and Wildlife Service (USFWS), with support from the Wind Turbine Guidelines Federal Advisory Committee, released revised land-based wind energy guidelines in September 2011 (USFWS 2011a), which recommend that proponents develop a BBCS that documents the bird and bat impacts, avoidance, minimization, and mitigation measures as they apply to phases (pre-construction, construction, post-construction) of a wind energy project.

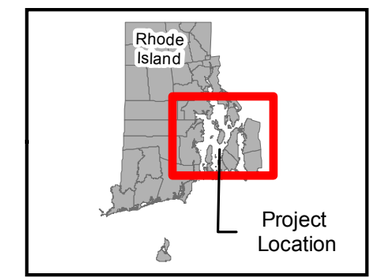
1.3 REGULATORY DRIVERS

Native birds and bats in North America are protected under a variety of federal and state laws and regulations. The construction, operation, and maintenance of any wind energy project must comply with these regulations. These include the federal Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), Lacey Act, and Bald and Golden Eagle Protection Act (BGEPA). At the state level regulatory protections for birds and bats in Rhode Island are provided by the Coastal Zone Management Act (CZMA). These laws and regulations are described in the subsections below (sections 1.3.1–1.3.5).



Legend

Naval Station Newport



N

0 1.5 3 6 Kilometers

0 1 2 4 Miles

Figure 1-0. Location of Naval Station Newport, Rhode Island

Prepared For: NAVFAC Naval Facilities Engineering Command

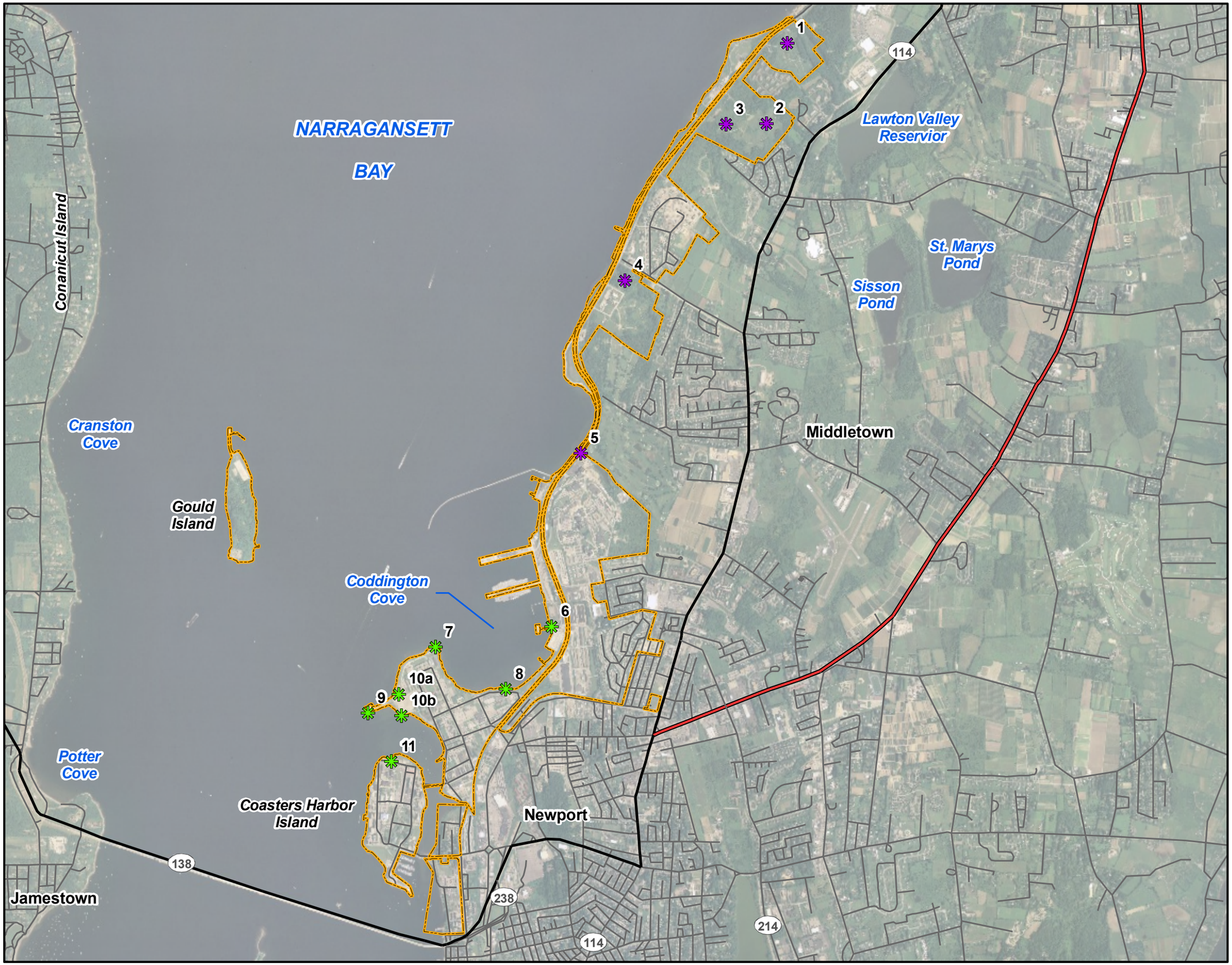
Prepared By: TETRA TECH

Date: 12/2011

Source: 2010 National Geographic Society, NAVFAC LANT GeoReadiness Center, Rhode Island Geographic Information System

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19, North, Meters

Z:\projects\100-NRS_123330\WE07_NS_NEWPORT_RADAR\GIS\MXD\100-NRS_123330.WE07_Figure1-0_20111220B2.mxd, BPA

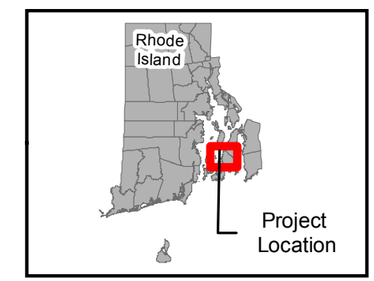


Legend

- Naval Station Newport
- Road
- Interstate
- Highway

Potential Wind Turbine Site

- North
- South



N

0 0.375 0.75 1.5 Kilometers

0 0.25 0.5 1 Miles

Figure 1-1. Proposed turbine layout at Naval Station Newport, Rhode Island

Prepared For: NAVFAC Naval Facilities Engineering Command

Prepared By: TETRA TECH

Date: 12/2011

Source: NAVFAC LANT GeoReadiness Center; Rhode Island Geographic Information System; 2009 ESRI, i-cubed, GeoEye; Tetra Tech

Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19, North, Meters

Z:\projects\100-NRS_123330.WE07_NS_NEWPORT_RADAR\GIS\MXD\100-NRS_123330.WE07_Figure1-1_20111220B3.mxd, BPA

1.3.1 ENDANGERED SPECIES ACT

The purpose of the ESA is "to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of these species." Section 9 of the ESA prohibits "take" of threatened or endangered species, which includes killing, injuring, or harming a listed species or its habitat. Any activity that may result in the "incidental take" of a threatened or endangered species requires a permit issued from the USFWS under Sections 7 or 10 of the ESA.

1.3.2 MIGRATORY BIRD TREATY ACT

Under the MBTA it is unlawful to "pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or eggs of any such bird." The USFWS has established a permitting scheme for a variety of intentional activities, such as hunting and scientific research, but has not done so for the incidental take of migratory birds during otherwise lawful activities. As a result, there is no permitting framework that allows a company to protect itself from liability resulting from take at wind facilities; however, USFWS does not usually take action under the MBTA if good faith efforts have been made to minimize impacts.

1.3.3 BALD AND GOLDEN EAGLE PROTECTION ACT

The BGEPA prohibits the take of any bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos)*, alive or dead, including any part, nest, or egg. "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle. "Disturb" means to agitate or bother an eagle to a degree that causes, or is likely to cause, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. The USFWS has recently been requesting that developers prepare a project-specific BBCS in place of a permit under the BGEPA, because such permits are not available at this time.

1.3.4 COASTAL ZONE MANAGEMENT ACT

The CZMA of Rhode Island was enacted in 1972 to manage marine and coastal resources at the state level. The act has regulatory authority up to 61 m from any coastal feature. Since some of the proposed turbines fall within this regulatory distance, this Act applies.

1.3.5 LACEY ACT

The Lacey Act was passed in 1900 and protects bald eagles, along with plants and other wildlife species, by making it a federal offense to take, possess, transport, sell, import, or export their nests, eggs, and parts that are taken in violation of any state, tribal or U.S. law. It also prohibits false records, labels, or identification of wildlife shipped; prohibits importation of injurious species; and prohibits shipment of fish or wildlife in an inhumane manner. Penalties include a maximum of five years and $250,000 fine for felony convictions and a maximum $10,000 fine for civil violations and $250 for marking violations. Fines double for organizations.

2.0 PRE-CONSTRUCTION WILDLIFE ASSESSMENTS AND SITING

2.1 PRELIMINARY SITE SCREENING

Naval Station Newport considered a variety of factors when siting the Project, including wind speed and direction, distance to the closest electric transmission and interconnection facilities, compatibility with existing land uses, setbacks from residences, construction and engineering feasibility, and minimizing potential for environmental impacts. The current proposed action would include the construction, operation, maintenance, and decommissioning of wind turbines and associated infrastructure at up to 12 sites (Figure 1-1).

2.2 PRE-CONSTRUCTION FIELD STUDIES

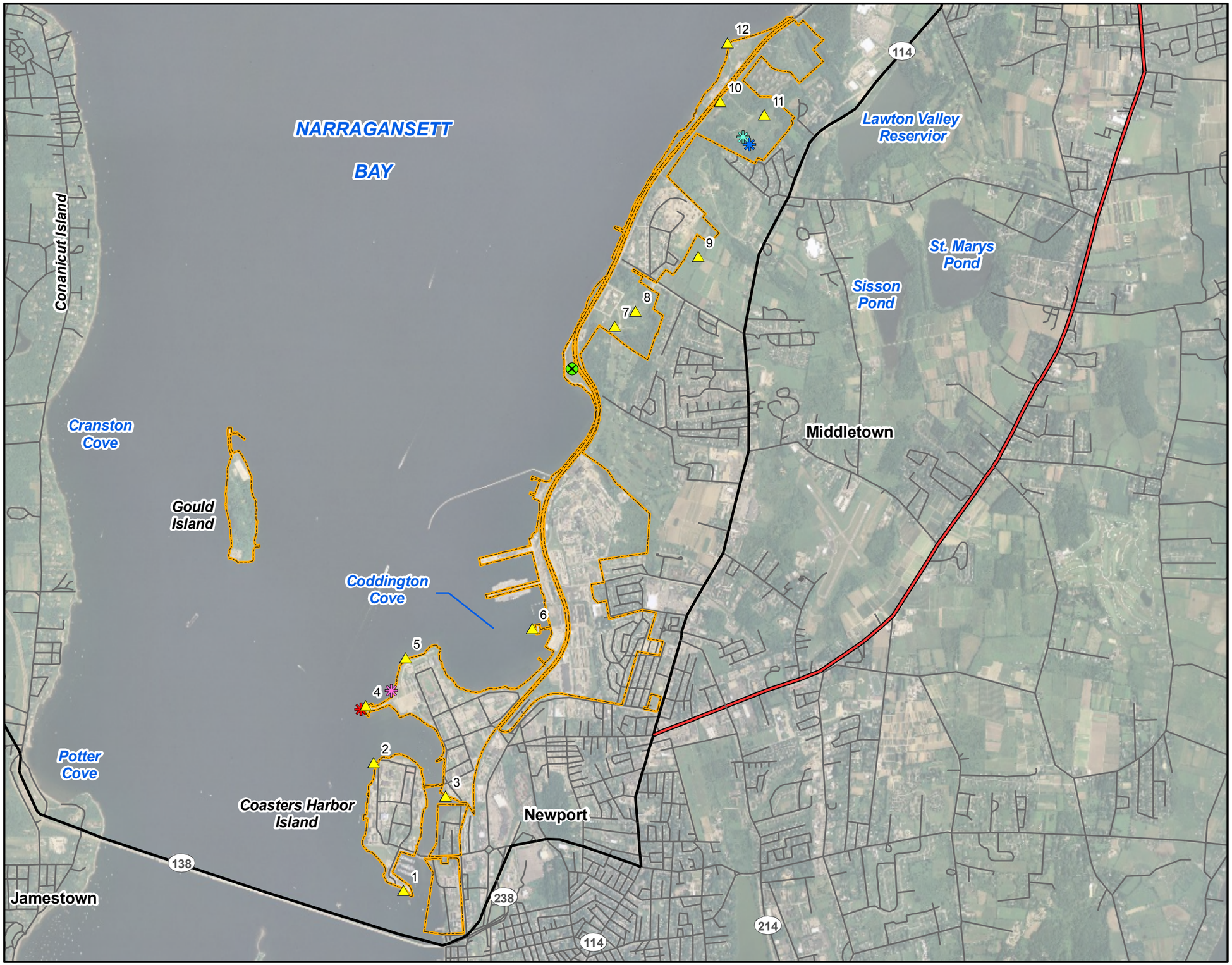
As part of the facility siting and permitting process, Naval Station Newport contracted Tetra Tech to design a bird and bat study plan following previous versions of the USFWS *Draft-Land Based Wind Energy Guidelines* (USFWS 2011a) and then presented the plan to the USFWS and Rhode Island Department of Environmental Management (RIDEM). The scope of work was accepted by USFWS and RIDEM through a series of agency consultation meetings in 2009 and 2010. The study plan consisted of bird and bat surveys during the spring migration, summer residency, and fall migration periods of 2009, 2010, and 2011 (Table 2-0). The purposes of these surveys were to document avian and bat occurrence in the Project Area, to provide baseline information on the avian and bat communities around the Project Area, and to facilitate a project design that minimizes potential environmental impacts. Biological surveys were conducted in the vicinity of the proposed turbines (Figure 2-0). Details on the study design and pre-construction survey results can be found in the following reports:

- *Fall 2009 Bird and Bat Biological Survey Report, Naval Station Newport, Rhode Island* (Tetra Tech 2010),
- *Bird and Bat Biological Survey Report, Winter, Spring, Summer, and Fall 2010, Naval Station Newport, Rhode Island* (Tetra Tech 2011a),
- *Bat Biological Survey Report Addendum, Spring and Summer 2011, Naval Station Newport* (Tetra Tech 2011b),
- *Avian Radar Survey Report for the Development of Wind Energy Facilities at Naval Station Newport, Rhode Island, Fall 2010 and Spring 2011* (Geo-Marine 2011), and
- *Fall 2011 Avian Radar Survey, Naval Station Newport, Rhode Island* (Tetra Tech 2011c).

In addition to collecting information on bird abundance and behavior, bird flight heights were categorized into flight height bins to determine percent of biomass within the general rotor-swept zone (RSZ) (distance between the lowest and highest points of the wind turbine blade) of a utility scale wind turbine. Point count surveys during 2010 at Naval Station Newport used a general RSZ area of 35 m–130 m for calculating percent of targets within the rotor-swept zone. Geo-Marines' radar study in fall 2010 used a RSZ area of 30 m–150 m and a RSZ area of 15 m–137 m during their spring 2011 radar survey. Tetra Tech used a RSZ area of 15 m–137 m during their fall 2011 avian radar survey. Regarding risk to bats in the RSZ, the High detector (30 m) was considered to be within the lower half of the RSZ of a utility scale wind turbine. These RSZ calculations are one of the metrics used to quantify risk to birds and bats from the proposed Project. The following is a summary of pre-construction survey effort from 2009 to 2011 at Naval Station Newport.

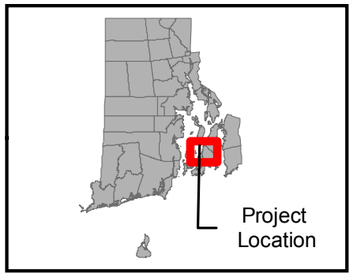
Table 2-0. Bird and bat survey effort summary for the proposed wind project at Naval Station Newport.

Study	Taxa	Survey Dates	Company
Fall Point Count Bird Survey (2009)	Birds	2 October–19 November	Tetra Tech
Fall Bat Acoustic Survey (2009)	Bats	1 October–10 December, two detectors in coastal meteorological tower (met tower)	Tetra Tech
Winter Point Count Bird Survey (2010)	Birds	Four surveys between 13 January and 4 February	Tetra Tech
Spring Point Count Bird Survey (2010)	Birds	Seven surveys between 7 April and 21 May	Tetra Tech
Spring, Summer, Fall Bat Acoustic Survey (2010)	Bats	7 April–22 November, one detector at Bishop Rock	Tetra Tech
Breeding Bird Point Count Survey (2010)	Birds	Three surveys between 4 June and 18 June	Tetra Tech
Fall Point Count Bird Survey (2010)	Birds	Seven surveys between 27 August and 7 October	Tetra Tech
Expanded Fall Bat Acoustic Survey (2010)	Bats	13 August–22 November, two detectors in Tank Farm met tower	Tetra Tech
Fall Avian Radar Survey (2010)	Birds and Bats	12 October–12 November	Geo-Marine
Spring Avian Radar Survey (2011)	Birds and Bats	20 April–19 May	Geo-Marine
Spring/Summer Bat Acoustic Survey (2011)	Bats	30 March–2 August, three detectors	Tetra Tech
Fall Avian Radar Survey (2011)	Birds and Bats	30 September–18 October	Tetra Tech



Legend

- Naval Station Newport
- Radar Site
- Bird Survey Point Count
- Coastal Met Tower (High and Low)
- Bishop Rock Bat Detector
- Tank Farm Met Tower (High and Low)
- Tank Farm Stake Detector
- Road
- Interstate
- Highway



N

0 0.375 0.75 1.5 Kilometers

0 0.25 0.5 1 Miles

Figure 2-0. Bird and Bat Survey Locations 2009-2011 at Naval Station Newport, Rhode Island

Prepared For: NAVFAC Naval Facilities Engineering Command

Prepared By: TETRA TECH

Date: 12/2011

Source: NAVFAC LANT GeoReadiness Center; Rhode Island Geographic Information System; 2009 ESRI, i-cubed, GeoEye; Tetra Tech

Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19, North, Meters

Z:\projects\100-NRS_123330.WE07_NS_NEWPORT_RADAR\GIS\MXD\100-NRS_123330.WE07_Figure2_20112211B3.mxd, BPA

2.3 FALL 2009 AVIAN POINT COUNTS AND BAT ACOUSTIC SURVEYS

Fall 2009 Point Count Survey

During late fall 2009 Tetra Tech biologists conducted standardized point count surveys at 12 different locations to determine the number and species of migrant birds using the Project Area during the tail end of the migration season (Figure 2-1). Point count surveys were conducted on four separate days during October and November 2009. All 12 points were sampled during each survey event. Transects were chosen based on proximity to the proposed development and to ensure that representative habitat types of the Project Area were sampled. All birds visually or audibly detected at each survey point were recorded during 10-minute sampling periods. A total of 2,435 individual birds were documented, representing 57 species, with an overall relative abundance (RA) of 50.73 birds/point. No bird flight heights were recorded during 2009. There was a mix of native species observed including gulls, ducks, waterfowl, passerines, sparrows, raptors, and wading birds, as well as some introduced and nuisance species. The peregrine falcon (*Falco peregrinus*) was the only state listed endangered species observed. Four state listed avian species of special concern were documented including the white-throated sparrow (*Zonotrichia albicollis*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), and great-blue heron (*Ardea herodias*). No federally listed threatened or endangered species were documented.

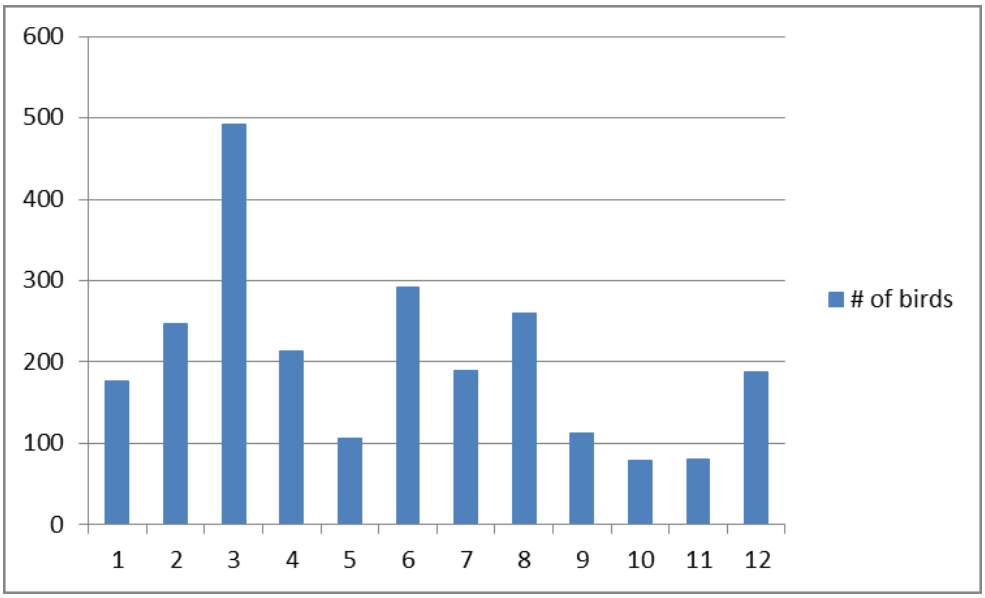


Figure 2-1. Observations of birds by point location at Naval Station Newport, fall 2009.

Fall 2009 Bat Acoustic Survey

The fall and early winter 2009 field surveys included over two months (1 October–10 December 2009) of passive acoustic bat monitoring. Three acoustic bat detectors were used to assess bat activity, species richness (SR), and habitat use of the Project Area (Table 2-1). Two bat detectors were located on the coastal meteorological tower (High and Middle detectors), and one detector was located on the Bishop Rock peninsula (Low detector) (Figure 2-0). The High detector (30 m) was considered to be within the lower half of the rotor-swept height of a utility scale turbine. Detectors monitored bat echolocation calls for approximately 12 hours per night, resulting in 2,688 detector-hours. The 71 night sampling period consisted of 191 detector-nights, with 107 bat call sequences recorded and an overall Index of Activity (IA) of 56.6 (minutes of bat activity/detector-nights * 100).

Table 2-1. Summary of bat acoustic monitoring survey effort by detector at Naval Station Newport, 1 October–10 December 2009.

Detector	Deployment Dates	Call Sequences	Call Pulses	Minutes of Activity	Detector-nights	Index of Acitivty
High	Oct. 1 - Dec. 10, 2009	36	334	29.0	71	40.9
Middle	Oct. 1 - Dec. 10, 2009	45	513	48.2	71	67.8
Bishop Rock (Low)	Oct. 1 - Dec. 10, 2009	26	334	48.3	49	98.6
Total		**107**	**1181**	**125.5**	**191**	**65.7**

Four bat species were documented during the fall 2009 bat acoustic surveys: eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*), which are migratory tree roosting bats; and big brown bat (*Eptesicus fuscus*), a non-migratory bat that commonly occurs in developed landscapes (Table 2-2). Minutes of activity were lower at the High detector than the other two detectors. Three or the four bat species were recorded at each of the detectors; hoary bats were not recorded at the Bishop Rock detector. Bat activity rates and phenology do not indicate a large magnitude of bat migration in the Project Area during late fall 2009. No state or federally listed species were recorded during the fall acoustic monitoring study.

Table 2-2. Summary of bat acoustic monitoring survey effort by detector at Naval Station Newport, 1 October–10 December 2009.

	Species / Group	Call Sequences	Call Pulses	Minutes of Activity	Index of Activity
High Detector	Big brown bat	3	46	3.4	4.8
	Eastern red bat	9	81	8.3	11.6
	Hoary bat	7	101	7.1	10.0
	Silver-haired bat	7	82	8.5	11.9
	High Frequency Unknown	4	11	0.6	0.9
	Middle Frequency Unknown	6	13	1.2	1.6
	Total	**36**	**334**	**29.0**	**40.9**
	Species / Group	**Call Sequences**	**Call Pulses**	**Minutes of Activity**	**Index of Activity**
Middle Detector	Big brown bat	1	20	19.5	27.5
	Eastern red bat	21	309	6.0	8.4
	Hoary bat	3	29	2.8	3.9
	Silver-haired bat	8	93	17.6	24.7
	High Frequency Unknown	5	25	1.8	2.5
	Middle Frequency Unknown	7	37	0.5	0.7
	Total	**45**	**513**	**48.2**	**67.8**
	Species / Group	**Call Sequences**	**Call Pulses**	**Minutes of Activity**	**Index of Activity**
Bishop Rock Detector	Big brown bat	4	111	2.2	4.5
	Eastern red bat	7	71	24.3	49.5
	Silver-haired bat	5	120	17.6	35.8
	High Frequency Unknown	7	26	1.7	3.4
	Middle Frequency Unknown	3	6	2.6	5.4
	Total	**26**	**334**	**48.3**	**98.6**

2.4 2010 AVIAN POINT COUNTS AND BAT ACOUSTIC SURVEYS

2010 Point Count Bird Surveys

Twenty six separate surveys of 12 point count locations (Figure 2-0) were conducted between 13 January and 7 October 2010. During the surveys a total of 10,620 individuals representing 96 species were observed. The most commonly recorded species included herring gull (*Larus argentatus*) (*n* = 2,134), European starling (*Sturnus vulgaris*) (*n* = 1,123), Canada goose (*Branta canadensis*) (*n* = 1,065), and rock pigeon (*Columba livia*) (*n* = 983). Fall and winter surveys recorded the greatest number of observations, with 3,003 and 2,831 individuals, respectively. No federally listed species were observed; however, two state endangered species, peregrine falcon and northern harrier (*Circus cyaneus*), were detected during the point count surveys (Table 2-3). Peregrine falcon was detected during surveys in February, April, June, and September. Northern harrier was detected during fall migration surveys in the months of September and October.

Table 2-3. Summary of avian surveys at Naval Station Newport, 2010.

Naval Station Newport – 2010 Bird Surveys	All	Winter	Spring	BBS[1]	Summer	Fall
Number of surveys	26	4	7	3	5	7
Length of each point count (minutes)	–	10	10	10	10	10
Total individual observations (min, max on any one survey)	10,620 (214, 779)	2,831 (651, 779)	2,418 (267, 400)	961 (269, 360)	1,407 (214, 362)	3,003 (223, 585)
Mean # of individuals per survey	408.5	707.75	345.4	320.3	281.4	429
Total # of species	96	39	59	53	52	64
Most numerous species	HERG, EUST	HERG, CAGO	HERG, ROPI	EUST, HERG	HERG, EUST	EUST, HERG
% (#) at rotor-swept zone (35 m–130 m)	12% (1,238)	9% (259)	10% (240)	4% (43)	8% (107)	20% (589)
Most numerous species observed within rotor-swept zone	HERG, CAGO	HERG, CAGO	HERG, DCCO	DCCO, ROPI	HERG, ROPI	EUST, HERG
Federal endangered or threatened species observed	–	–	–	–	–	–
Rhode Island state endangered species observed (in addition to federally listed species)	NOHA, PEFA	PEFA	PEFA	PEFA	PEFA	NOHA, PEFA

[1]BBS = breeding bird surveys

[2]Species abbreviations:

CAGO = Canada goose
ROPI = Rock pigeon
HERG = Herring gull
EUST = European starling
DCCO = Double-crested cormorant
NOHA = Northern harrier
PEFA = Peregrine falcon

A total of 1,238 individuals, or 12 percent of all birds observed, were detected flying within the RSZ (35 m–130 m). The species with the greatest number of individuals observed flying at heights between 35 and 130 m were herring gull (*n* = 357), Canada goose (*n* = 172), and European starling (*n* = 160). The highest number of individuals observed flying at heights within the RSZ were documented on 8 September (*n* = 172) and 9 September (*n* = 153). Peregrine falcon was observed on two occasions in September within the RSZ, while northern harrier was observed on one occasion in September within the RSZ.

2010 Winter Point Count Survey

During winter resident surveys, a total of 2,831 individuals representing 39 known and 2 unknown species were documented. No federally threatened or endangered species were detected during winter resident surveys at the Project Area, though one state endangered species, peregrine falcon (*n* = 2), was detected. No listed species were documented at heights equal to the RSZ. Twenty-one percent (*n* = 259) of all observations of 22 species flew at heights between 35 m and 130 m. Analyses show 9 percent (*n* = 72) of herring gull, 12 percent (*n* = 72) of Canada goose, and 18 percent (*n* = 27) of common goldeneye (*Bucephala clangula*) were documented flying at heights equal to the RSZ. The most commonly encountered species were herring gull (*n* = 799), Canada goose (*n* = 600), rock pigeon (*n* = 322), and red-breasted merganser (*Mergus serrator*) (*n* = 260).

Overall relative abundance for the winter resident period was 707.75 birds/survey. Peregrine falcon (RA = 0.5, *f* = 50%) was recorded on 3 February and 4 February and was not observed flying between 35 and 130 m. Observers documented 27.5 percent (*n* = 779) of all observations on 3 February and the greatest species richness (SR = 30) on 14 January. The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on 14 January when 48 percent (*n* = 120) of birds were documented flying at heights equal to the RSZ. The frequency of occurrence (*f*)and relative abundance of common bird species for the survey period were herring gull (RA = 199.75, *f* = 100%), Canada goose (RA = 150, *f* = 100%), rock pigeon (RA = 80.5, *f* = 100%), and red-breasted merganser (RA = 65, *f* = 100%).

Overall relative abundance for point count locations was 235.9 birds/location. Twenty-five percent (*n* = 715) of birds were recorded at point 12, and 17 percent (*n* = 476) were observed at sandy and rip-rapped coastal cove adjacent to carrier docking (location 6), yielding 37 percent of all observations (Figure 2-2). Species richness at each point ranged from 9 species at maintained lawn adjacent to rocky coastal habitat (location 5) to 19 species in shrubland habitat (location 8). The greatest number of observations of birds flying within the RSZ were at point count location 1 (*n* = 70), a marina adjacent to rip-rapped coastal shoreline, and point 3 (*n* = 48), a cove adjacent to developed areas (Figure 2-2).

State endangered peregrine falcon (RA = 0.17, *f* = 16.7%) was detected at location 3 and location 6. The frequency of occurrence and relative abundance of common bird species for each survey location were herring gull (RA = 66.6, *f* = 100%), Canada goose (RA = 50, *f* = 50%), rock pigeon (RA = 26.8, *f* = 42%), and red-breasted merganser (RA = 21.7, *f* = 58%). The greatest number of observations during the three morning surveys occurred at points 12 (*n* = 494) and 1 (*n* = 391), and during the one afternoon survey at points 12 (*n* = 221) and 6 (*n* = 182).

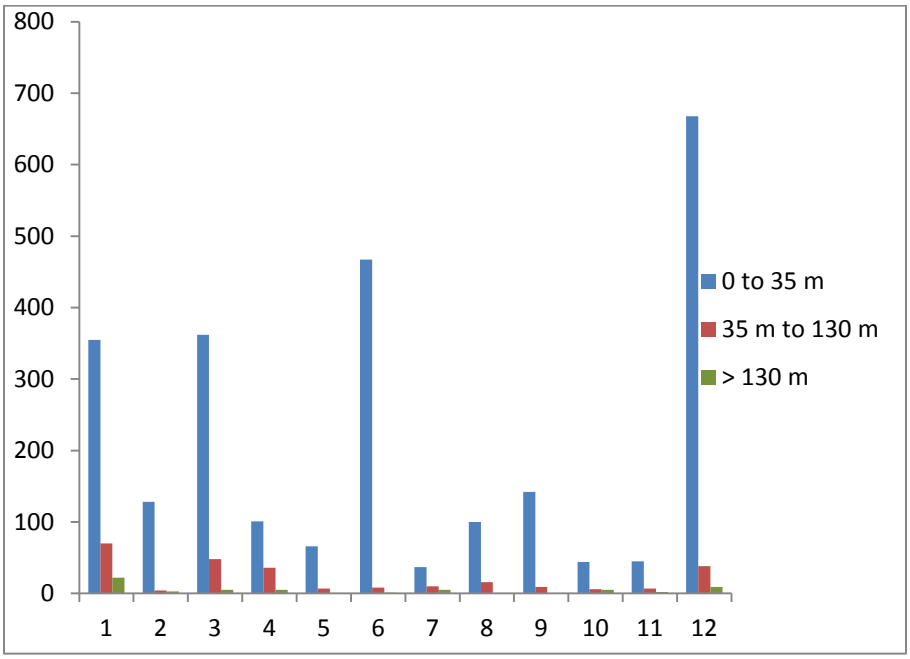


Figure 2-2. Observations of bird flights heights by point location at Naval Station Newport, winter 2010.

2010 Spring Point Count Survey

During seven spring migration surveys between 7 April and 21 May, a total of 2,418 individuals representing 59 species were documented. No federally threatened or endangered species were detected. There was one state endangered peregrine falcon (*n* = 2) detected during spring surveys at the Project Area. No listed species were documented flying at heights equal to the RSZ. Ten percent (*n* = 240) of all observations were of 16 species flying at heights equal to the RSZ during surveys. Analyses indicate 23 percent (*n* = 133) of herring gull, 52 percent (*n* = 65) of double-crested cormorant (*Phalacrocorax auritus*), and 29 percent (*n* = 5) of glossy ibis (*Plegadis falcinellus*) observations were documented flying at heights equal to the RSZ. The most commonly encountered species were herring gull (*n* = 574), rock pigeon (*n* = 178), and European starling (*n* = 128).

Temporal results from the survey period show an overall relative abundance of 345.4 birds/survey. Observers recorded 400 (16.5%) of all detections on 21 May and the greatest species richness (SR = 36) on 8 April and 5 May. The survey period with the greatest number of flight heights recorded between 35 and 130 m was on 5 May when 28 percent (*n* = 68) of all observations within the RSZ were documented. No birds were observed below 130 m (Figure 2-3). State endangered peregrine falcon (RA = 0.3, *f* = 28.5%) was detected in the Project Area on 7 April and 23 April. The frequency of occurrence and relative abundance of common bird species for the survey period were herring gull (RA = 82, *f* = 100%), rock pigeon (RA = 25.4, *f* = 100%), and European starling (RA = 18.3, *f* = 100%).

Three surveys were performed during afternoon hours and four were conducted during the morning at the Project Area. There was a difference of 508 individual observations during morning surveys (*n* = 1,463) and afternoon surveys (*n* = 955) over the spring migration survey period. The greatest number of observations during morning surveys occurred on 21 May and during afternoon surveys on 20 May. Spatial results indicate an overall relative abundance of 201.5 birds/location. Twelve percent (*n* = 289) of

observations were recorded at point count location 3 (sandy beach cove adjacent to a residential area with a linear forested edge), and 10 percent (*n* = 249) occurred point 6 (shrubland habitat). The greatest number of observations of flight heights equal to the RSZ were at point count locations 3 (*n* = 62) and 6 (*n* = 43) (Figure 2-3).

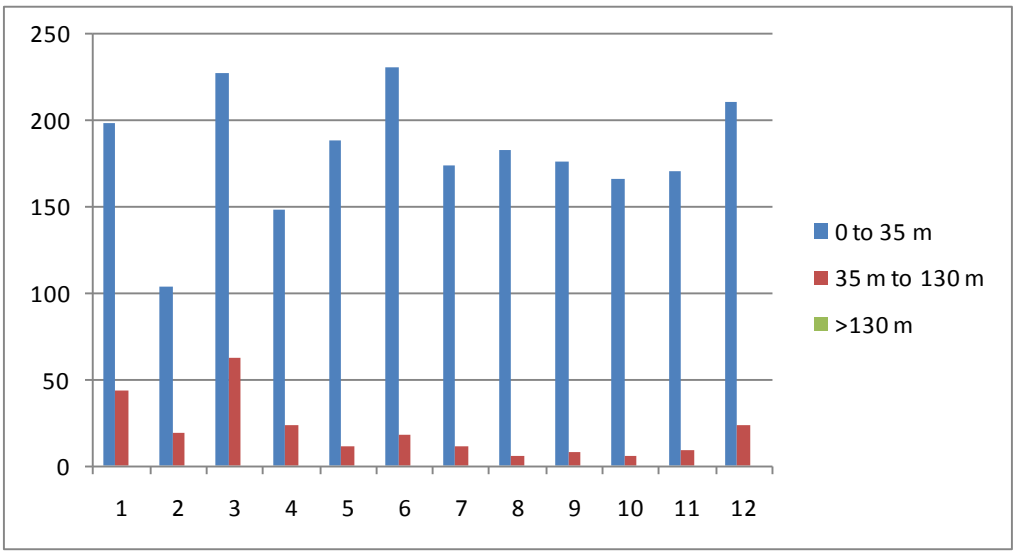


Figure 2-3. Observations of bird flights heights by point location at Naval Station Newport, spring 2010.

The number of different bird species (SR) detected at each point ranged from 14 (points 2 and 4) to 30 species (point 11). Peregrine falcon (RA = 0.2, *f* = 16.7%) was detected at locations 2 and 6. The frequency of occurrence and relative abundance of common bird species for the survey locations were herring gull (RA = 47.8, *f* = 100%), rock pigeon (RA = 14.8, *f* = 58.3%), and European starling (RA = 10.7, *f* = 100%). The greatest number of observations during morning surveys occurred at point 3 (*n* = 180), and during afternoon surveys at points 3 (*n* = 109) and 12 (*n* = 109).

2010 Breeding Bird Point Count Survey

During breeding bird surveys, three point count surveys were performed between 4 June and 18 June. A total of 961 individual observations representing 53 species were recorded. No federally listed species were detected during surveys. There was one state endangered species, peregrine falcon (*n* = 1), detected in the Project Area. No listed species were observed flying at heights between 35 and 130 m, and no birds were observed flying at heights greater than 130 m. Five percent (*n* = 43) of all observations were of 12 species flying at heights equal to the RSZ during surveys. Analysis of flight heights indicate 85.7 percent (*n* = 6) of glossy ibis, 21.7 percent (*n* = 10) of double-crested cormorant, and 14 percent (*n* = 10) of rock pigeon individuals were documented flying at heights equal to the RSZ. The most common bird species were European starling (*n* = 126), herring gull (*n* = 99), rock pigeon (*n* = 71), and red-winged blackbird (*Agelaius phoeniceus*) (*n* = 69).

Overall relative abundance from the breeding bird survey period was 320.33 birds/survey. Observers documented 37 percent (*n* = 360) of all observations and the greatest species richness (SR = 42) on 4 June. The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on 5 April when 44 percent (*n* = 19) of all observations within the RSZ were documented. Peregrine falcon (RA = 0.3, *f* = 33%) was detected on 18 June. The frequency of occurrence and relative abundance

of common bird species for the survey period were European starling (RA = 42, *f* = 100%), herring gull (RA = 33, *f* = 100%), rock pigeon (RA = 23.7, *f* = 100%), and red-winged blackbird (RA = 23, *f* = 100%).

Overall relative abundance for point count locations was 80.1 birds/location. Twelve percent (*n* = 118) of birds were recorded at a sandy and rip-rapped coastal cove adjacent to a developed area (location 6), and 12 percent (*n* = 116) were observed at point 4 rocky rip-rapped coastal habitat, yielding 24 percent of all observations. Species richness at each point ranged from 12 species at location 4, to 20 species at location 8 in shrubland habitat. The greatest number of observations of birds flying within the RSZ were at point count location 8 in shrubland habitat (*n* = 15) and point 6 in rip-rapped coastal habitat (*n* = 6) (Figure 2-4). The state endangered peregrine falcon (RA = 0.08, *f* = 8.3%) was detected at location 6. The frequency of occurrence and relative abundance of common bird species for each survey location were European starling (RA = 10.5, *f* = 91.7%), herring gull (RA = 8.25, *f* = 75%), rock pigeon (RA = 5.9, *f* = 25%), and red-winged blackbird (RA = 5.7, *f* = 75%).

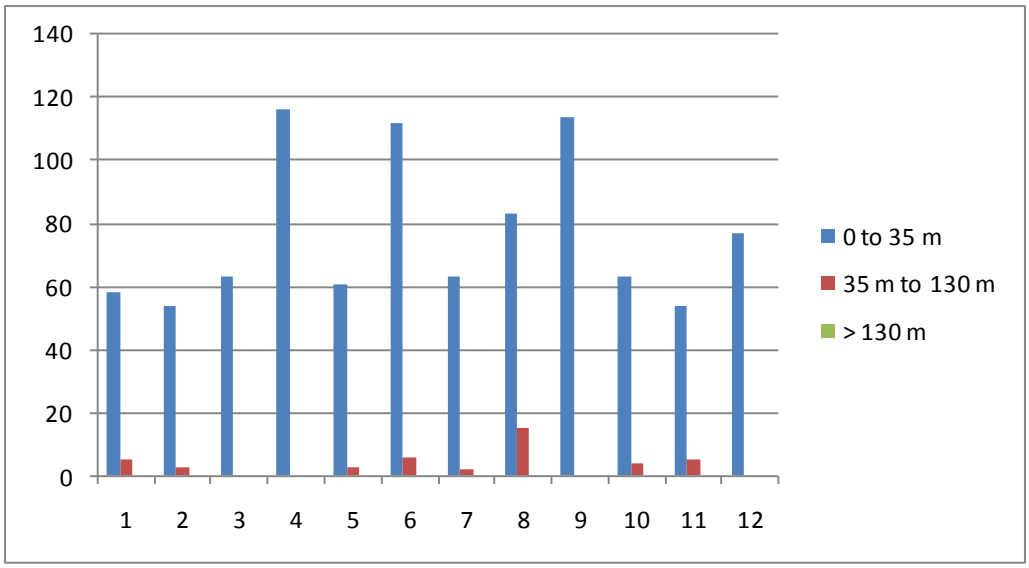


Figure 2-4. Observations of bird flight heights by point count location at Naval Station Newport, 2010 breeding bird surveys.

2010 Summer Resident Survey

Summer resident surveys consisted of five surveys at 12 locations between 3 June and 6 August, and yielded 1,407 detections of 52 species. No federally threatened or endangered species were detected, though the state endangered peregrine falcon (*n* = 1) was documented in the Project Area. No listed species were documented flying between 35 and 130 m. Eight percent (*n* = 107) of all observations were of individuals flying at heights equal to the RSZ. The most commonly observed species flying within the RSZ were herring gull (*n* = 40) and rock pigeon (*n* = 23). The most common species detected were herring gull (*n* = 233), European starling (*n* = 194), rock pigeon (*n* = 121), and barn swallow (*Hirundo rustica*) (*n* = 99).

Overall relative abundance for the summer resident period was 281.4 birds/survey. Observers documented 26 percent (*n* = 362) of all individuals on the afternoon of 6 August and the greatest species

richness (SR = 38) on 17 June. The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on 28 October when 48 percent (*n* = 52) of all individuals flying at heights equal to the RSZ were documented. Peregrine falcon (RA = 0.2, *f* = 20%) was recorded on 17 June. The frequency of occurrence and relative abundance of common bird species for the survey period were European starling (RA = 38.8, *f* = 100%), herring gull (RA = 46.6, *f* = 100%), rock pigeon (RA = 24.2, *f* = 100%), and barn swallow (RA = 19.8, *f* = 100%). The greatest number of observations during morning surveys occurred at point 4 (*n* = 59) and during afternoon surveys at points 6 (*n* = 117) and 5 (*n* = 105).

Spatial results indicate an overall relative abundance of 117.25 birds/location. The state endangered peregrine falcon (RA = 1, *f* = 66.7%) was detected in the Project Area at location 6. Twelve percent (*n* = 169) of observations were recorded at point count location 6 (sandy and rip-rapped shoreline adjacent to developed areas) and 11 percent (*n* = 150) occurred at point 4 (rocky rip-rapped shoreline adjacent to maintained lawn), yielding 23 percent of all observations. The number of different bird species detected at each point ranged from 14 species in rocky rip-rapped shoreline habitat (location 2) to 20 species at locations 5, 8, and 10. The greatest number of observations of flight heights equal to the RSZ were at point count locations 6 (*n* = 29) and 4 (*n* = 18) (Figure 2-5). The frequency and abundance of common bird species at point count locations were European starling (RA = 16.2, *f* = 100%), herring gull (RA = 19.4, *f* = 83%), rock pigeon (RA = 10.1, *f* = 58%), and barn swallow (RA = 8.25, *f* = 75%).

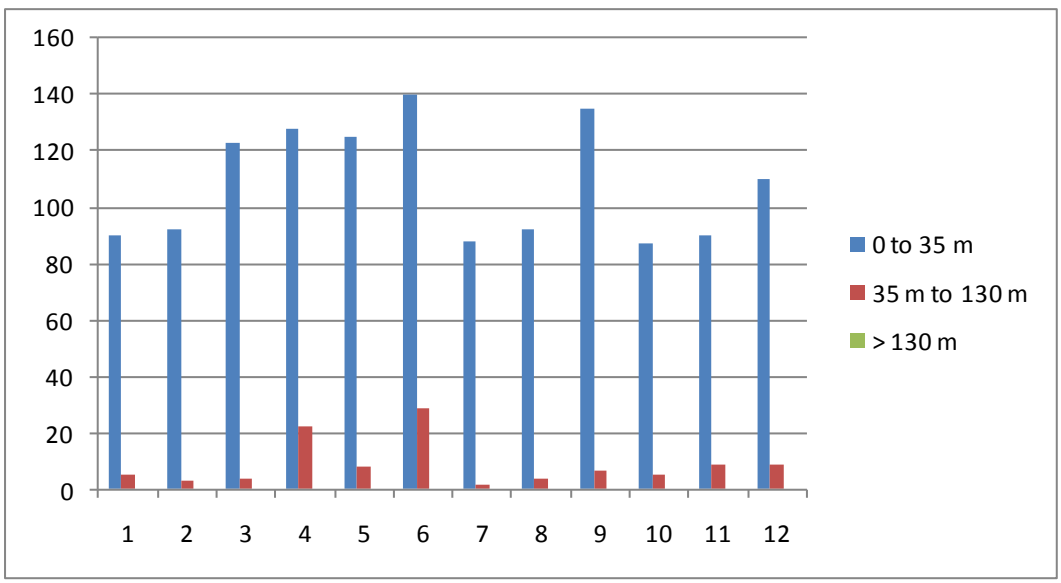


Figure 2-5. Observations of bird flights heights by point location at Naval Station Newport, summer 2010.

2010 Fall Point Count Survey

In the fall Tetra Tech biologists performed seven surveys to document migration within the Project Area between 27 August and 7 October. Ten minute point counts at 12 locations recorded 3,003 individual observations of 64 known species and 3 unknown species. The state endangered peregrine falcon (*n* = 2) and northern harrier (*n* = 2) were observed flying within the RSZ in the Project Area. Twenty percent (*n* = 589) of all observations were of birds recorded flying at heights within the RSZ. The most common species observed flying between 35 and 130 m were European starling (*n* = 149), herring gull (*n* = 106), and Canada goose (*n* = 99). Commonly observed species in the Project Area include European starling (*n* = 520), herring gull (*n* = 429), Canada goose (*n* = 368), and rock pigeon (*n* = 291).

The overall relative abundance for the fall migration period was 429 birds/survey. Observers documented 19 percent (*n* = 585) of all observations on 23 September and the greatest species richness (SR = 37) on 7 October. The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on 8 September when 29 percent (*n* = 172) of all observations within the RSZ were documented. Peregrine falcon (RA = 0.9, *f* = 43%) was recorded on 8, 9, and 23 September. Northern harrier (RA = 0.3, *f* = 28.6%) was observed on 23 September and 7 October. The frequency of occurrence and relative abundance of common bird species for the survey period were herring gull (RA = 61.3, *f* = 100%), Canada goose (RA = 52.6, *f* = 85.7%), European starling (RA = 74.3, *f* = 85.7%), and rock pigeon (RA = 48.5, *f* = 83%).

Three surveys were conducted during the morning, and four surveys were performed during afternoon hours. A difference of 167 individuals was observed between morning surveys (*n* = 1,585) and afternoon surveys (*n* = 1,418) over the fall migration period. The highest number of morning observations (*n* = 585) was documented on 23 September, whereas the highest number of birds observed during afternoon surveys (*n* = 438) was on 8 September.

The overall relative abundance for the Project Area was 250.25 birds/location. The state endangered peregrine falcon (RA = 0.5, *f* = 16.7%) was documented at point locations 3 and 6, and northern harrier (RA = 0.2, *f* = 16.7%) was recorded at points 8 and 10. Fifteen percent (*n* = 438) of birds were recorded at point 9 in maintained lawn adjacent to grassland. The number of different bird species detected at each point ranged from 15 species in rocky rip-rapped coastal shoreline (point 4) to 37 species in shrubland habitat (point 11). The greatest number of observations of birds flying at heights equal to the RSZ were at point count location 11 (*n* = 123) in shrubland habitat and point count location 12 (*n* = 115) in shrubland bordered by maintained lawn (Figure 2-6). The frequency and abundance of common bird species among point count locations were European starling (RA = 43.3, *f* = 100%), herring gull (RA = 35.8, *f* = 91.7%), Canada goose (RA = 30.7, *f* = 50%), and rock pigeon (RA = 24.25, *f* = 100%). The greatest number of observations during morning surveys occurred at point 9 (*n* = 268) and point 6 (*n* = 249). The greatest number of observations during afternoon surveys also occurred at points 9 (*n* = 170) and 6 (*n* = 162).

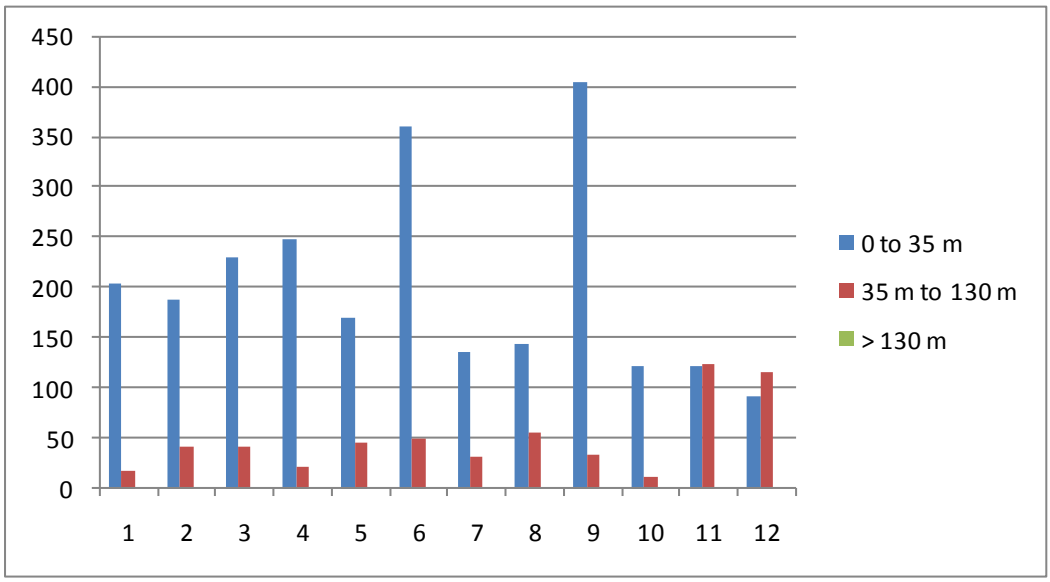


Figure 2-6. Observations of bird flights heights by point count location at Naval Station Newport, fall 2010.

2010 Spring, Summer, Fall Bat Acoustic Survey

Three bat acoustic monitoring stations (Figure 2-0) were established at different heights at the Project Area for the 2010 survey. The duration of the deployment period for the three detector stations varied. Initially, one detector was deployed at Bishop Rock on 7 April 2010 at a height of 1.5 m. On 13 August 2010 two detectors were deployed on the Tank Farm 4 met tower at heights below and within the RSZ of the proposed turbines. The two met tower detectors (High and Low) sampled bat activity within the airspace of the proposed Project Area considered to be of highest risk to migratory bats. Detectors were operational for every night of deployment with no loss of data during the survey period. A total of 2,059 bat call sequences and 1,703 minutes of bat activity were recorded during this period (Table 2-4).

Table 2-4. Summary of bat acoustic monitoring effort by detector at Naval Station Newport, 2010.

Detector Location		Period of Operation 2010	Detector Nights	Activity Minutes	Call Sequences	*Overall Index of Activity	Pooled Index of Activity
Tank Farm 4 Met Tower	High	August 13 - November 22	102	211	302	*206.9*	284.3
	Low	August 13 - November 22	102	369	446	*361.8*	
Bishop Rock		April 7 - November 22	230	1123	1311	*488.3*	488.3
Total			**434**	**1703**	**2059**	**392.4**	**392.4**

* (# of Mins Activity/ Detector-Nights)*100

The highest IA rate was recorded by the Bishop Rock detector (IA = 488.3). This detector recorded 1,311 call sequences during 1,123 minutes of bat activity. The lowest IA rate (206.9) was recorded by the met tower High detector, which recorded 302 call sequences. The met tower Low detector recorded 446 call sequences with an IA rate of 361.8 (Table 2-5).

Table 2-5. Summary of Index of Activity by bat species recorded at Naval Station Newport, 2010.

Detector Location		Species										Overall
		Hoary bat	Silver-haired bat	Big brown/ Silver-haired bat	Big brown bat	Eastern red bat	Little brown myotis	*Myotis* species	Low Frequency	Middle Frequency	High Frequency	
Tank Farm 4	Low	24.5	45.1	56.9	10.8	52.9	2.9	0.0	5.9	52.9	109.8	361.8
Met Tower	High	14.7	37.3	29.4	2.0	25.5	0.0	0.0	13.7	29.4	54.9	206.9
Bishop Rock		11.7	24.3	122.2	12.2	93.9	10.0	0.9	4.3	45.2	163.5	488.3
Overall		15.4	32.3	85.0	9.4	68.2	6.0	0.5	6.9	43.3	125.3	392.4

Bat call sequences were identified to the lowest possible taxonomic level. A total of 48 percent of recorded calls were identified to species level (*n* = 990); calls were then combined into four "Known Species Groups" based on similarities in call sequence structure: Low Frequency Species, Middle Frequency Species, *Myotis* Species, and eastern red bat. Call sequences that did not meet the parameters required for genus level identification could not be classified to species level (*n* = 1,069) and were grouped into "Unknown Species Groups."

Five species were definitively identified within the recorded call sequences from the 2010 passive monitoring effort. A total of 534 calls (26 percent) were attributed to long-distance migratory bats including the hoary bat, silver-haired bat, and eastern red bat. A small number of calls (*n* = 26) were identified as little brown bat (*Myotis lucifugus*). A total of 19 percent of recorded call sequences (*n* = 387) were identified as silver-haired bat/big brown bat due to call quality and the overlap in call characteristics of the two species. These calls were not included in the totals for silver-haired bat or big brown bat. The remaining call sequences (*n* = 43) identified to species level were classified as big brown bat. Overall, big brown bat calls comprised 2 percent of recorded call sequences. None of the species documented during the survey period are state listed species of special concern in Rhode Island. In addition, no calls of federally listed bat species were identified during the survey.

2.5 FALL 2010 AVIAN RADAR SURVEY

An avian radar study was conducted in fall 2010 from 12 October to 12 November from the McAllister Point Landfill site with a Geo-Marine Mobile Avian Radar System (MARS) as a tool to study bird and bat movements (Harmata et al. 1999). The MARS was set to continuously operate during the fall migration period (Geo-Marine 2011). The RSZ used for analysis was 30 m–150 m. All data below were summarized from Geo-Marine's 2011 avian radar survey report (Geo-Marine 2011).

PASSAGE RATES

Over Land

Over land average nocturnal passage rates (15.48 targets per kilometer per hour [targets/km/hr]) were greater than over land average diurnal passage rates (6.37 targets/km/hr). Diurnal and nocturnal passage rates over land were both low with diurnal rates ranging from 0.28 to 20.93 (targets/km/hr) and nocturnal passage rates ranging from 0.93 to 30.32 (targets/km/hr).

Over Water

Over water average diurnal passage rates were greater (21.34 targets/km/hr) than over water average nocturnal passage rates (14.45 targets/km/hr). Diurnal and nocturnal passage rates over water were both low with diurnal rates ranging from 0.39 to 68.43 (targets/km/hr) and nocturnal passage rates ranging from 0.27 to 44.53 (targets/km/hr).

FLIGHT DIRECTION

Over land during fall 2010, the majority of birds flew southbound during both the day and night. However, diurnal birds flew in variable directions over water in fall 2010. At night over water, more birds flew in northerly directions than in southerly directions.

FLIGHT HEIGHTS

The median nocturnal flight altitude was 138 m (just above the RSZ) and the median diurnal flight altitude was 75 m (within the RSZ). The median flight altitude during the day was within the RSZ on 13 days (43% of time), and the median flight altitude during nights was within the RSZ on 10 nights (33.3% of time). Fifty-three percent of birds were within the RSZ during the day, and 44 percent of birds were within the RSZ at night.

2.6 SPRING 2011 AVIAN RADAR SURVEY

An avian radar study was conducted in spring 2011 from 20 April to 19 May from the McAllister Point Landfill site with a MARS that was set to continuously operate during the spring migration period (Geo-Marine 2011). The RSZ used for analysis was 15 m–137 m.

PASSAGE RATES

Over Land

Over land average nocturnal passage rates were greater (5.6 targets/km/hr) than over land average diurnal passage rates (2.7 targets/km/hr). Diurnal and nocturnal passage rates over land were both low, with diurnal rates ranging from 0.28 to 20.93 (targets/km/hr) and nocturnal passage rates ranging from 0.93 to 30.32 (targets/km/hr).

Over Water

Over water average diurnal passage rates were greater (34.98 targets/km/hr) than over water average nocturnal passage rates (24.66 targets/km/hr). Diurnal and nocturnal passage rates over water were both low, with diurnal rates ranging from 0.85 to 65.18 (targets/km/hr) and nocturnal passage rates ranging from 0.22 to 47.78 (targets/km/hr).

FLIGHT DIRECTION

Over land during the day, most birds flew to the north and northeast. At night, most birds flew to the northeast with fewer numbers to the north and east. The majority of birds flew to the northeast over water during both the day and night.

FLIGHT HEIGHTS

The median nocturnal flight altitude was 235 m (just above the RSZ) and the median diurnal flight altitude was 222 m (within RSZ). The median flight altitude during the day was within the RSZ on 11 days

(36.6% of time), and the median flight altitude during nights was within the RSZ on 4 nights (13.3% of time). Thirty-three percent of birds were within the RSZ during the day, and 30 percent of birds were within the RSZ at night.

2.7 SPRING/SUMMER 2011 BAT ACOUSTIC SURVEY

Three bat acoustic monitoring stations were established at different heights in the Project Area for the 2011 survey (Figure 2-0). The duration of the deployment period for the three detector stations varied (Table 2-6). Initially, two detectors were deployed at the Tank Farm met tower on 30 March 2011 at heights of 15 m (Low) and 30 m (High). The two Tank Farm met tower detectors were removed on 5 May and subsequently redeployed in a new met tower location, the Coastal met tower, on 8 July where they were operational through 22 August. The Coastal Met tower detectors were deployed at 15 m (Low) and 30 m (High). A Tank Farm stake detector was deployed at Tank Farm 4 at a height of 1.5 m; this unit was operational from 21 April through 22 August 2011.

During the 2011 survey period 284 detector-nights were recorded (∑ number of nights recorded by each detector). The Tank Farm stake detector operated for the longest continuous period (*n* = 122 detector-nights) (Table 2-6). The relative levels of bat activity across detectors were variable. The highest activity rates were recorded at the Tank Farm stake detector (IA = 763.1), indicating a higher concentration of bat activity. Activity during the early spring (20 March–5 May) at the Tank Farm met tower was low, with only a single bat sequence recorded (IA = 2.8). Activity levels at the Coastal met tower detectors during the summer were moderate compared to the Tank Farm stake detector. IA values across all detectors indicate that there was greater bat activity at lower heights above ground level. The Low detector (15 m) in the Coastal met tower recorded nearly twice as much activity as the High detector (30 m), and the Tank Farm stake detector (1 m) had substantially more activity (IA) than the other detectors combined.

Table 2-6. Summary of bat acoustic monitoring effort by detector at Naval Station Newport, 2011.

Detector Location		Period of Operation	Detector-Nights	Number of Minutes with Activity	Total Number of Call Sequences	Overall Index of Activity (# of Mins Activity/ Detector-Nights)*100	Pooled Index of Activity
Tank Farm Met Tower	High	March 30 - May 5, 2011	36	0	1	*2.8*	2.8
	Low	March 30 - May 5, 2011	36	0	0	*0.0*	
Coastal Met Tower	High	July 8 - August 22, 2011	45	40	69	*153.3*	185.6
	Low	July 8 - August 22, 2011	45	127	128	*284.4*	
Tank Farm Stake		April 21 - August 22, 2011	122	931	980	*763.1*	
Total			**284**	**1098**	**1177**	***386.6***	***386.6***

Seven species were definitively identified within the recorded call sequences from the 2011 passive monitoring effort. A total of 1,040 calls (88%) were attributed to long-distance migratory bats including the hoary bat, silver-haired bat, and eastern red bat. A small number of calls (*n* = 6) were identified as little brown bat, and two northern long-eared bat (*Myotis septentrionalis*) calls were also recorded. Tricolored bat (*Pipistrellus subflavus*) calls comprised 4.5 percent of calls, and 2.8 percent of calls were big brown bat. The remainder of bat calls was from unknown *Myotis* species.

2.8 FALL 2011 AVIAN RADAR SURVEY

This section presents radar data recorded at the Project Area in Newport, Rhode Island during a portion of fall migration 2011 (30 September–18 October 2011). The MERLIN Avian Radar System simultaneously uses horizontal and vertical radars to automatically and continuously record bird and bat activity in the vicinity of the proposed Project. The Vertical Surveillance Radar (VSR) data provide both count and altitude information on targets, while the Horizontal Surveillance Radar (HSR) provides target directions. The VSR was divided into two 1-km fronts for data analysis: land and water. The RSZ used for analysis was 15 m–137 m.

PASSAGE RATES AND FLIGHT HEIGHTS

Land Night

Land target passage rates during nights were variable, ranging from 3.6 to 153.6 targets/km/hr, with a nightly average of 56.4 targets/km/hr (Table 2-7). The majority (84.1%) of all targets detected during nights of the fall 2011 survey period were above the RSZ of 15 m–137 m, with 15.4 percent within the RSZ and the remaining 0.4 percent below the RSZ. Nightly target passage rates averaged 47.0 targets/km/hr above the RSZ, while target passage rates were much lower within the RSZ (9.1 targets/km/hr) and below the RSZ (0.3 targets/km/hr). The average mean target height over land across all nights of the fall 2011 survey period was 292.0 m, while the average median height was 245.3 m; both are greater than the maximum height of the proposed turbines (130 m).

Land Day

Land target passage rates during days were variable, ranging from 1.4 to 22.4 targets/km/hr, with a day average of 11.5 targets/km/hr (Table 2-7). The majority (53.0%) of all targets detected during days of the fall 2011 survey period were above the RSZ of 15 m–137 m, with 41.7 percent within the RSZ and the remaining 5.3 percent below the RSZ. Daily target passage rates averaged 6.0 targets/km/hr above the RSZ, while target passage rates were much lower within the RSZ (4.9 targets/km/hr) and below the RSZ (0.6 targets/km/hr). The average mean target height over land across all days of the fall 2011 survey period was 217.6 m, while the average median height was 138.9 m; both are greater than the maximum height of the proposed turbines.

Water Night

Water target passage rates during nights were variable, ranging from 2.9 to 196.4 targets/km/hr, with a nightly average of 60.1 targets/km/hr (Table 2-7). The majority (77.5%) of all targets detected during nights of the fall 2011 survey period were above the RSZ of 15 m–137 m, with 21.0 percent within the RSZ and the remaining 1.5 percent below the RSZ. Nightly target passage rates averaged 45.7 targets/km/hr above the RSZ, while target passage rates were much lower within the RSZ (13.3 targets/km/hr) and below the RSZ (1.1 targets/km/hr). The average mean target height over water across all nights of the fall 2011 survey period was 256.1 m, while the average median height was 209.5 m; both are greater than the maximum height of the proposed turbines.

Water Day

Water target passage rates during days were variable, ranging from 9.8 to 33 targets/km/hr, with a day average of 20.5 targets/km/hr (Table 2-7). The majority (32.2%) of all targets detected during days of the fall 2011 survey period were above the RSZ of 15 m–137 m, with 49.2 percent within the RSZ and the remaining 18.6 percent below the RSZ. Daily target passage rates averaged 6.3 targets/km/hr above the RSZ, while target passage rates were greater in the RSZ (10.1 targets/km/hr) and lower below the RSZ (4.0 targets/km/hr). The average mean target height over water across all days of the fall 2011 survey period was 131.5 m, while the average median height was 60.2 m; both are below the maximum height of the proposed turbines.

Table 2-7. Radar summary statistics of land and water target passage rates at the proposed Naval Station Newport wind project site for the two biological periods (day and night), 30 September–18 October 2011.

Passage Rates	Land		Water	
	Day	Night	Day	Night
Average	11.5	56.4	20.5	60.1
Standard Deviation	6.2	52.8	7.5	54.5
Median	10.5	28.4	20.1	34.0
Minimum	1.4	3.6	9.8	2.9
Maximum	22.4	153.6	33.7	196.4
Range	20.9	150.0	23.9	193.4

FLIGHT DIRECTION

The average flight direction of all targets during the fall 2011 survey period was 260° (west-southwest). Average flight directions for each biological period were 159.8° (south-southeast) during nights and 183.8° (south-southwest) during days (Figure 2-7). Targets were less concentrated (*r*) during nights (*r* = 0.52) than during days (*r* = 0.80) (a value closer to 1.0 indicates strong concentration, while a value closer to 0.0 indicates a weak concentration of movement).

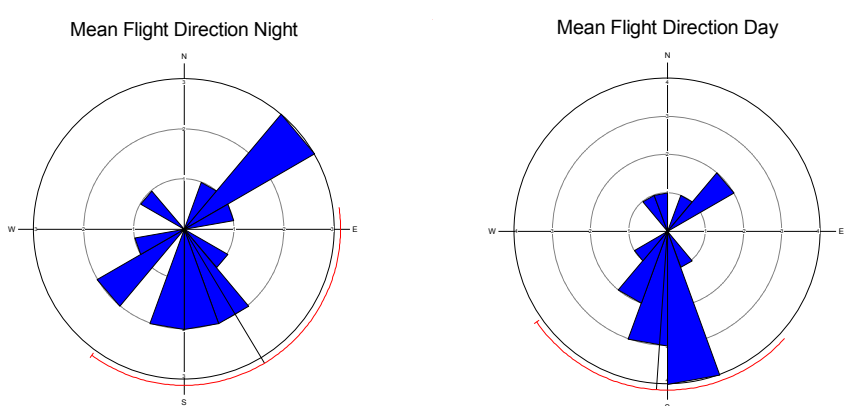


Figure 2-7. Radar flight direction data for Naval Station Newport, 30 September–18 October 2011.

3.0 AVIAN RISK ASSESSMENT

3.1 RISK ASSESSMENT METHODOLOGY

Risk categories of low, moderate, and high were developed for birds and bats at Naval Station Newport using the latest fatality estimates and data reported from post-construction wind energy projects in the east (Barclay et al. 2007, Kunz et al. 2007, Arnett et al. 2008, Cryan and Barclay 2009). A risk category of low, moderate, or high was established for each group of birds and bats. The evaluation criteria for assigning a risk level consisted of a variety of factors including species abundance, occurrence in the RSZ of the proposed Project footprint, seasonal trends, location of observations, and general and regional trends in population status. In addition the presence of a state listed species was added to the risk criteria. Pre-construction data from Naval Station Newport were compared with fatality data from post-construction surveys to help evaluate and refine the risk category for each species group. This risk category evaluation is only a preliminary predictor of risk; post-construction fatality surveys will quantify actual risk to bird and bats. The Project Area was also divided into a northern section (turbines 1 to 5) and southern section (turbines 6 to 11) to evaluate risk to birds and bats from specific areas or specific turbines (Figure 2-0). Table 3-0 describes the criteria for evaluating risk to bird and bats at Naval Station Newport.

Table 3-0. Evaluation criteria for assessing risk to birds and bats by the proposed wind project at Naval Station Newport.

Bird Risk Criteria	
Low risk	Bird fatalities in low number (< 5 birds/turbine/year).
Moderate risk	Bird fatalities in moderate numbers (5–10 birds/turbine/year), fatality to a state T&E* species.
High risk	Bird fatalities in high numbers (> 10 birds/turbine /year), fatality to a federal T&E species.
Bat Risk Criteria	
Low risk	Bat fatalities in low numbers (< 10 bats/turbine/year).
Moderate risk	Bat fatalities in moderate numbers (10–20 bats/turbine/year), fatality to a state T&E species.
High risk	Bat fatalities in high numbers (>20 bats/turbine /year), fatality to a federal T&E species.

*T&E species = threatened and endangered species

3.2 GENERAL THREATS TO BIRDS

This section is a summary of general threats to birds from the development of wind energy projects in the United States.

Collision

Wind Turbines

Birds have been identified as a group at risk for collisions with wind turbines (Erickson et al. 2005, Drewitt and Langston 2006, Arnett et al. 2007). However, with an understating of the pre-construction conditions and proper siting, post-construction monitoring studies have indicated that fatalities from collision with wind turbines are relatively low. Although post-construction methods and metrics have changed since inception, annual mortality from collisions with 15,000 operational wind turbines in the United States (≈4200 megawatt [MW] installed capacity) in 2002 was estimated at 40,000, with the majority occurring in California (Manville 2005). Since 2001, wind energy development has increased in the United States to 43,461 MW of installed capacity in 2011 according to the American Wind Energy Association. Cumulative results based on earlier studies suggest some eastern U.S. sites have demonstrated slightly greater fatality rates than in western states (Weston Solutions 2010). Technological advances in engineering and design of wind turbines, as well as environmental planning with respect to avian species, have aided in reducing potential mortality at wind energy facilities.

Power Lines

Collisions with power transmission and distribution lines likely contribute to significant mortality in birds annually (Manville 2005). Although it is difficult to determine mortality estimates due to a lack of monitoring, it has been estimated that anywhere from 100,000 to more than 100 million birds collide with power transmission and distribution lines annually (Koops 1987, Erickson et al. 2001). Species that collide with power transmission and distribution lines vary across habitat types (Faanes 1987, Erickson et al. 2001). Marker balls, bird diverters, and paint have been shown to reduce collisions by as much as 63 percent (Brown and Drewien 1995, Savereno et al. 1996). However, it is preferred and recommended by USFWS and the Avian Power Line Interaction Committee (APLIC) to bury power lines when possible to reduce bird collisions (APLIC 2006, USFWS 2011a).

Meteorological Towers

Collisions with lattice and tubular met towers and associated guy supports have been documented. Studies indicate that the average number of birds killed at guyed met towers were significantly higher than at towers without guy wires (Young et al. 2003). A study of communication towers in 2006 documented a higher rate of fatalities at guyed towers than at unguyed towers less than 153 m in height (Kerlinger et al. 2007). Studies also indicate that birds collide with the guy supports more often than with the tower itself (Brewer and Ellis 1958, Avery et al. 1976, Fisher 1966), and that collision with towers increases with the height of the tower. Lower bird mortality was reported at towers shorter than 100 m versus those constructed 300 m and higher (Karlsson 1977). APLIC and USFWS recommend installation of marker balls and bird diverters on guy supports and bicolored towers in an effort to reduce collision.

Electrocution

Power lines can also potentially result in the electrocution of bird species (e.g., raptors, gulls, and ducks). Mortality estimates indicate that power lines electrocute tens to hundreds of thousands of birds annually (Manville 2005, Lehman 2001) and are considered the fourth leading cause of death for bald eagles (Lehman 2001). Several species (i.e., bald eagle, osprey, gulls) have large wing spans that enable a bird to simultaneously contact two conductors, or a conductor and grounded hardware. Therefore, any structures that allow for circuit completion (i.e., flesh-to-flesh contact between energized parts or an energized and grounded part) pose an electrocution risk (Boeker and Nickerson 1975, Harness 1997). In an attempt to reduce mortality from electrocution and collision, investor-owned electric utilities, the National Audubon Society, and USFWS collaborated on the formation of APLIC and subsequently established suggested practices for reducing electrocution and collision with power distribution and transmission lines (Manville 2005).

Lighting

Lighting of towers and associated maintenance buildings and substations is a contributing factor to mortality in birds. Fatalities have been documented at various light sources including communication towers, lighted buildings, ships, and at wind energy facilities (Jones and Francis 2003, Clark et al. 2005, Cochran and Graber 1958). Nocturnal migrants appear to aggregate at lights, particularly in fog and inclement weather (Clark et al. 2005; Cochran and Graber 1958). A recent mortality event occurred at Laurel Mountain Wind Project when a substation light was left on overnight. Birds became confused and disoriented and crashed into each other and the ground. Another event in Utah where ducks crash landed into a parking lot was attributed to lighting in the area. Studies indicate that lower bird mortality has occurred at towers using strobe or flashing lights, where birds tend to aggregate less, compared with towers using steady-burning lights (Gehring el al. 2009). White lights tend to interfere with a bird's orientation, especially during inclement weather. Draft guidelines established by the USFWS (2011a) recommend using only red or white strobe-type lights for obstruction lighting and to keep lighting (especially during the migration periods of spring and fall) to a minimum at operational maintenance buildings and substations located within the Project Area. USFWS has also recommend motion activated lights at substations, maintenance buildings, and tower entrances, as well as the installation of shields to focus the lighting downward.

Disturbance/Displacement

In addition to mortality associated with wind farms, concerns have been raised that some bird species may avoid areas near turbines after the wind farm is in operation (Drewitt and Langston 2006). For example, at the Buffalo Ridge wind energy facility in Minnesota, densities of male songbirds were lower in Conservation Reserve Program grasslands containing turbines than in Conservation Reserve Program grasslands without turbines. It was suggested that the reduced density may be due to avoidance of turbine noise and maintenance activities, and to reduced habitat quality resulting from the creation of access roads and gravel pads around the turbines (Leddy et al. 1999). Reduced abundance of grassland songbirds was found within 50 m of turbine pads for a wind farm on the Washington and Oregon border, but the investigators attributed displacement to the direct loss of habitat or reduced habitat quality and not the presence of the turbines (Erickson et al. 2004). Recent research at two sites in North and South Dakota (Shaffer and Johnson 2008) suggests that certain grassland songbird species (two of the four studied) may avoid turbines by as much as 200 m, but these results have not been finalized nor verified at additional sites. None of these studies have addressed whether these avoidance effects are temporary (i.e., the birds may habituate to the presence of turbines over time) or permanent. No

publically accessible data were available for east coast wind projects in regards to disturbance/ displacement.

Construction activities and the presence of turbines and other Project features may disturb or displace birds. The impacts to birds from disturbance or displacement at the Project Area are likely to be low. The risk of disturbance/displacement will be further reduced through avoidance and minimization measures taken during the design, construction, and operational phases of the Project Area. Key measures include minimization of surface disturbance, native seed and plant restoration of temporarily disturbed areas, burial of collector lines, and trash abatement programs.

Habitat Fragmentation

Habitat fragmentation can exacerbate the problem of habitat loss for birds by decreasing patch area and increasing edge habitat. Habitat fragmentation can reduce avian productivity through increased nest predation and parasitism and reduced pairing success of males. The construction of the Project Area wind energy facility would slightly increase the degree of habitat fragmentation of the area. However, because the current layout of the proposed turbines (Figure 1-1) is located in areas that are already developed and fragmented due to the roads, trails, and multiple uses within the area, the additional effects of fragmentation resulting from the small clearings created are likely to be low. Potential habitat fragmentation would be reduced through avoidance and minimization measures taken during the design, construction, and operational phases of the Project. Key measures include minimization of habitat disturbance, native re-vegetation of all temporarily disturbed areas, erosion controls, and burial of collection lines.

Indirect Effects

The construction and operation of wind energy facilities can also have indirect effects on birds and their habitats. Although more difficult to quantify, indirect effects can result in reduced populations through a number of means such as modification of foraging habitat, impacts on overall population resilience, facilitated predation, loss of shelter, changes in behavior and movements, species isolation, and other effects (Morrison 1998, Osborn et al. 1998, Strickland et al. 2003, Thelander et al. 2003, Koford et al. 2004). Indirect effects can have positive and negative effects on species. Recent studies indicated that scissor-tailed flycatcher (*Tyrannus forficatus*) nests in closer proximity to turbines had higher nest success (Karsten et al. 2011), while other studies suggest that disturbance around turbines may degrade habitat suitability for other breeding species (Leddy et al. 1999, Johnson et al. 2000). The risk of indirect effects should be reduced through avoidance and minimization measures taken during the planning, construction, and operational phases in the Project Area. Key measures include minimization of surface disturbance, erosion controls, native seed and plant restoration of temporarily disturbed areas, burial of collector lines, trash abatement programs, and minimization of night lighting.

3.3 POTENTIAL RISK TO BIRDS

Approximately 427 species of birds are known to occur in Rhode Island, with at least 173 of these species that breed in the state and 150 that are regular migrants.. A list of the 101 bird species observed at Naval Station Newport birds is provided in Appendix A.

3.3.1 RARE, THREATENED, AND ENDANGERED SPECIES

Because little is known about interactions between specific species and wind turbines, predicting relative risk to individual rare, threatened, and endangered (RTE) bird species is not possible. At eastern U.S. sites, no federally listed endangered or threatened species have been documented colliding with wind turbines (Kerns and Kerlinger 2004, Arnett et al. 2008, Stantec 2008, 2009a, 2009b).

In Rhode Island, two federally endangered species occur: the roseate tern (*Sterna dougallii*) and the piping plover (*Charadrius melodus*). Neither one of these species was observed during surveys at the Project Area. *Rhode Island's Comprehensive Wildlife Strategy* (RIDEM 2005) lists 129 species to be of the Greatest Conservation Need in Rhode Island. Of these, 37 species were observed at the Project Area during surveys, two of which—the peregrine falcon and northern harrier—are considered state endangered.

The peregrine falcon is a year-round resident to the Project Area and was observed during the surveys throughout the year. Peregrine falcons were routinely observed perched on top of the aircraft carrier berthed at Pier 1 (near proposed turbine 6) and during hunting flights on or near the aircraft carrier. They were also observed in flight along the coast and out over Narragansett Bay. A pair of peregrine falcons breeds on the Newport Bridge, which is less than 1.6 km from the Project Area. One peregrine falcon fatality was reported during mortality surveys at the Jersey-Atlantic Wind Farm (Atlantic City, NJ) in 2007, which is the first coastal wind farm in the United States (NJ Audubon 2008). Due to the low number of breeding peregrine falcons in Rhode Island, loss of a single peregrine falcon could impact the this breeding population. Considering the locations of proposed turbines and the concentrations of prey along the coast, risk to peregrine falcons resulting from the Project would be low to moderate. Northern harriers were observed infrequently during the spring and fall migration periods. Considering the low numbers of migrating northern harriers through the Project Area, collision and other risks to this species are low. Overall, risk to rare, threatened, and endangered species is considered to be low to moderate.

3.3.2 RAPTORS

Despite data that suggest that most avian fatalities at wind farms in the United States are songbirds, raptor mortality has historically received the most attention. Prior to the establishment of wind energy guidelines with respect to avian species, early wind energy projects in the western United States were constructed with shorter lattice towers and faster moving blades in open mountainous areas. In addition, some projects (e.g., Altamont Pass Wind Resource Area [near Livermore, CA] and Foote Creek Rim Wind Farm [near Rawlins, WY]) were poorly sited in areas where a concentration of golden eagles hunted for prey. These factors contributed to the greater rate of golden eagle fatalities documented at some earlier wind energy projects (Arnett et al. 2007). Raptor mortality at newer wind projects has been low relative to older-generation wind farms, although there is substantial regional variation in raptor mortality rates. This lower mortality rate can be attributed to improved wind turbine design as well as early stage impact avoidance/minimization measures prescribed as a consequence of environmental and civil engineering practices (Erickson et al. 2002 and 2004, Johnson et al. 2002, Kerns and Kerlinger

2004, Jain et al. 2007). During mortality surveys at the Jersey-Atlantic Wind Farm, two of the nine recorded fatalities to birds were a peregrine falcon and osprey (*Pandion haliaetus*) (NJ Audubon 2008).

Raptors appear to be susceptible to collision with power distribution and transmission lines (Manville 2005). However, raptors, particularly eagles, can be at high risk of electrocution from power distribution and transmission. From 1986 to 1996, electrocution was the second and third highest reported cause of mortality to golden eagles and bald eagles, respectively (Harness and Wilson 2001). According to a 2001 publication, electrocution is now the fourth highest reported cause of mortality to bald eagles (Lehman 2001). Overhead lines at the Project Area would follow suggested APLIC guidelines, and collection lines would be buried in an effort to reduce the risk of electrocution to all species.

The Project Area contains a variety of habitat types and provides some habitat for raptors. However, the 2009 and 2010 point count surveys recorded low raptor occurrence (<2.0 birds/hour) in the Project Area. The peregrine falcon and northern harrier were the only state endangered raptors observed during surveys. Raptor species most likely to be found onsite include sharp-shinned hawk, Cooper's hawk, red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), osprey, northern goshawk (*Accipiter gentilis*), and turkey vulture (*Cathartes aura*). Analysis of range maps and habitats found in the Project Area indicates that in addition to migrating through the area, some of these species are year-round residents. Based on pre-construction data, low levels of raptor use of the Project Area suggest that raptor mortality is anticipated to be low for most species (Young et al. 2003). Due to the year-round presence of the peregrine falcon, abundance of prey at Naval Station Newport, and endangered species status in Rhode Island, the risk to peregrine falcons and raptors as a group is considered low to moderate.

3.3.3 WATERFOWL

Waterfowl were present in the Project Area during all four seasons. Canada geese were the most numerous, and 16 percent of individuals were reported flying within the RSZ of the Project Area. A nearby golf course and sheltered bays offer areas to forage and rest. The combination of these features and anticipated low to moderate flight heights suggests that Canada geese are vulnerable to collision from the proposed turbines.

Nine different species of ducks were observed during the 2009–2011 surveys. Sea ducks were observed mostly in Narragansett Bay; very little sea duck movement was observed over land. During winter months, rafts of sea ducks (mostly red-breasted mergansers) can be seen from the shores of the Project Area. The Project Area is also home to year-round family of mallard ducks (*Anas platyrhynchos*), which were usually observed in the sheltered bays. A 1987 study conducted in close proximity to wetlands indicated that waterfowl are susceptible to collision with transmission lines (Faanes 1987), but the lack of wetland habitat at the Project Area and small number of recorded waterfowl produces an anticipated low risk of collision to both migratory and year-round duck species. However, due to the abundance and flight heights of geese within the Project Area, waterfowl as a group are considered to be low to moderate risk of collision.

3.3.4 WADING/MARSH BIRDS

Fifty-five wading birds representing five species were observed in low numbers in the Project Area: great-blue heron (n = 5), black-crowned night heron (*Nycticorax nycticorax*) (n = 2), great egret (*Ardea alba*) (n = 8), snowy egret (*Egretta thula*) (n = 8), and glossy ibis (n = 32). Marsh birds (e.g., rails, bitterns,

cranes, coots) were not observed within the Project Area. The Project Area offers little suitable habitat for these species and, therefore, risk of collision to marsh birds is anticipated to be low.

No rookeries are present within the Project Area, and although habitat for wading birds is minimal, the shores of sheltered coves within the Project Area provide foraging habitat for these species. Survey data indicate that 45 percent of wading birds were observed flying at RSZ heights. Glossy ibis is at the greatest risk of collision of the wading birds, as 53 percent (n = 17) were observed within the RSZ (most within the northern section of the Project Area). Most glossy ibis were recorded flying over the Tank Farm 4 met tower area into Narragansett Bay to roost. There is a black-crowned night heron rookery on Little Gould Island east of the Project Area. Although studies indicate that large wading birds are at risk of collision into transmission lines (Lewis 1993, Lockman 1988, Huckabee 1993), the lack of wetlands for breeding and foraging habitat suggest that collision risk to wading birds as a group is anticipated to be low.

3.3.5 SEABIRDS

Of the species groups to be potentially affected by the Project, seabird species are the most at risk. Surveys conducted at the Project Area documented 2,506 gulls, 81 terns, and 428 cormorants. Other largely pelagic seabirds were not documented during surveys. Federally endangered roseate terns have not been documented in Newport County since August 2004 (eBird 2011) nor observed during surveys at Naval Station Newport.

Gull species are the most susceptible seabird to collision with turbines from the proposed Naval Station Newport wind project (NJ Audubon Society 2008). The herring gull population at the Project Area is high, and 17 percent of these species were observed flying within the RSZ. Within the Project Area, gulls utilize the existing coastal buildings (southern section of turbines) for nesting, resting, and staging, and they are known to forage in water, on shorelines, and in urban areas. The turbines proposed near buildings and shoreline areas are likely in areas where the highest risk of collision would occur due to gull movements from foraging areas to those areas used for nesting, resting, and staging.

A moderate percentage (21%) of cormorants was documented flying at medium flight heights equal to the RSZ. Most of these observations were restricted to the rocky rip-rapped areas along or just off the coastline (near proposed turbine 9). On other occasions, cormorants were observed flying within the RSZ in the southern portion of the Project Area. There is a propensity for this species to fly across land, especially during their migration period. Thus, in areas where turbines are to be built close to the shoreline, a low to moderate risk of collision with turbines is expected.

Of the 81 terns documented in the Project Area, common terns (*Sterna hirundo*) were most abundant. However, a majority of these observations were during flights over the water, and only eight were documented flying within the RSZ near Bishop Rock (proposed turbine 9). Offshore and nearshore foraging behavior and minimal modifications of habitat indicate that the overall risk to seabirds is expected to be low to moderate.

3.3.6 SHOREBIRDS

Shorebirds are a group of species not common around the Project Area. No endangered piping plovers were observed. The most abundant shorebird observed in the Project Area was killdeer (*Charadrius vociferus*) (n = 22). Although killdeer are a common ground nesting resident of the Project Area, fewer than 10 percent were documented flying within the RSZ. Of the 15 observations of American

oystercatcher (*Haematopus palliatus*) at the Project Area, most were restricted to rip-rapped and rocky coastal locations and none were documented at heights equal to the RSZ. All these observations occurred in the southern portion of the Project Area between turbines 5 and 11. Some of these areas contained small parcels of natural shoreline while others consisted of rip-rap. Other observations of shorebirds were restricted to migration periods. Migratory shorebirds observed in the Project Area included semipalmated plover (*Charadrius semipalmatus*) (*n* = 7), solitary sandpiper (*Tringa solitaria*) (*n* = 1), black-bellied plover (*Pluvialis squatarola*) (*n* = 1), and spotted sandpiper (*Actitis macularia*) (*n* = 1). No migratory shorebirds were documented flying within the RSZ. The mostly developed coastline does not provide adequate sandy beach habitat for the state and federally listed piping plover. According to records from USFWS, as of 2010 there are 71 nesting pairs of piping plovers in Rhode Island. The piping plover nesting location closest to the Project Area is the nearby Sachuest Point National Wildlife Refuge, approximately 6.4 km to the east-southeast. Overall, due to the small number of shorebirds observed flying within the RSZ in the Project Area and the lack of high quality habitat at Naval Station Newport, the risk of collision to this species group is low.

3.3.7 PASSERINES

Migrant passerines (e.g., songbirds) are more frequently documented during post-construction mortality monitoring compared with other avian groups (Arnett et al. 2007). At newer generation wind energy facilities outside of California, approximately 80 percent of documented mortalities have been songbirds, and about half of songbirds are nocturnal migrants (Erickson et al. 2001, Drewitt and Langston 2006, Johnson et al. 2007, Strickland and Morrison 2008). However, radar data and mortality monitoring indicate that fewer than 0.01 percent of migrant songbirds that pass over wind farms are killed (Erickson 2007). While locally breeding songbirds may experience lower mortality rates than migrants because many of these species tend to fly at heights below the RSZ during the breeding season, some breeding songbird species nonetheless exhibit behaviors (i.e., aerial displays) that increase their risk of collision with turbines.

The Project Area provides habitat for a variety of passerines. Urban passerines utilize the trees, flora from landscaping, buildings, bridges, and other human-made structures for nesting, foraging, and breeding. Shrubland habitat found along the coast provides habitat for several resident songbird species and also provides resources for migrant songbirds. Most of the songbirds observed at Naval Station Newport are common to this region of Rhode Island. The most common songbird species recorded during the 2009–2011 surveys were American goldfinch (*Carduelis tristis*) (*n* = 403), song sparrow (*Melospiza melodia*) (*n* = 278), barn swallow (*Hirundo rustica*) (*n* = 199), and American robin (*Turdus migratorius*) (*n* = 341).

Overall risk among songbirds is considered low as they were infrequently documented flying within the RSZ. Notwithstanding, of the songbirds documented in the Project Area, tree swallows (*Tachycineta bicolor*) (*n* = 77) appear to be at a greater risk of collision; 65 of the 74 (87%) tree swallows documented were flying at heights equal to the RSZ. In terms of the locality of these occurrences, the greatest abundance of songbirds, as well as the greatest species richness, was documented in parts of the Project Area consisting primarily of shrubland habitat (i.e., Tank Farm areas near proposed turbines 1, 2, 3, and 4). The direct effect of habitat loss from construction may result in lower abundance and, possibly, species richness in shrubland areas near turbines 1, 2, 3, and 4. Minimizing impacts to these areas and allowing for regeneration of the vegetation adjacent to permanent structures is recommended.

3.3.8 NOCTURNAL MIGRANTS

The majority of nocturnal migrants flew above the RSZ during the three periods of radar studies, though some migrants were recorded within the RSZ. During fall 2010, spring 2011, and fall 2011, average nocturnal passage rates (targets/km/hr) at Naval Station Newport were less than 56. However, the percentage of nocturnal migrants in the potential turbine RSZ was moderate (43%) during fall 2010, low (29.6%) during spring 2011, and low (15.4%) during fall 2011 (Geo-Marine 2011, Tetra Tech 2011c). Nocturnal radar passage rates in the Project Area were also lower than the radar passage rates documented at inland locations in the Northeast since 2003. Although methods and metrics vary among radar systems, of the 28 Northeast locations sampled during the spring, the mean passage rate was 324.2, and the 39 locations sampled during fall exhibited an overall mean passage rate of 311.3 (Woodlot Alternatives, Inc. 2005a–2007d, EDR 2006a and 2006b, Cooper et al. 2004a, 2004b, 2004c, Kerlinger et al. 2007, Geo Marine 2011, Tetra Tech 2011c).

During spring and fall migration periods, there may be incidences of fallout of nocturnal migrants normally attributed to changing weather conditions. Nighttime fallouts in some conditions can cause migrant birds to use artificial light sources to navigate to the ground. A recent mortality event during a fallout event at a wind energy project in West Virginia was caused by a substation light left on overnight. Due to Federal Aviation Administration (FAA) requirements, some wind turbines must install obstruction lighting systems. A recent study conducted at communication towers testing a variety of FAA obstruction lighting systems found fewer bird fatalities at towers equipped with strobes/flashing lights and greater mortality at towers with steady burning lights (Gehring et al. 2009). It is therefore highly recommended that the use of all white-emitting outside lights (steady burning) be minimized during nighttime hours, especially during migration periods. Nocturnal migrants are considered to have a low to moderate risk of collision with turbines based on the percentage of birds flying with the RSZ at night within the Project Area.

3.3.9 DIURNAL MIGRANTS

Radar studies at the Project Area indicate that diurnal migrants/residents have a greater probability of collision risk due to the lower flight heights recorded. During fall 2010, spring 2011, and fall 2011, the average diurnal passage rate at Naval Station Newport was less than 35 bird targets/km/hr. This passage rate would be considered low when compared with other radar studies conducted during the daylight hours (Geo-Marine 2011, Tetra Tech 2011c). However, the percentage of diurnal migrants in the potential turbine RSZ was moderate during fall 2010 (53%), spring 2011 (33.2%), and fall 2011 (41.7%) (Geo-Marine 2011, Tetra Tech 2011c). Fall 2011 radar results reveal that, on average, there were significantly more targets over water (20.5 targets/km/hr) than land (11.5 targets/km/hr) during the day. Observations from point count surveys show that a majority of daytime activity over water was of gull, tern, and cormorant species. Diurnal migrants/residents (mostly attributed to seabird movement) are considered to have a low to moderate risk of collision with turbines due to the greater numbers of birds flying with the RSZ during the day within the Project Area.

3.3.10 GAME BIRDS

Game birds were not documented during surveys at the Project Area. Due to the lack of game birds observed, risk of collision to this group would be low.

3.3.11 INTRODUCED SPECIES

The Project Area has a high number of exotic and introduced species including rock pigeons, house sparrows (*Passer domesticus*), house finches (*Carpodacus mexicanus*), and European starlings. In fact, some of these species had the greatest recorded abundances at the Project Area. European starlings (*n* = 1,123) and rock pigeon (*n* = 983) were the most commonly encountered introduced species, whereas, house sparrows (*n* = 143) and house finches (*n* = 15) were documented less frequently. Most occurrences of these species were in urban areas at Naval Station Newport. The only introduced species observed flying within RSZ were European starling (14%) and rock pigeon (10%). It is anticipated that some level of collision would occur given the abundance of introduced species in the Project Area; however, risk to introduced species is considered to be low to moderate.

3.4 GENERAL RISK SUMMARY TO BIRDS

Risk of collision with turbines is uncertain; however, it is anticipated that some level of bird mortality can occur. Table 3-1 summarizes the potential risk to each species group from the general threats outlined above. Most species groups had a risk category of low to moderate. No species groups were considered high risk. Mitigation measures outlined in Section 5.0 can help minimize and/or eliminate some of these general threats.

Table 3-1. Summary of general threats posed to birds by the proposed wind project at Naval Station Newport.

Species Group	Species likely impacted	Observed in Rotor Swept Zone	Most likely project stressor	Risk to local population	Risk to overall population	Overall Risk Level
Rare, threatened, Endangered	Peregrine falcon	Yes	Turbine collision	May affect	May affect	Low to Moderate
Raptors	Peregrine falcon	Yes	Turbine collision	May affect	May affect	Low to Moderate
Waterfowl	Canada goose	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low to Moderate
Wading bird/marsh bird	Glossy Ibis	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low
Seabird	Herring gull	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low to Moderate
Shorebird	Killdeer	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low
Passerines	Tree swallow	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low
Nocturnal migrants	Migrants	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low
Diurnal migrants	Herring gull	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low to Moderate
Introduced species	Rock pigeon	Yes	Turbine collision	Not likely to impact	Not likely to impact	Low to Moderate
Low Risk =	Bird fatalities in low number (< 5 birds/turbine/year).					
Moderate Risk =	Bird fatalities in moderate numbers (5 to 10 birds/turbine/year), fatality to a state T&E species.					
High Risk =	Bird fatalities in high numbers (> 10 birds/turbine /year), fatality to a federal T&E species.					

3.5 GENERAL THREATS TO BATS

The following section describes the general threats bats may be exposed to from the proposed wind project at Naval Station Newport. A list of the five bat species observed at Naval Station Newport is provided in Appendix A.

Collision- Wind Turbines

Post-construction monitoring studies indicate that foliage- or tree-roosting migratory bat species have experienced the highest fatality rates at wind energy facilities in North America, particularly during the late summer–early fall migration staging and swarming period (Kunz et al. 2007). Tree bats (*lasiurines*), such as eastern red bats, silver-haired bats, and hoary bats, make latitudinal migrations to warmer climates, and peaks in fatality rates appear to coincide with increasing bat activity levels associated with the primarily southward (fall) migration of these species (Cryan 2003, Arnett et al. 2008). Data on bat mortality at utility-scale wind facilities in the Northeast United States are limited; however, mortality studies show that the most commonly found species during post-construction monitoring are eastern red bat, hoary bat, and silver-haired bat (Kunz et. al 2007, Arnett et al. 2008). Hoary bats in particular account for approximately 75 percent of fatalities recorded during studies at wind farms (Tierney 2007, Piorkowski and O'Connell 2010).

Bat fatalities at existing wind facilities in the eastern United States have demonstrated that the risk of bats colliding with wind turbines may be greater than that for birds (Johnson 2005; Stantec 2008, 2009a, 2009b). Fatality monitoring studies in West Virginia and Pennsylvania concluded that bat mortality was greatest on nights with wind speeds less than 4–6 m/second, and that no mortalities occurred at a turbine that was feathered during the entire survey period (Arnett 2005). These results indicate that bats are likely to be at a greater risk of collision with rotating blades than with stationary turbines or turbine towers. The Maple Ridge Wind Farm (Lewis County, NY) post-construction mortality study in (Curry and Kerlinger 2009) noted bat fatalities among five species (hoary bat, eastern red bat, silver-haired bat, little brown bat, and big brown bat). Mars Hill and Stetson Mountain wind projects in Maine documented a similar suite of migratory bat species mortalities during post-construction surveys (Stantec 2008, 2009a, 2009b).

The placement of wind energy projects in certain landscape features and habitat types may increase the potential for bats to be exposed to risk of collision and barotrauma (Kunz et al. 2007, Baerwald et al. 2008, Cryan and Barclay 2009). Bats may also be attracted to turbines; behavioral studies indicate that bats investigate turbine blades and towers, which could place individuals at an increased risk of collision (Horn et al. 2008).

Bat migration and foraging activity in coastal and nearshore marine habitats has been documented (Ahlén et al. 2007, 2009; Cryan and Brown 2007; Johnson and Gates 2008), and bat mortality at coastal sites has also been reported (NJ Audubon 2008). Although, coastal sites appear to incur fewer fatalities than sites on forested ridgelines, fatalities have been recorded for at least two species of bat (hoary and eastern red) at the Jersey-Atlantic Wind Farm (NJ Audubon 2008).

Barotrauma

Some bat mortality at wind farms has been attributed to barotrauma (Kunz et al. 2007, Cryan and Barclay 2009), which is tissue damage to air-containing structures (lungs) that results from the rapid air-pressure changes near moving turbine blades (Baerwald et al. 2008).

Disturbance/Displacement

Disturbance and displacement have not been identified as the primary risks associated with bats and wind farms in the most current reviews of bat/wind turbine impacts (Kunz et al. 2007). The apparent limited concern with disturbance is likely due to the ability of bats to habituate to development (Keeley and Tuttle 1999). Some bat species are more sensitive to the pressures of development than others, although all bats recorded during the 2010–2011 surveys are common and widespread. Furthermore, the current Project Area has a substantive amount of existing development, and it is assumed that the bats currently occurring there are already habituated to human-made structures, changes to ambient nighttime light regimes, and noise levels. We predict that bats are unlikely to be displaced or disturbed by construction and operation of the Project. Given the existing and past use of the Project Area, we expect the local bat community to remain in the area after construction of the wind project.

Habitat Fragmentation

Habitat fragmentation is not considered a primary threat to bats from wind energy development, although the impacts of habitat fragmentation from wind development on bats are not well-known (Kuvlesky et al. 2007). Bats are highly mobile and often rely on ephemeral food resource concentrations and daytime roosting sites (Lacki et al. 2007). Some species, especially those adapted to foraging in interior forested habitat, including northern long-eared bat, may be more susceptible to habitat loss than more generalist species such as big brown bat. However, no closed canopy forests occur in the Project Area.

Indirect Effects

Population decline of hibernating bats in eastern North America as a result of white-nose syndrome has been identified as the single largest threat to bats in the region (Youngbaer 2009, USFWS 2011b). White-nose affects hibernating bats including bats of the *Myotis* genus, as well as big brown bat and tricolored bat (USFWS 2011b). Some *Myotis* species have declined to such an extent that they are being proposed as candidates for state and federal endangered and threatened species listing. Fortunately hibernating bats, in general, are at a lower risk of mortality from wind energy facilities than non-hibernating migratory bats. White-nose is not known to occur in Rhode Island, but it occurs in all surrounding states (USFWS 2011b). Any bats found during post-construction monitoring should be examined for white-nose fungus and reported to USFWS.

3.6 POTENTIAL RISK TO BATS

3.6.1 MIGRATORY TREE BATS

Call sequences for all three eastern North American migratory tree-bat species were recorded during spring, summer, and fall surveys at the Project Area; this indicates that these species move through the Project Area during migration but may also be resident in the area during the summer breeding period. The occurrence of long-distance migratory tree-roosting species indicates that individuals use the Tank Farm area and coastal areas (Figure 2-0) for foraging and/or migration, and may be exposed to risk from the proposed Project. The degree of risk and the potential for mortality are unknown. However, based on the overall low levels of bat activity during much of the monitoring period, it is unlikely that a large and robust bat community exists in the area of the proposed turbine array. However, given declining populations of bats and threat of collision/barotrauma, risk to migratory tree bats is low to moderate.

3.6.2 LOCAL BATS

Bat roosting habitat at the Project Area is likely relegated to natural habitat areas with large tress, as well as human-made structures such as abandoned buildings. No hibernacula or caves are known to exist at Naval Station Newport. Foraging likely occurs in open areas and along forest-field or shrub-field edges. However, given the fragmented forested/early successional nature of the Project Area and historic land uses (urban development), the local bat community should not be adversely affected by the Project. Based on the overall low levels of bat activity during much of the monitoring period, the risk to local bats is low to moderate.

3.6.3 BATS

No studies, to our knowledge, have attempted to directly address the potential effects a land-based coastal wind farm would have on bats; however, mortality monitoring at an existing coastal wind facility in the Great Lakes indicates that there may be less potential for fatality at coastal sites. Studies of bat migration at offshore islands and other marine coastal sites demonstrate that weather conditions, including visibility, barometric pressure, wind speeds, and temperature, influence bat migration (Cryan and Brown 2007). Bat activity at the Project Area was generally low, although migratory tree bats, including eastern red bat, were recorded during the migration period. It is possible that some take of eastern red bat may occur, though likely at low levels.

Some bat species seem to be more closely associated with coastal areas than others; for example eastern red bat may migrate along coastal flyways in a manner analogous to avian migrants (Hooton and Fenton 2008, Dzal et al. 2009). Foraging bats may also be attracted to coastal areas, including estuaries, marshes, and adjacent uplands, because insects often occur at higher concentrations in those areas. In addition, some bats may breed in coastal areas that meet microhabitat requirements for whelping (Johnson and Gates 2008). Other species, including hoary bat, silver-haired bat, and the non-migratory tricolored bat, can occur in coastal areas, primarily during migration but also during summer residency and regional movements to hibernacula (tricolored bat) (Johnson and Gates 2008).

Because of the limited understanding of bat migration and the paucity of data on mortality at coastal wind facilities, it is uncertain whether a coastal wind project would increase exposure risk for bats compared to inland or offshore facilities. Some recent mortality monitoring studies seem to indicate that risk may be lower at coastal sites in the Northeast compared to forested ridgelines further inland, although risk is still present (NJ Audubon 2008, Cryan and Barclay 2009, Stantec 2011).

At the moment, there are insufficient fatality data in Rhode Island to estimate the possible quantity of bat fatalities at the Project Area. Based on bat monitoring results collected at the Project Area and information from other regional studies, collision risk to bats would likely be low to moderate. A post-construction fatality monitoring program would help accurately estimate and refine the levels of bat mortality, the spatial and temporal patterns of the fatalities, and post-construction levels of bat activity.

3.7 GENERAL RISK SUMMARY TO BATS

Risk of collision with turbines and overall mortalities to bats is uncertain, however, it is anticipated that some level of mortality will occur at Naval Station Newport. Bat species recorded at Naval Station Newport have been found during post-construction surveys at east coast wind energy projects (Barclay et al. 2007, Kunz et al. 2007). In addition, bat populations in the east are in significant decline mostly attributed to white-nosed syndrome. Table 3-2 summarized the potential risk to bats from the general threats outlined above. Mitigation measures outlined in Section 5.0 can help minimize and/or eliminate some of these general threats.

Table 3-2. Summary of general threats posed to bats by the proposed wind project at Naval Station Newport.

Species Group	Species likely impacted	Recorded in RSZ of turbine footprint	Most likely project stressor	Risk to local population	Risk to overall population	Overall Risk Level
Long distance migratory bats	Silver haired, eastern red bat, hoary bat	Yes	Turbine collision, barotrauma	Not likely to impact	Not likely to impact	Low to Moderate
Local bats	Little brown bat, big brown bat	Yes	Turbine collision, barotrauma	Not likely to impact	Not likely to impact	Low to Moderate
Low Risk =	Bat fatalities in low numbers (< 10 bats/turbine/year).					
Moderate Risk =	Bat fatalities in moderate numbers (10 to 20 bats/turbine/year), fatality to a state T&E species.					
High Risk =	Bat fatalities in high numbers (>20 bats/turbine /year), fatality to a federal T&E species.					

4.0 CONCLUSIONS

A total of 101 bird species were observed during point count surveys at the Project Area from 2009 to 2011. Due to the developed and coastal nature of Naval Station Newport, a variety of birds from multiple species groups were frequently observed: seabirds (gulls and cormorants), shorebirds (killdeer), passerines (American goldfinch, song sparrow, barn swallow, and American robin), waterfowl (Canada geese), wading birds (glossy ibis), raptors (osprey and peregrine falcon), and introduced species (rock pigeons, house sparrows, house finches, and European starlings). Most of these species are considered to be common species of this region of Rhode Island. Two state protected species were observed, the peregrine falcon and northern harrier. No federally endangered or threatened species were observed during surveys from 2009 to 2011. No species groups were considered to be at high risk from the proposed turbines at Naval Station Newport. Risks to species groups ranged from low to moderate, and in most instances, one or two species within a group were considered at greater risk from the Project than other members of the group.

Shorebirds and wading birds are unlikely species groups to concentrate within the Project Area due to an abundance of higher quality habitat throughout the region. Most species observed during avian surveys had relatively low to moderate encounter rates, indicating that the risk of turbine collision for these species is low to moderate. Avian radar studies at the Project Area indicated that diurnal migrants/residents have a greater probability of collision risk due to the lower flight heights recorded than nocturnal migrants. The majority of nocturnal migrants flew at heights greater than the RSZ. Minimization of lighting would be very important to maintaining a low to moderate risk to nocturnal migrants and local year-round residents.

A greater abundance of seabirds, specifically herring gulls and great black-backed gulls (*Larus marinus*), occur at the Project Area year-round. Gulls were frequently observed occurring within the RSZ during all times of the year and day (especially in the southern portion of the Project Area). Gulls were routinely observed roosting and resting on top of buildings at Naval Station Newport. Gulls initiated their foraging flights from the building tops within the Project Area and out along the coast and into the Bay, and would then return to the building tops to eat their meals. Feeding frenzies of gulls were also observed in the nearshore environment close to the Project Area.

During the summer months, waterfowl species such as Canada geese and other introduced species occur in greater abundances and are another species group at low to moderate risk from the Project. Canada geese tend to congregate in the open grassy areas of the Project Area, as well as at the nearby golf course. A healthy population of wintering ducks (mostly red-breasted mergansers) used the sheltered coves and Project Area coastline. The majority of ducks remained in the nearshore environment but outside the Project footprint. Ducks were observed flying around the Bishop Rock peninsula as they flew from one side of the peninsula to the other, noticeably avoiding crossing land.

Raptor migration through the Project Area was relatively low. Ospreys were the most common raptor observed during the spring, summer, and fall surveys. The majority of their flight paths were along the coast and not over land. The peregrine falcon, a year-round resident that nests on the nearby bridge, is the one raptor species that may have a greater chance of collision due to the abundance of prey (i.e., rock pigeons) at the Project Area and pre-construction flight paths with the RSZ of proposed turbines.

In terms of locations within the Project Area where bird strikes are more likely to occur, the data suggest that the southern section (turbines 6 to 11) may impact birds more than the northern section. The

proposed southern turbines would be located in a coastal area near clustered buildings that are heavily used by birds for roosting, resting, and nesting. Birds were routinely observed flying from buildings to the Bay. The proposed southern turbines would be located within their flight paths. The northern group of turbines lacks the clustering of buildings but does provide bird species with early successional fields and woodlots for foraging and nesting.

Of the proposed turbines at Naval Station Newport, data suggest that turbine 9 may pose the greatest risk to birds than other turbines. This assessment is based upon the turbine's juxtaposition within Naval Station Newport and surrounding landscape features. Migrating birds and some bats follow coastlines. Turbine 9 is proposed for the Bishop Rock peninsula, which is a narrow piece of land that juts into Narragansett Bay. During point count surveys in 2010 a total of 848 birds representing 33 species were observed at this turbine location. Greater than 70 percent of these birds flew at varying heights over land and within, below, and above the airspace of the proposed turbine. The remaining bird flights were restricted to water and were considered outside the Project Area. Bird behavior near turbine 9 ranged from birds flying over land and water, to birds perched on the ground, to flocks of birds flying at heights greater than 130 m. The surrounding coves, beaches, and rocky coastline of Bishop Rock peninsula were used by all the species groups outlined in this risk assessment.

Because of the limited understanding of bat migration and the paucity of data on mortality at coastal wind facilities, it is uncertain whether a coastal wind project would increase exposure risk for bats compared to inland or offshore facilities. Some recent mortality monitoring studies (NJ Audubon 2008) seem to indicate that risk may be lower at coastal sites in the Northeast compared with forested ridgelines further inland (Barclay et al. 2007, Kunz et al. 2007), although some risk is still present.

Call sequences for all three eastern North American migratory tree-bat species were recorded during spring, summer, and fall surveys at the Project Area, which indicates that these species move through the Project Area during migration but may also be resident in the area during the summer breeding period. Bat roosting habitat at the Project Area is likely relegated to natural habitat areas with large trees, as well as human-made structures such as abandoned buildings within and around Naval Station Newport. The occurrence of long-distance migratory tree-roosting species indicates that individuals use the Tank Farm area and coastal areas for foraging and/or migration, and may be exposed to risk from the proposed Project.

The two stake detectors (Bishop Rock and Tank Farm 4 Stake) recorded the greatest index of bat activity compared to the High and Low detectors at the Tank Farm and coastal met tower sites of the Project Area. Bat acoustic data from the Bishop Rock detector near proposed turbines 4 indicated the greatest index of activity compared to the other bat acoustic survey locations at Naval Station Newport in 2009 and 2010. Bat data in 2011 showed the greatest index of activity occurring at the Tank Farm 4 Stake detector located near proposed turbines 2 and 3. A bat detector was not located at the Bishop Rock peninsula in 2011 because this area was under construction and access was restricted. Data suggest that bats are using both the tank farms and coastal areas of Naval Station Newport, and the northern and southern group of turbines subsequently have an equal likelihood of collision.

Weather is another factor that may contribute to bird and bat strikes at Naval Station Newport (Thomas et al. 2011). It is assumed that on good weather days, birds will be able to see and avoid turbines during daylight hours. The strike potential increases during nighttime and inclement weather events such as fog, rain, and snow.

It remains uncertain exactly how the coastal nature of this Project would affect overall bird and bat mortality. However, based on the available information, construction of the Naval Station Newport wind energy facility would result in some mortality to birds and bats, with some species (e.g., gulls and geese) likely more susceptible to collision than other bird species found at Naval Station Newport. A post-construction fatality monitoring program would help accurately estimate and refine the levels of bat and bird mortality, the spatial and temporal patterns of the fatalities, and post-construction levels of bat and bird activity.

It is anticipated that the level of mortality for birds and bats at Project Area would fall within the ranges observed during post-construction surveys at other existing wind energy facilities in the eastern United States. Naval Station Newport is not considered a high risk site to birds and bats or to any federally threatened or endangered species. Other ecological impacts resulting from construction of the Project would be minor given the developed nature of the Project Area. Naval Station Newport plans to implement mitigation and conservation measures to evaluate (post-construction fatality monitoring), as well as to help avoid, significant bird and bat impacts. These mitigation measures as outlined in Section 5.0 are intended to be important measures taken to minimize risk to birds and bats at Naval Station Newport.

5.0 MITIGATION MEASURES

Naval Station Newport has implemented a number of impact avoidance and minimization measures throughout the siting, design, and permitting phases of the Project, and has also committed to additional avoidance and minimization measures during Project construction and operations.

Impact Avoidance and Conservation Measures

- Naval Station Newport proposes to conduct two non-consecutive years of post-construction mortality surveys within the first five years of Project operations to further evaluate risk to birds and bats. Surveys would include carcass searches, searcher efficiency trials, and scavenger removal assessments to estimate avian and bat collision mortality. Surveys would be conducted from 1 April through 1 November.

- Naval Station Newport selected a turbine model with new turbine technology that uses smooth tubular steel tower structures containing no potential roosting sites with the potential to attract birds, and no guy wires that could present a collision risk. This avoids and minimizes potential concerns associated with older turbine model technology that included lattice tower structures that attracted birds to available perching sites on the towers, and guy wires on turbine towers that presented a potential collision risk to birds.

- Naval Station Newport evaluated numerous alternatives during the micro-siting of Project facilities to avoid and minimize impacts to state and federally protected wetlands, waterbodies, and significant wildlife habitats.

- Naval Station Newport is placing most power lines underground and conforming to APLIC standards to the extent practicable for the marking of transmission towers and lines. These standards are intended to protect raptors and other birds from electrocution. These measures are sufficient to protect from electrocution even the largest birds that may perch or roost on transmission lines or towers.

- Naval Station Newport would minimize lighting in the Project vicinity. Lighting of the turbines would be pursuant to FAA aviation hazard lighting standards. Naval Station Newport is proposing in its lighting plan to use the minimum number of aviation hazard lights acceptable to the FAA. Naval Station Newport would install motion-activated timed lighting and shields on light fixtures to direct light downward on tower entrances, as well as on other facilities that require lighting at night, to avoid the potential to attract insects that may draw birds and bats toward the facility. This technique would also help protect migratory birds, as they are sometimes drawn to light sources during migration.

- Project design minimizes the number and length of access roads, uses existing roads when possible, and would close and restore with native vegetation roads not used for operation, maintenance, and/or emergency purposes.

- During operations, no trash or food-related waste containers would be allowed in the vicinity of the turbines. This would prevent trash from being exposed or blown around the Project Area and would avoid attracting predators/scavengers to the area.

- Road-killed animals or other carcasses detected by personnel on or near roads within the Project Area would be recorded and promptly removed to avoid attracting eagles or other raptors to the area.

6.0 LITERATURE CITED

Ahlén, I., H. J. Baagoe, and L. Bach. 2009. Behaviour of Scandinavian bats during migration and foraging at sea. *Journal of Mammalogy* 90: 1318–1323.

Ahlén, I., L. Bach, H.J. Baagoe, and J. Pettersson. 2007 *Bats and offshore wind turbines studied in southern Scandinavia*.

APLIC (Avian Power Line Interaction Committee). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the Californian Energy Commission. Washington, D.C., and Sacramento, California.

Arnett, E.B. 2005. *Relationships between bats and wind turbines in Pennsylvania and West Virginia: an assessment of bat fatality search protocols, patterns of fatality, and behavioral interactions with wind turbines*. The Bats and Wind Energy Cooperative, Bat Conservation International, Austin, Texas.

Arnett, E.B., D.B. Inkley, D.H. Johnson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Mason, M.L. Morrison, M.D. Strickland, and R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. *Wildlife Society Technical Review* 07-2. The Wildlife Society, Bethesda, MA.

Arnett, E.B., W.K. Brown, W.P. Erickson, K.K. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T.J. O'Connel, M.D. Piorkowski, and R.D. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. *Journal of Wildlife Management* 72: 61–78.

Avery, M., P. F. Springer, and J. F. Cassel. 1976. The effects of a tall tower on nocturnal bird migration—A portable ceilometer study. *Auk* 93: 281–291.

Baerwald, E.F, G.H. D'Amours, B.J. Klug, and R.M.R Barclay. 2008. Barotrauma is a Significant Cause of Bat Fatalities at Wind Turbines. *Current Biology* 18: 695–696.

Barclay, R. M. R., E. F. Baerwald, and J.C. Gruver. 2007. Variation in bat and bird fatalities at wind energy facilities: assessing the effects of rotor size and tower height. *Canadian Journal of Zoology-Revue Canadienne De Zoologie* 85: 381–387.

Boeker, E. L. and P. R. Nickerson. 1975. Raptor electrocutions. *Wildlife Society Bulletin* 3: 79–81.

Brewer, R., and J. A. Ellis. 1958. An analysis of migrating birds killed at a television tower in east-central Illinois, September 1955–May 1957. *Auk* 75: 400–414.

Brown, W. M. and R. C. Drewien. 1995. Evaluation of two power line markers to reduce crane and waterfowl collision mortality. *Wildlife Society Bulletin* 23: 217–227.

Clark, A. R., C.E. Bell, and S.R. Morris. 2005. Comparison of daily avian mortality characteristics at two television towers in western New York. *Wilson Bulletin* 117: 35-43.

Cochran, W. W., and R.R. Graber. 1958. Attraction of nocturnal migrants by lights on a television tower. *Wilson Bulletin* 70: 378–380.

Cooper, B.A., A.A. Stickney, J.J. and Mabee. 2004a. *A visual and radar study of 2003 spring bird migration at the proposed Chautauqua wind energy facility, New York*. 2004. Final Report prepared by ABR Inc. Chautauqua Windpower LLC.

Cooper, B.A., T.J. Mabee, and J.H. Plissner. 2004b. *A Radar Study of Nocturnal Bird Migration at a Proposed Mount Storm wind power development, West Virginia, Fall 2003*. Appendix in Avian baseline studies Mount Storm wind power project Grant County, West Virginia, final report 2004. Prepared for NedPower Mount Storm, LLC.

Cooper, B.A., A.A. Stickney, and T.J. Mabee. 2004c. *A radar study of nocturnal bird migration at the proposed Chautauqua wind energy facility, New York, Fall 2003*.

Cryan, P.M. 2003. Seasonal Distribution of Migratory Tree Bats (Lasiurus and Lasionycteris) in North America. *Journal of Mammalogy* 84:579–593.

Cryan, P. M., and R. M. R. Barclay. 2009. Causes of bat fatality at wind turbines: Hypotheses and predictions. *Journal of Mammalogy* 90: 1330–1340.

Cryan, P. M., and A. C. Brown. 2007. Migration of bats past a remote island offers clues toward the problem of bat fatalities at wind turbines. *Biological Conservation* 139: 1–11.

Curry and Kerlinger LLC. 2009. *Annual report for the Maple Ridge Wind Power Project. Post-construction bird and bat fatality study – 2008*. Prepared for Iberdrola Renewables and Horizon Wind and Technical Advisory Committee for the Maple Ridge Project Study.

Drewitt, A.L., and R.H.W. Langston. 2006. Assessing the impacts of wind farms on birds. *Ibis* 148: 29–42.

Dzal, Y., L. A. Hooton, E. L. Clare, and M. B. Fenton. 2009. Bat activity and genetic diversity at Long Point, Ontario, an important bird stopover site. *Acta Chiropterologica* 11: 307–315.

eBird. 2011. eBird: An online database of bird distribution and abundance [web application]. Version 2. eBird, Ithaca, New York. Available online at: http://www.ebird.org (Accessed December 2011).

EDR (Environmental Design and Research). 2006a. *Draft Environmental Impact Statement for the Dairy Hills Wind Farm Project*. Towns of Perry, Warsaw and Covington, Wyoming County, New York. Prepared for Dairy Hills Wind Farm, LLC.

———. 2006b. *Draft Environmental Impact Statement for the Cohocton Wind Power Project*. Town of Cohocton, Steuben County, New York. Prepared for Canandaigua Wind Partners, LLC.

Erickson, W.P. 2007. *Summary of methods and results for prediction and estimation of impacts and risk*. Presented at NWCC Probability of Impact Workshop, November 13, 2007, Golden, CO.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young Jr., 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*. National Wind Coordinating Committee, Washington.

Erickson, W.P., G.D. Johnson, D.P. Young, Jr., D. Strickland, R. Good, M. Bourassa, K. Bay, and K.Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Technical report prepared for

Bonneville Power Administration, Portland, Oregon by WEST, Inc., Cheyenne, Wyoming. December 2002. http://www.bpa.gov/Power/pgc/wind/Avian_and_Bat_Study_12-2002.pdf.

Erickson, W.P., G.D. Johnson, and D.P. Young, Jr. 2005. *A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collisions*. USDA Forest Service General Technical Report PSW-GTR-191.

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. *Stateline Wind Project Wildlife Monitoring Final Report, July 2001–December 2003*. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee.

Faanes, D.C. A. 1987. *Bird behavior and mortality in relation to power lines in prairie habitats*. General Technical Report 7. Fish and Wildlife Service, U.S. Department of the Interior; 24 p.

Fisher, H. I. 1966. Midway's deadly antennas. *Audubon Magazine* 68: 220–223.

Gehring, J., P. Kerlinger, and A.M. Manville. 2009. Communication towers, lights, and birds: successful methods of reducing the frequency of avian collisions. *Ecological Applications* 19: 504–514.

Geo-Marine. 2011. *Avian radar report for the development of wind energy facilities at Naval Station Newport, Rhode Island*.

Harmata, A. R., K. M. Podruzny, J. R. Zelenak, and M. L. Morrison. 1999. Using marine surveillance radar to study bird movements and impact assessment. *Wildlife Society Bulletin* 27: 44–52.

Harness, R. E. 1997. *Raptor electrocutions caused by rural electric distribution powerlines*. Ft. Collins: Colorado State University; 110 p. M.S. thesis.

Harness, R. E., and K. R. Wilson. 2001. Electric-utility structures associated with raptor electrocutions in rural areas. *Wildlife Society Bulletin*. 29: 617–673.

Hooton, L. A., and M. B. Fenton. 2008. Bat Migration Activity at an Important Stopover Site for Migratory Birds. *Bat Research News* 49: 128–129.

Horn, J. W., E. B. Arnett, and T. H. Kunz. 2008. Behavioral responses of bats to operating wind turbines. *Journal of Wildlife Management*. 72: 123–132.

Huckabee, J. W. 1993*. Proceedings: avian interactions with utility structures*. International workshop, September 13- 16, 1992. Miami, FL: Electric Power Research Institute, Project 3041, EPRI TR-103268.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2007. *Annual Report for the Maple Ridge Wind Power Project Post-construction Bird and Bat Fatality Study—2006*. Prepared by Curry and Kerlinger, LLC for PPM Energy, Horizon Energy, and Technical Advisory Committee for the Maple Ridge Project.

Johnson, G. D. 2005. A review of bat mortality at wind-energy developments in the United States. *Bat Research News* 46: 45–49.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000. *Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study*. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. 2002. Collision Mortality of Local and Migrant Birds at a Large-scale Wind Power Development on Buffalo Ridge, Minnesota. *Wildlife Society Bulletin* 30:879–887.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. 2007. Collision mortality of local and migrant birds at a large-scale wind-power development on Buffalo Ridge, Minnesota. *Wildlife Society Bulletin* 30: 879–887.

Johnson, J. B., and J. E. Gates. 2008. Bats of Assateague Island National Seashore, Maryland. *American Midland Naturalist* 160: 160–170.

Jones, J., and C.M. Francis. 2003. The effects of light characteristics on avian mortality at lighthouses. *Journal of Avian Biology* 34: 328–333.

Karsten, K.B., A.M. Hale, J.A. Meyer, T.G. Rubenstahl, E.S. Hatchett, T.K. Stevens. 2011. *Indirect Effects of Wind Turbines on Summer and Winter Grassland Bird Communities in Texas*. Abstract presented at the Association of American Geographers Annual Meeting. April 2011

Karlsson, J. 1977. Fågelkollisioner med master och andra byggnadsverk [Bird collisions with towers and other man-made constructions]. *Anser* 16: 203–216.

Keeley, B.W., and M.D Tuttle. 1999. *Bats in American Bridges*. Bat Conservation International. Resource Publication No. 4. 40pp. Available online at: http://www.batcon.org/pdfs/bridges/ BatsBridges2.pdf (Accessed December 2011)

Kerlinger, P., R. Curry and A. Hasch 2007. Status Report on Met Tower Incidents. Collinsville Montezuma Hills Wind Resource Area, Solano County, California. Prepared for FPL Energy.

Kerns, J., and P. Kerlinger. 2004. *A study of bird and bat collision fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual report for 2003*. Technical report prepared by Curry and Kerlinger, LLC for FPL Energy and Mountaineer Wind Energy Center Technical Review Committee.

Koford, R., A. Jain, G. Zenner, and A. Hancock. 2004. *Avian mortality associated with the Top of Iowa Wind Farm: Progress Report, Calendar Year 2003*. in Iowa State University, Iowa Cooperative Fish and Wildlife Research Unit, Ames Iowa. Pp. 9.

Koops, F. B. J. 1987. *Collision victims of high-tension lines in the Netherlands and effects of marking*. KEMA Report 01282-mob 86-3048.

Kunz, T.H., E.B. Arnett, B.M. Cooper, W.P. Erickson, R.P. Larkin, T. Mabee, M.L. Morrison, M.D. Strickland, and J.M. Szewczak. 2007. Assessing impacts of wind-energy development on nocturnally active birds and bats: a guidance document. *Journal of Wildlife Management* 71: 2449–2486.

Kuvelsky, Jr., W., Brennan, L., Morrison, M., Boydston, K., Ballard, B., and Bryant, F. 2007. *Wind Energy Development and Wildlife Conservation: Challenges and Opportunities. Journal of Wildlife Management* 71:2487–2498.

Lacki, M. J., S. K. Amelon, and M. D. Baker. 2007. Foraging ecology of bats in forests. Pages 83–128 in J. P. H. M.J. Lacki, and A. Kurta, editor. *Bats in Forests: Conservation and Management*. The Johns Hopkins University Press, Baltimore, MD.

Leddy, K. L., K. F. Higgins, and D. Naugle. 1999. Effects of wind turbines on upland nesting birds in Conservation Reserve Program Grasslands. *Wilson Bulletin* 111: 100–104.

Lehman, R. N. 2001. Raptor electrocution on power lines: current issues and outlook. *Wildlife Society Bulletin* 29: 804–813.

Lewis, J. C. 1993. The U.S. Fish and Wildlife Service and bird-power line interactions. In: J. W. Huckabee, editor. *Proceedings: avian interactions with utility structures*. International workshop, September 13-16, 1992. Miami, FL: Electric Power Research Institute, Project 3041, EPRI TR-103268; 2-1- 2.6

Lockman, D. C. 1988. Trumpeter Swan mortality in Wyoming 1982-1987. *Proceedings and papers of the eleventh Trumpeter Swan Society conference*; 12-13.

Manville, A.M., II. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science – next steps toward mitigation. *Bird Conservation Implementation in the Americas: Proceedings 3rd International Partners in Flight Conference 2002*, C.J. Ralph and T. D. Rich, Editors. U.S.D.A. Forest Service General Technical Report PSW-GTR-191, Pacific Southwest Research Station, Albany, CA: 1051-1064

Morrison, M.L. 1998. *Avian risk and fatality protocol in Dept. of Energy, National Technical Information Service*.

NJ Audubon (New Jersey Audubon Society). 2008. *Post-construction wildlife monitoring at the Atlantic City Utilities Authority-Jersey Atlantic Wind Power Facility*. Submitted to N.J. Board of Public Utilities. Newark, N.J.

Osborn, R.G., C.D. Dieter, K.F. Higgins, R.E. Usgaard. 1998. Bird flight characteristics near wind turbines in Minnesota. *American Midland Naturalist* 139: 29–37.

Piorkowski, M., and T. O'Connell. 2010. Spatial Pattern of Summer Bat Mortality from Collisions with Wind Turbines in Mixed-grass Prairie. *American Midland Naturalist* 164:260-269.

RIDEM (Rhode Island Department of Environmental Management). 2005. *Rhode Island's Comprehensive Wildlife Strategy.* Division of Fish and Wildlife, Wakefield, RI. September 2009. Available online at: http://www.wildlifeactionplans.org/pdfs/action_plans/ri_action_plan.pdf (Accessed December 2011)

Savereno, A. J., L. A. Savereno, R. Boettcher, and S. M. Haig.1996. Avian behavior and mortality at power lines in coastal South Carolina**.** *Wildlife Society Bulletin* 24: 636–648.

Shaffer, J. and D. Johnson. 2008. *Displacement Effects of Wind Developments on Grassland Birds in the Northern Great Plains*. NWCC Wind Wildlife Conference, October 2008. Milwaukee, WI.

Stantec (Stantec Consulting, Inc.). 2008. *2007 Spring, Summer, and Fall Post-Construction Bird and Bat Mortality Study at the Mars Hill Wind Farm, Maine*. Prepared for UPC Wind Management, LLC, Cumberland, Maine, by Stantec Consulting, formerly Woodlot Alternatives, Inc., Topsham, Maine. January, 2008.

———. 2009a. *Post-Construction Monitoring at the Mars Hill Wind Farm, Maine - Year 2, 2008*. Prepared for First Wind Management, LLC, Portland, Maine. Prepared by Stantec Consulting, Topsham, Maine. January 2009.

———. 2009b. *Stetson I Mountain Wind Project. Year 1 Post-construction Monitoring Report ,2009 for the Stetson Mountain Wind Project in Penobscot and Washington Counties, Maine*. Prepared for First Wind Management, LLC, Portland, Maine. Prepared by Stantec Consulting, Topsham, Maine. January 2009.

———. 2011. *Wolfe Island Wind Plant Post-Construction Follow-up Plan Bird and Bat Resources*. Monitoring Report No. 5. January – June 2011. Prepared for TransAlta Corporation's Canadian Renewable Energy Corporation. Prepared by Stantec Consulting, Guelph, ON. December 2011.

Strickland, M.D., G.D. Johnson, W.P. Erickson, S.A. Sarappo, and R.M. Halet. 2003. *Avian use, flight behavior, and mortality on the Buffalo Ridge, Minnesota, Wind Resource Area*. National Avian - Wind Power Planning Meeting III, 70-79.

Strickland, M. D. and M.L. Morrison. 2008. *A summary of avian/wind facility interactions in the U.S.* Federal Guidelines Committee for Wind Siting Guidelines, February 26, 2008, Washington, DC.

Tetra Tech, Inc. 2010. *Fall 2009 Bird and Bat Biological Survey Report, Naval Station Newport, Rhode Island*. Prepared for NAVFAC Atlantic, Norfolk Virginia. Prepared by Tetra Tech, Portland, Maine. December 2010.

Tetra Tech, Inc. 2011a. *Bird and Bat Biological Survey Report, Winter, Spring, Summer, and Fall 2010, Naval Station Newport, Rhode Island*. Prepared for NAVFAC Atlantic, Norfolk Virginia. Prepared by Tetra Tech, Portland, Maine. April 2011.

Tetra Tech, Inc. 2011b. *Bat Biological Survey Report Addendum, Spring and Summer 2011, Naval Station Newport*. Prepared for NAVFAC Atlantic, Norfolk Virginia. Prepared by Tetra Tech, Portland, Maine. October 2011.

Tetra Tech, Inc. 2011c. *Fall 2011 – Avian Radar Survey Naval Station Newport Wind Energy Project, Rhode Island*. Prepared for NAVFAC Atlantic, Norfolk Virginia. Prepared by Tetra Tech, Portland, Maine. December 2011.

Thelander, C.G., K.S. Smallwood, and L. Rugge. 2003. *Bird risk behaviors and fatalities at the Altamont Pass Wind Resource Area*. Dept. of Energy, ed. BioResource Consultants. Pp. 87.

Thomas, P. J., A.K. Labrosse, A.C. Pomeroy, K.A. Otter. 2011. Effects of weather on avian migration at proposed ridgeline wind energy sites. *Journal of Wildlife Management* 75: 805–815.

Tierney, R. 2007. *Buffalo Gap I Wind Farm Avian Mortality Study: February 2006 – January 2007*. Final Survey Report. Prepared for AES SeaWest, Inc.

USFWS (U.S. Fish and Wildlife Service). 2011a. *Draft Land-Based Wind Energy Guidelines*. September 13, 2011. Available online at http://www.fws.gov/windenergy/docs/WEG_September_13_2011.pdf (Accessed December 2011)

———. 2011b. *White-nose syndrome: The devastating disease of hibernating bats in North America*. November 2011.

Weston Solutions, Inc. 2010. *Final environmental assessment. 2-MW wind turbine generators*. U.S. Coast Guard Training Center (TRACEN), Cape May, New Jersey. Edison, New Jersey: Weston Solutions, Inc.

Woodlot Alternatives, Inc. 2005a. *A Fall 2004 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windfarm Prattsburgh Project in Prattsburgh, New York*. Prepared for UPC Wind Management, LLC.

———. 2005b. *A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windfarm Prattsburgh Project in Prattsburgh, New York*. Prepared for UPC Wind Management, LLC.

———. 2005c. *A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont*. Prepared for PPM Energy/Deerfield Wind, LLC.

———. 2005d. *A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Mars Hill Wind Project in Mars Hill, Maine*. Prepared for UPC Wind Management, LLC.

———. 2006a. *A Fall 2005 Radar Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine*. Prepared for TRC and TransCanada Energy, Ltd.

———. 2006b. *Spring 2006 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont*. Prepared for PPM Energy, Inc.

———. 2006c. *A Spring 2006 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine*. Prepared for Evergreen Windpower, LLC.

———. 2007a. *A Fall 2006 Survey of Bird and Bat Migration at the Proposed Lempster Mountain Wind Power Project in Lempster, New Hampshire*. Prepared for Lempster Wind, LLC.

———. 2007b. *A Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Mountain Wind Power Project in Washington County, M*aine. Prepared for Evergreen Wind V, LLC.

———. 2007c. *A Spring 2007 Survey of Nocturnal Bird Migration, Breeding Birds, and Bicknell's Thrush at the Proposed Lempster Mountain Wind Power Project Lempster, New Hampshire*. Prepared for Lempster Wind, LLC.

———. 2007d. *A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine*. Prepared for Evergreen Wind V, LLC.

Young, D.P., Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. *Avian and bat mortality associated with the initial phase of the Foote Creek Rim Wind Power Project, Carbon*

County, Wyoming: November 1998 – June 2002. Technical Report prepared by WEST, Inc. for Pacificorp, Inc., SeaWest Windpower, Inc. and Bureau of Land Management.

Youngbaer, Peter. 2009. *White nose syndrome March, 2009 Research Status Report*. NSS WNS Liason.

APPENDIX A – SPECIES LIST

Bird Species List at Naval Station Newport 2009 to 2011		
Alder Flycatcher	Downy Woodpecker	Osprey
American Black Duck	Eastern Kingbird	Peregrine Falcon
American Crow	Eastern Phoebe	Purple Finch
American Goldfinch	Eastern Towhee	Red-breasted Merganser
American Oystercatcher	Eastern Tufted Titmouse	Red-eyed vireo
American Redstart	Eastern Wood-Pewee	Red-tailed Hawk
American Robin	European Starling	Red-winged Blackbird
American Tree Sparrow	Fish Crow	Ring-billed Gull
Atlantic Brant	Gadwall	Rock Pigeon
Barn Swallow	Glossy Ibis	Rose-breasted Grosbeak
Belted Kingfisher	Golden-winged Warbler	Ruby-crowned kinglet
Black-and-White Warbler	Gray Catbird	Ruby-throated Hummingbird
Black-bellied Plover	Great Black-backed Gull	Savannah Sparrow
Black-capped Chickadee	Great Blue Heron	Semipalmated Plover
Black-crowned Night-Heron	Great Cormorant	Sharp-shinned Hawk
Blue Jay	Great Crested Flycatcher	Snow Bunting
Blue-winged Warbler	Great Egret	Snowy Egret
Bobolink	Herring Gull	Solitary Sandpiper
Brown Thrasher	Horned Grebe	Song Sparrow
Brown-headed Cowbird	Horned Lark	Spotted Sandpiper
Bufflehead	House Finch	Tree Swallow
Canada Goose	House Sparrow	Tufted titmouse
Carolina Wren	House Wren	Turkey Vulture
Cedar Waxwing	Indigo Bunting	Unidentified Duck
Chestnut-sided Warbler	Killdeer	Unidentified Gull
Chimney Swift	Laughing Gull	Unidentified Sparrow
Chipping Sparrow	Mallard	Unidentified Warbler
Common Eider	Merlin	Warbling Vireo
Common Goldeneye	Mourning Dove	White-throated Sparrow
Common Grackle	Mute Swan	White-winged Scoter
Common Loon	Northern Cardinal	Willow Flycatcher
Common Tern	Northern Flicker	Winter Wren
Common Yellowthroat	Northern Harrier	Yellow Warbler
Cooper's Hawk	Northern Mockingbird	Yellow-billed cuckoo
Double-crested Cormorant	Northern Rough-winged Swallow	Yellow-rumped warbler
Bat Species List at Naval Station Newport 2009 to 2011		
Hoary Bat	Eastern-red Bat	Silver-haired-Bat
Big Brown Bat	Little Brown Bat	