



***Bird and Bat Biological Survey Report
Winter, Spring, Summer, Fall 2010***

***Naval Station Newport
Newport, Rhode Island***



Prepared for:

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Table of Contents

EXECUTIVE SUMMARY	III
1.0 INTRODUCTION	7
1.1 PROJECT OVERVIEW	7
2.0 AVIAN POINT COUNT SURVEYS	9
2.1 INTRODUCTION	9
2.2 METHODS.....	9
2.3 SEASONAL RESULTS	11
Winter Bird Surveys – 2010	11
Spring Bird Surveys – 2010	14
Breeding Bird Surveys – 2010	18
Summer Resident Surveys – 2010	20
Fall Bird Surveys – 2010	23
2.4 OVERALL RESULTS	27
2.5 DISCUSSION	30
3.0 BAT ACOUSTIC SURVEYS	33
3.1 INTRODUCTION	33
3.2 METHODS.....	33
Data Analysis.....	36
3.3 BAT ACOUSTIC RESULTS	37
Summary of Results from 2010	37
Summary of Results from 2009	41
3.4 DISCUSSION	42
4.0 REFERENCES	45
APPENDICES	49
A. WINTER RESIDENT DATA	49
B. SPRING MIGRATION.....	52
C. BREEDING BIRD SURVEYS.....	56
D. SUMMER RESIDENT SURVEYS.....	60
E. FALL MIGRATION	64
F. OVERALL RESULTS	68

List of Figures

Figure 1-1. Naval Station Newport location map.	8
Figure 2-1. Point count locations at Naval Station Newport, 2010.	10
Figure 2-2. Observations of flights heights by date at Naval Station Newport, winter 2010.....	12
Figure 2-3. Observations of flights heights by point location at Naval Station Newport, winter 2010.	13

Figure 2-4. Observations of flights heights at Naval Station Newport, spring 2010. 15
Figure 2-5. Observations of morning and afternoon surveys at Naval Station Newport, spring 2010. 16
Figure 2-6. Observations of flights heights by location at Naval Station Newport, spring 2010..... 17
Figure 2-7. Observations of flights heights by date at Naval Station Newport, BBS 2010. 19
Figure 2-8. Observations of flights heights by location at Naval Station Newport, BBS 2010. 20
Figure 2-9. Observations of flights heights by date at Naval Station Newport, summer 2010..... 21
Figure 2-10. Observations of flights heights by point location at Naval Station Newport, summer 2010. 22
Figure 2-11. Observations of flights heights by date at Naval Station Newport, fall 2010. 24
Figure 2-12. Observations during morning and afternoon surveys by date at Naval Station Newport, fall 2010. 25
Figure 2-13. Observations of flights heights by point at Naval Station Newport, fall 2010. 26
Figure 2-14. Observations of flights heights by season at Naval Station Newport, 2010. 28
Figure 2-15. Flights height observations by location at Naval Station Newport, 2010. 29
Figure 2-16. Summary of morning and afternoon bird observations at Naval Station Newport - 2010. 30
Figure 3-1. Bat detector locations at Naval Station Newport, 2010..... 34
Figure 3-2. Location of the Bishop Rock detector at Naval Station Newport, 2010..... 35
Figure 3-3. Forested edge habitat near the Tank Farm 4 met tower at Naval Station Newport, 2010. 35
Figure 3-4. The Tank Farm 4 met tower high and low detectors at Naval Station Newport, fall 2010..... 36
Figure 3-5. Total number of recorded call sequences by detector, 2010. 40

List of Tables

Table E-1. Summary of avian surveys at Naval Station Newport, 2010. iii
Table E-2. Summary of bat acoustic monitoring effort by detector at Naval Station Newport, 2010..... v
Table E-3. Summary of Index of Activity by bat species recorded at Naval Station Newport, 2010..... v
Table 2-1. Observations during morning and afternoon surveys at Naval Station Newport, winter 2010. 12
Table 2-2. Observations of flights heights by location at Naval Station Newport, winter 2010. 14
Table 2-3. Observations during morning and afternoon surveys by point location, spring 2010..... 17
Table 2-4. Observations during morning and afternoon surveys by date, summer 2010. 21
Table 2-5. Observations during morning and afternoon surveys by point location, summer 2010. 22
Table 2-6. Bird observations during morning and afternoon surveys by point, fall 2010..... 26
Table 2-7. Observations during morning and afternoon surveys at Naval Station Newport, 2010. 28
Table 3-1. Summary of acoustic monitoring survey effort by detector in the Project Area, 2010. 38
Table 3-2. Summary of bat call sequences and species recorded in the Project Area, 2010..... 39
Table 3-3. Summary of Index of Activity by species recorded in the Project Area, 2010. 39
Table 3-4. Summary of acoustic monitoring survey effort by detector in the Project Area, 2009. 42

EXECUTIVE SUMMARY

During 2010, Tetra Tech, Inc. (Tetra Tech) conducted field surveys to document avian and bat activity at the Naval Station Newport Wind Project (Project Area) in Newport, Rhode Island (RI). The surveys were initiated by Naval Facilities Engineering Command – Mid Atlantic as part of the planning and permitting process for the proposed wind energy development. Bird surveys included winter, spring, summer, and fall point count surveys conducted throughout Naval Station Newport. A fall 2010 bat acoustic survey was also conducted. These surveys supplement the initial bird and bat field surveys conducted at Naval Station Newport during fall 2009. The results of this investigation provide data on temporal and spatial use of the Project Area by birds and bats and create a baseline dataset for comparison with any future post-construction surveys.

Point Count Bird Surveys

Twenty six separate surveys of 12 point count locations (Figure 2-1) were conducted between January 13 and October 7, 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 (*Falco peregrinus*) and northern harrier (*Circus cyaneus*) were detected during the point count surveys (Table E-1). 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.

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

Table E-1. Summary of avian surveys at Naval Station Newport, 2010.

Naval Station Newport – 2010 Bird Surveys	All	Winter	Spring	BBS	Summer	Fall
Number of surveys	26	4	7	3	5	7
Length of each point count (min.)	-	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

Naval Station Newport – 2010 Bird Surveys	All	Winter	Spring	BBS	Summer	Fall
% (#) at rotor-swept zone	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	none	none	none	none	none	none
Rhode Island state endangered species observed (in addition to federally-listed species)	NOHA, PEFA	PEFA	PEFA	PEFA	PEFA	NOHA, PEFA
Rhode Island Comprehensive Wildlife Conservation Strategy Priority Species List species/ federally-listed species of concern observed			GLIB		-	
¹ Species abbreviations: CAGO = Canada Goose DCCO = Double-crested GLIB = Glossy Ibis ROPI = Rock Pigeon Cormorant HERG = Herring Gull NOHA = Northern Harrier EUST = European Starling PEFA = Peregrine Falcon						

Bat Acoustic Study

Three bat acoustic monitoring stations (Figure 3-1) were established at different heights at Naval Station Newport 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 April 7, 2010 at a height of 1.5 m. On August 13, 2010 two detectors were deployed in the Tank Farm 4 met tower at heights below and within the rotor-swept zone 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.

The 2010 bat acoustic monitoring survey started on April 7 and ended on November 22). During the 230-night survey period detectors operated for 434 detector-nights (number of detectors multiplied by the number of nights that detectors were operational). 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 E-2).

Table E-2. 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 Index of Activity (IA) rate (# of minutes of bat activity/detector-nights * 100) 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 E-3).

Table E-3. 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 (*Lasiurus borealis*). 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 (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), 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 (*Eptesicus*

fuscus) 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.

1.0 INTRODUCTION

1.1 Project Overview

The U.S. Navy is proposing to construct a wind energy facility within the Naval Station Newport located in Newport, Rhode Island, approximately 3–5 kilometers (km) north and inland of the mouth of Narragansett Bay (Figure 1-1). The proposed facility would include installation of turbines at up to 12 potential locations along the shoreline of the bay. If the current wind study proves feasible, turbines will be erected to 80 meter (m) hub heights with turbine blades extending an additional 50 m for a total of 130 m. 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 m of the shoreline, no construction or disturbance below the tidal line is anticipated. The proposed turbines will be located along an 8 km stretch of base.

To meet federal planning and permitting requirements related to potential impacts of a wind facility on birds and bats the Navy contracted Tetra Tech to conduct both avian and bat surveys at the base. The purpose of these surveys is to provide baseline information on avian and bat species composition, relative abundance, and distribution within the general Project Area, as well as data on any rare, threatened, or endangered bird or bat species with potential to be affected by project activities.

The following sections describe the 2010 bird and bat survey methods and results for the proposed Naval Station Newport Wind Energy Project. These surveys were conducted in addition to bird and bat surveys conducted at Naval Station Newport during fall 2009.

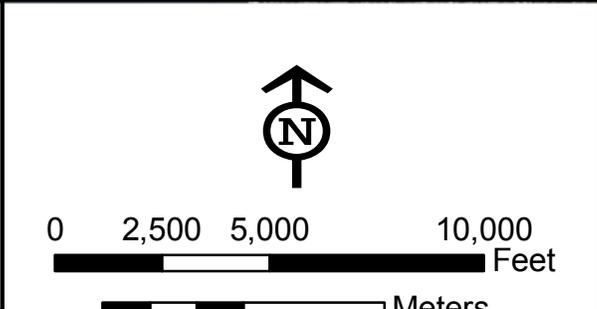
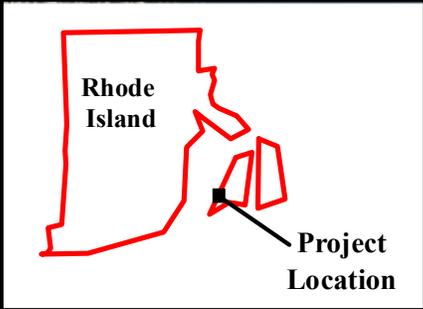
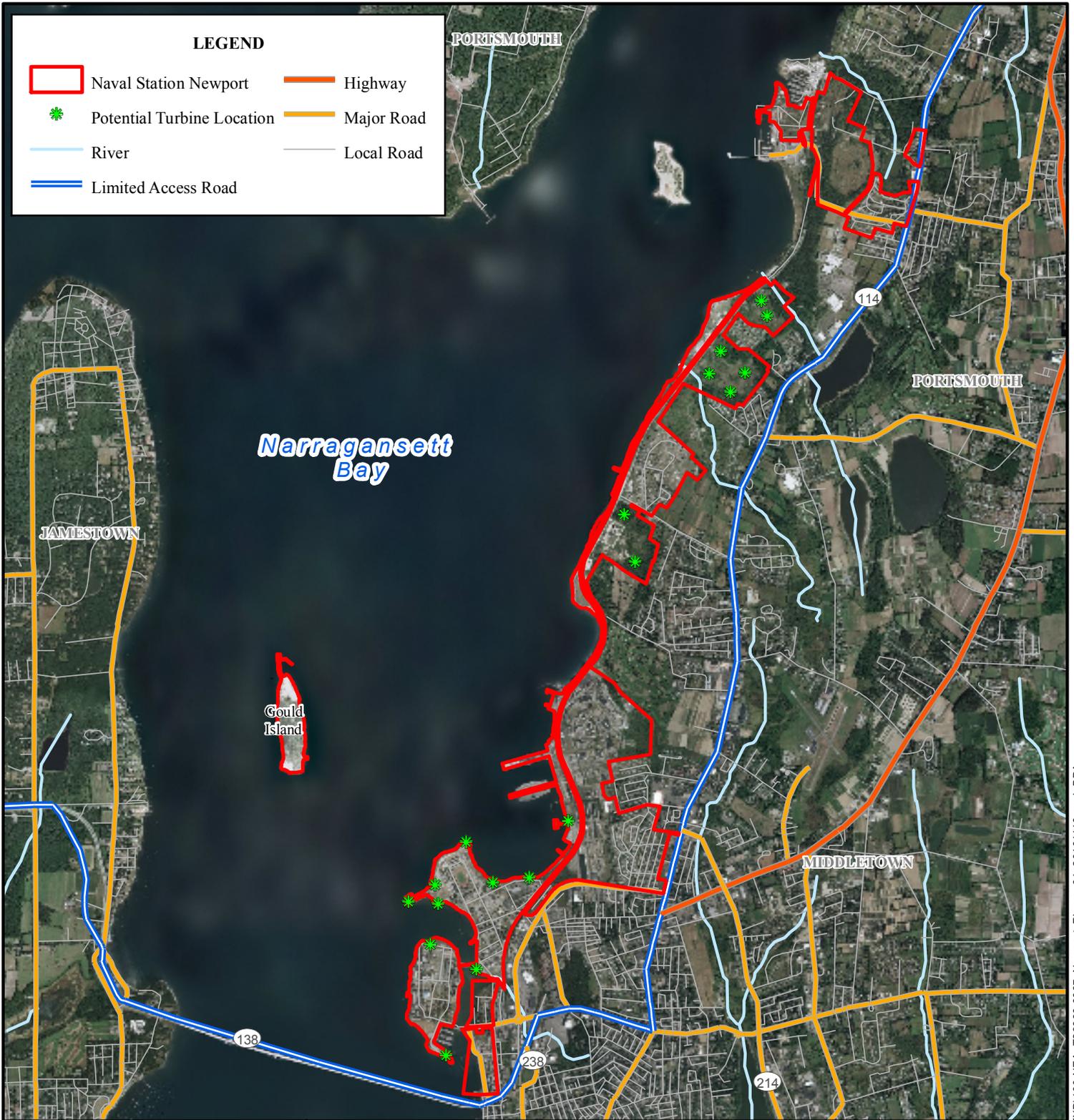


Figure 1/3. Naval Station Newport Wind Project, Newport, Rhode Island

Prepared For:  **NAFAC**
Naval Facilities Engineering Command

Prepared By:  **TETRA TECH** Date: 11/2010

Source: ESRI Data and Maps on CD-ROM, 2007

2.0 AVIAN POINT COUNT SURVEYS

2.1 Introduction

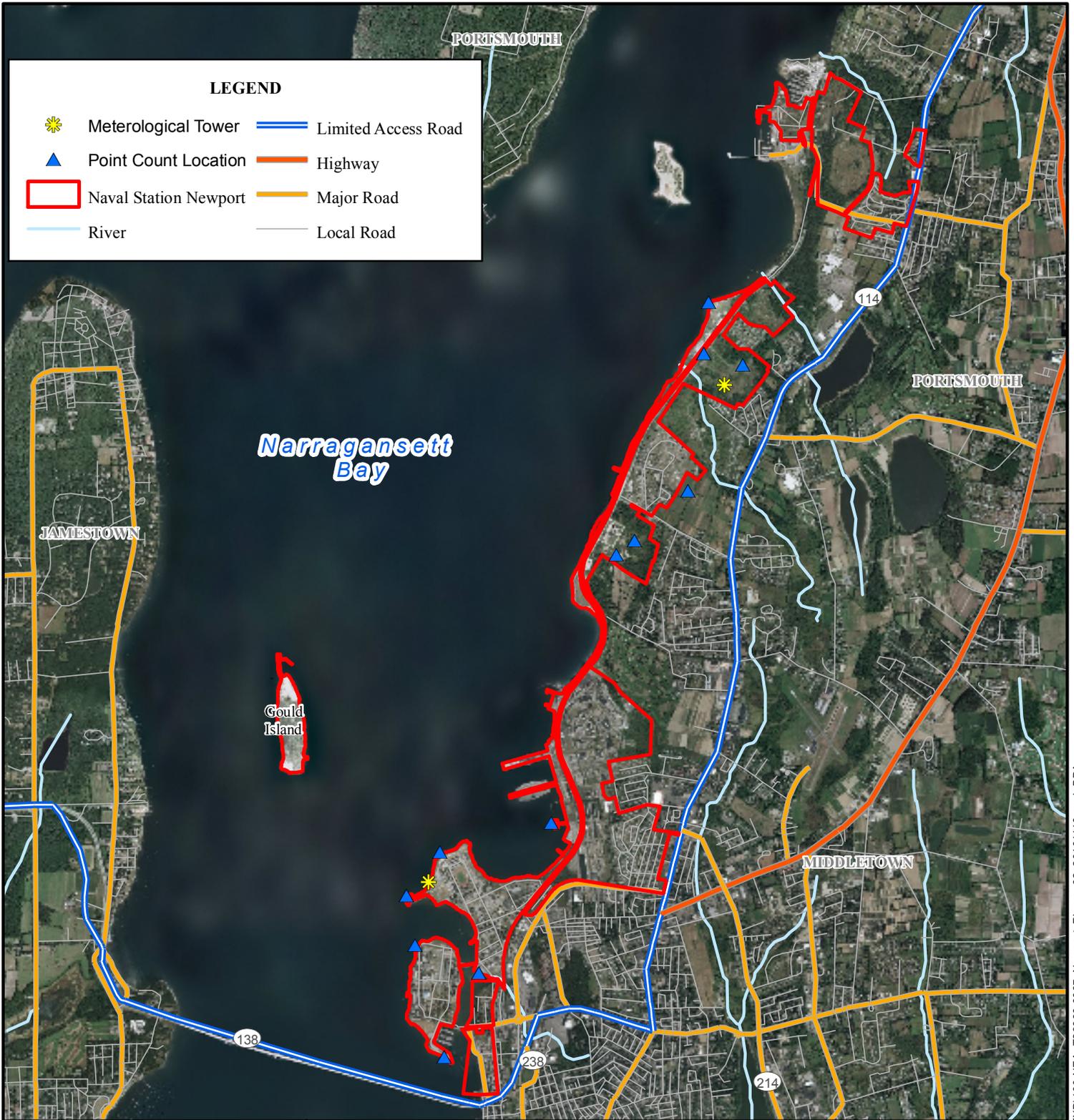
Avian surveys conducted at Naval Station Newport were designed to characterize breeding, resident, wintering, and migrant bird populations. Surveys conducted during the spring and fall migration seasons provide data to better understand how and when migrant species use the various habitats within the naval station, while winter and summer point count surveys were conducted to determine resident and breeding species occurring in the project vicinity. The following sections provide a description of the methods and results for observations made at the Naval Station Newport Project Area during the 2010 point count surveys. Data on totals (n), species richness (SR), relative abundance (RA) and frequency of occurrence (f) of species within the Project Area are presented and discussed.

2.2 Methods

During winter, spring, summer, and fall 2010, Tetra Tech biologists conducted standardized non-random point count surveys at 12 point count locations to determine the abundance and distribution of the avian species utilizing the landscape within air space over Naval Station Newport (Figure 2-1). Survey methods were loosely modeled after the U.S. Geological Survey (USGS) North American Breeding Bird Survey (BBS) protocol (USGS 1998). The survey produces an index of relative abundance of bird populations and assumes that fluctuations in these indices are representative of the greater population (Sauer et al. 1997). Point count locations were chosen based on the proposed turbine layout and were within representative habitat types. Points were spaced at distances greater than 200 m apart using a handheld Global Positioning System (GPS) to ensure individual birds were not double counted. The points were located within the main base area (fenced area) and in sections to the north along Burma Road (non-fenced area). The linear distance covered between point 1 and point 12 was approximately 8 km.

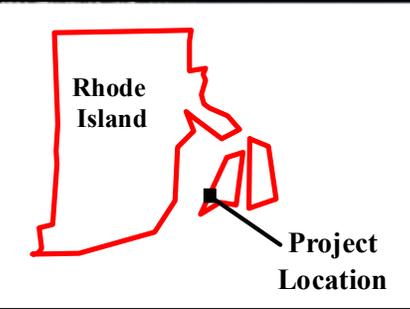
Surveys targeted optimal weather conditions with light winds and no precipitation. Morning surveys began around sunrise and were completed within 4 hours. Afternoon surveys began approximately 4 hours before sunset. Each point was surveyed for 10 minutes. Every bird that was detected either audibly or visually was identified to species and recorded onto standardized Tetra Tech data sheets. Flight heights of individuals were estimated into vertical distance categories: below 35 m (below rotor-swept zone), 35 m–130 m (within the rotor-swept zone), and greater than 130 m (above the rotor-swept zone). Behavior and any other notes were recorded.

Point count elevations ranged from approximately sea level to 45 m. All point count locations were within 0.6 km of the coast of Narragansett Bay. The habitat at the point count locations included natural shoreline, bulk-headed coastline, rip-rap, protected coves, urban developments, fields, recreational areas, forested, and early successional shrub habitat.



LEGEND

	Meteorological Tower		Limited Access Road
	Point Count Location		Highway
	Naval Station Newport		Major Road
	River		Local Road



Source: ESRI Data and Maps on CD-ROM, 2007


 0 2,500 5,000 10,000 Feet

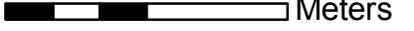
 0 500 1,000 2,000 Meters


Figure 2/3. Avian Point Count Locations Newport, Rhode Island Winter - Fall 2010

Prepared For:	
Prepared By:	
Date:	11/2010

2.3 Seasonal Results

Winter Bird Surveys – 2010

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 Naval Station Newport. There was one state endangered species, peregrine falcon (*Falco peregrinus*) ($n=2$) detected in the Project Area. No listed species were documented flying at heights equal to the rotor-swept zone. Twenty-one percent ($n=259$) of all observations were of 22 species flying at heights between 35 m and 130 m. Analyses show 9 percent ($n=72$) of herring gull (*Larus argentatus*), 12 percent ($n=72$) of Canada goose (*Branta canadensis*) and 18 percent ($n=27$) of common goldeneye (*Bucephala clangula*) were documented flying at heights equal to the rotor-swept zone. The most commonly encountered species were herring gull ($n=799$), Canada goose ($n=600$), rock pigeon (*Columba livia*) ($n=322$), and red-breasted merganser (*Mergus serrator*) ($n=260$) (Appendix A, Table A-1).

Overall relative abundance for the winter resident period was 707.75 birds/survey. Peregrine falcon ($RA=0.5$, $f=50\%$) was recorded on February 3 and 4 and was not observed flying between 35 and 130 m. Observers documented 27.5% ($n=779$) of all observations on February 3 and the greatest species richness ($SR=30$) on January 14 (Appendix A, Table 2). The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on January 14 when 48 percent ($n=120$) of birds were documented flying at heights equal to the rotor-swept zone (Figure 3-2). The frequency of occurrence 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 ($RA=65$, $f=100\%$) (Appendix A, Table A-1).

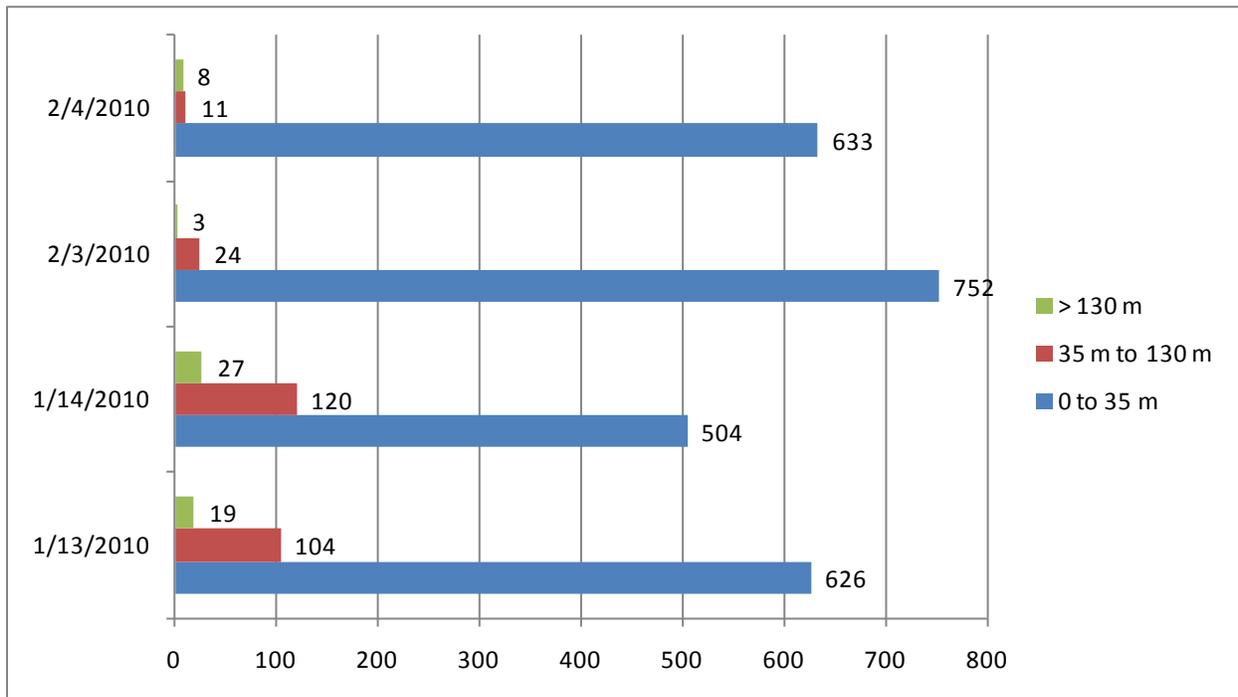


Figure 2-2. Observations of flights heights by date at Naval Station Newport, winter 2010.

Three surveys were performed during morning hours, and one was conducted during the afternoon at Naval Station Newport. There was a difference of 1,273 individual observations between morning surveys ($n=2052$) and afternoon surveys ($n=779$) over the winter survey period. The greatest number of observations during morning surveys occurred on May 21 ($n=749$) and during afternoon surveys occurred on February 3 ($n=779$) (Table 2-1).

Table 2-1. Observations during morning and afternoon surveys at Naval Station Newport, winter 2010.

Date	Morning	Afternoon	Totals
1/13/2010	749		749
1/14/2010	651		651
2/3/2010		779	779
2/4/2010	652		652
Total	2052	779	2831

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 (Appendix A, Table A3). 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 rotor-swept zone 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 2-3). 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, $f=58\%$) (Appendix A, Table A-2).

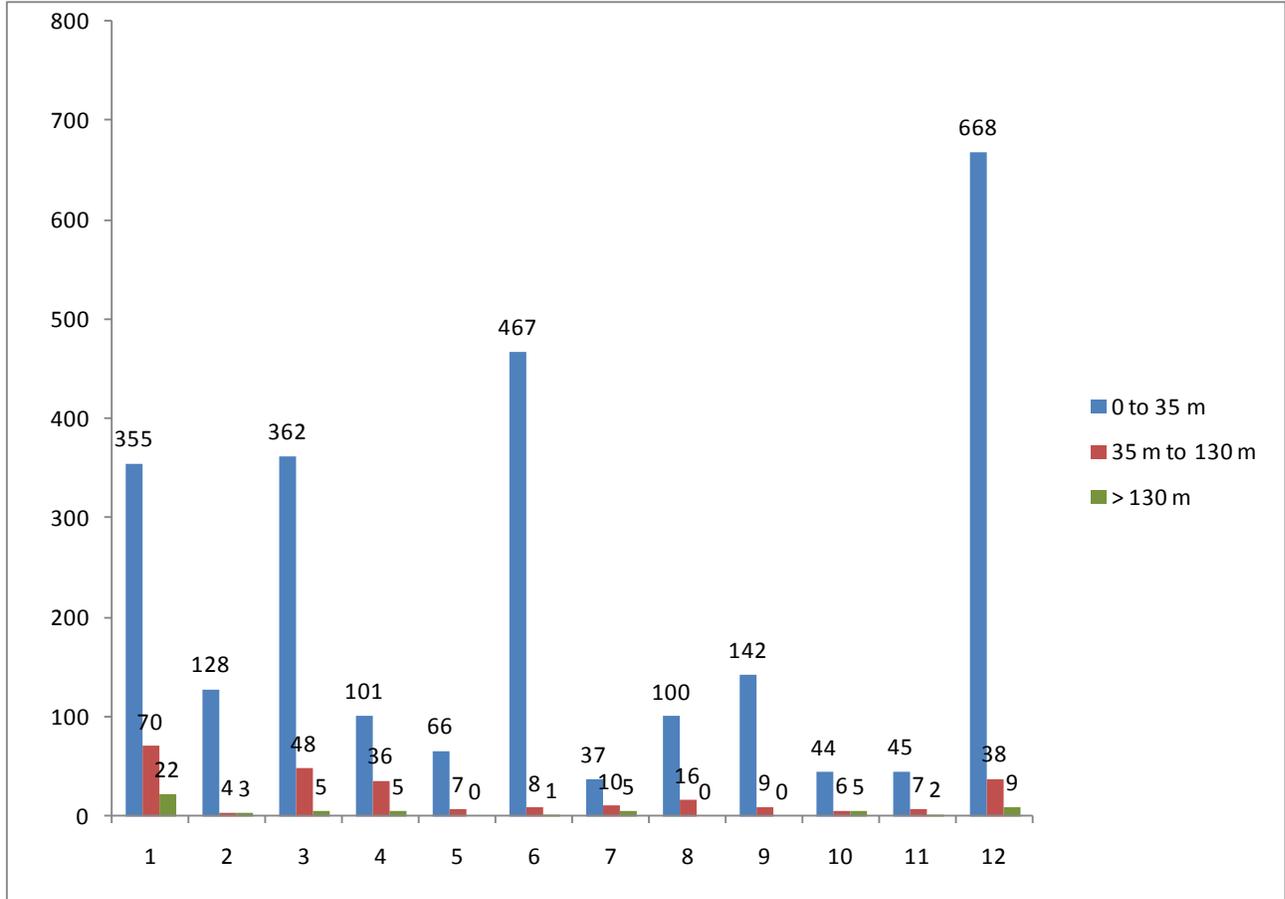


Figure 2-3. Observations of flights heights by point location at Naval Station Newport, winter 2010.

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 ($n=182$) (Table 2-2).

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

Point	Morning	Afternoon	Total
1	391	56	447
2	90	45	135
3	297	118	415
4	120	22	142
5	55	18	73
6	294	182	476
7	28	24	52
8	95	21	116
9	110	41	151
10	49	6	55
11	29	25	54
12	494	221	715
Total	2052	779	2831

Independent observers conducted 105 surveys around Newport County during January 2010 and reported 21,880 individuals of 93 species (ebird 2011). During the first week of February, observers submitted 15 checklists with 1,312 individuals of 36 species reported. Forty-five participants in Audubon’s Christmas Bird Count (CBC) on December 18, 2010 reported 37,476 individuals of 140 species in Newport County.

Spring Bird Surveys – 2010

During seven spring migration surveys between April 7 and May 21, 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 Naval Station Newport. No listed species were documented flying at heights equal to the rotor-swept zone. Ten percent ($n=240$) of all observations were of 16 species flying at heights equal to the rotor-swept zone 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 rotor-swept zone. The most commonly encountered species were herring gull ($n=574$), rock pigeon ($n=178$), and European starling (*Sturnus vulgaris*) ($n=128$) (Appendix B, Table B-1).

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 May 21 and the greatest species richness (SR=36) on April 8 and May 5. The survey period with the greatest number of flight heights recorded between 35 and 130 m was on May 5 when 28 percent (68) of all observations within the rotor-swept zone were documented. No birds were observed > 130 m (Figure 2-4). State endangered peregrine falcon (RA=0.3, $f=28.5\%$) was detected at the Project Area on April 7 and 23. 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, $f=100\%$) (Appendix B, Table B-1).

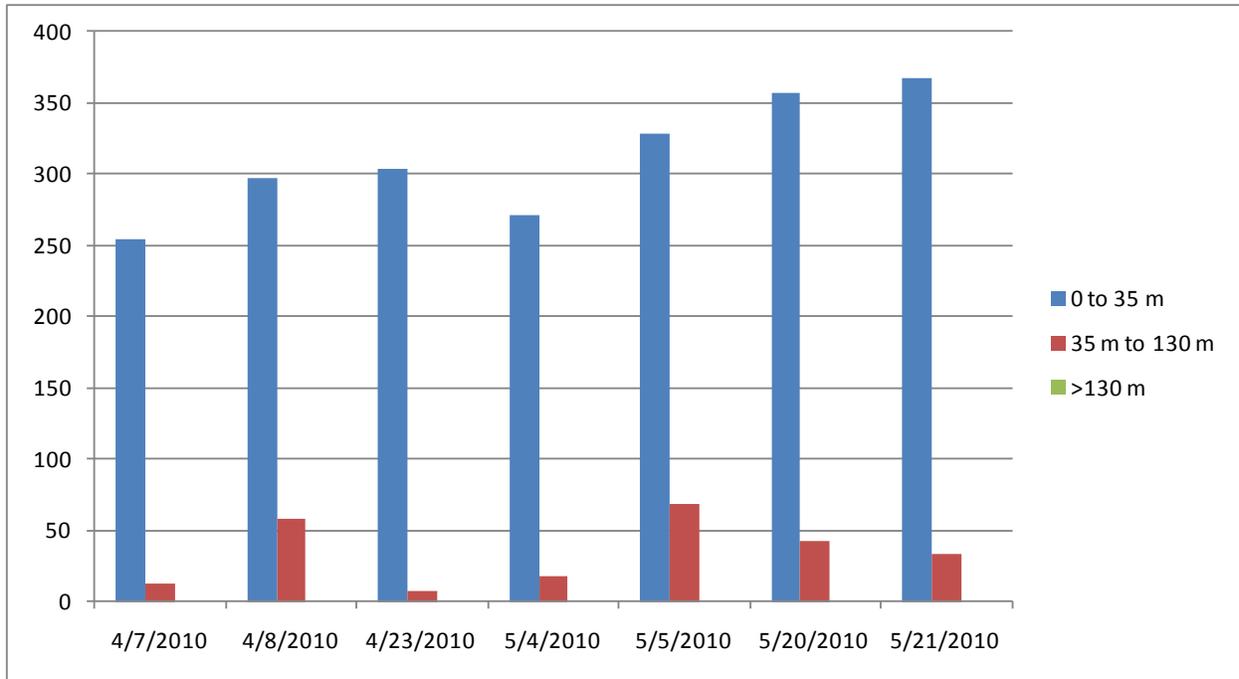


Figure 2-4. Observations of flights heights at Naval Station Newport, spring 2010.

Three surveys were performed during afternoon hours and 4four were conducted during the morning at Naval Station Newport. There was a difference of 508 individual observations during morning surveys ($n=1463$) and afternoon surveys ($n=955$) over the spring migration survey period. The greatest number of observations during morning surveys occurred on May 21 and on afternoon surveys on May 20 (Figure 2-5).

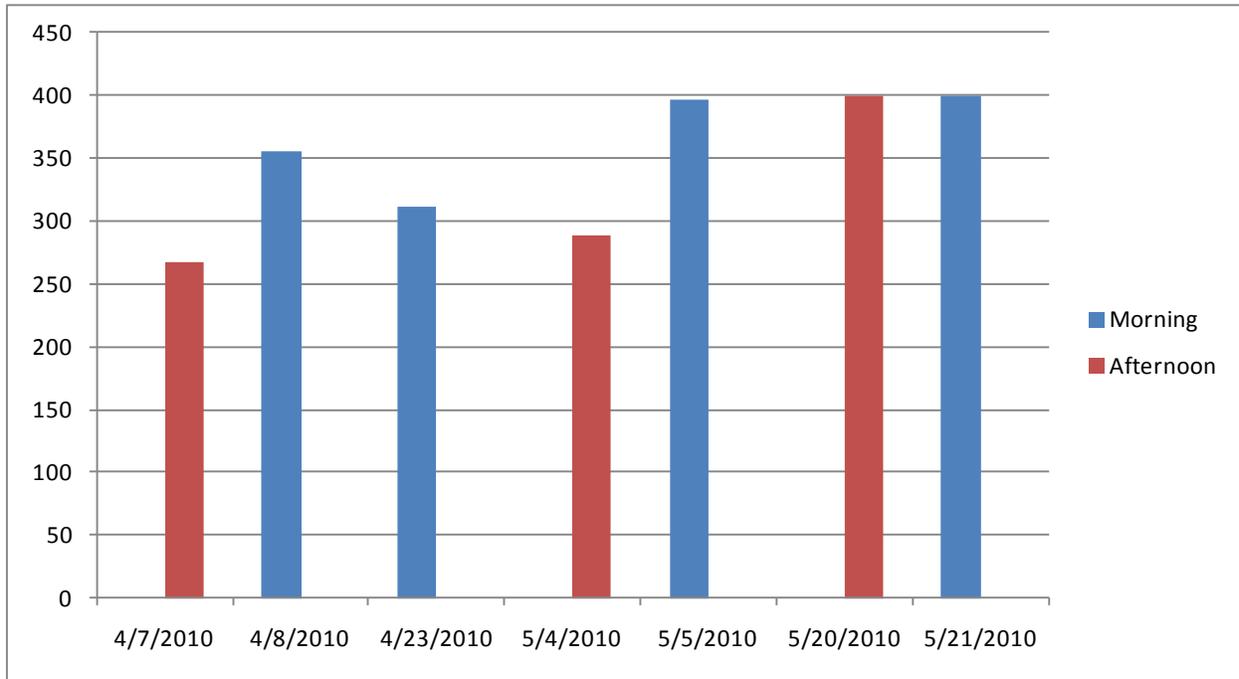


Figure 2-5. Observations of morning and afternoon surveys at Naval Station Newport, spring 2010.

Spatial results indicate an overall relative abundance 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 rotor-swept zone were at point count locations 3 ($n=62$) and 6 ($n=43$) (Figure 2-6). 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, $f=100\%$) (Appendix B, Table B-3).

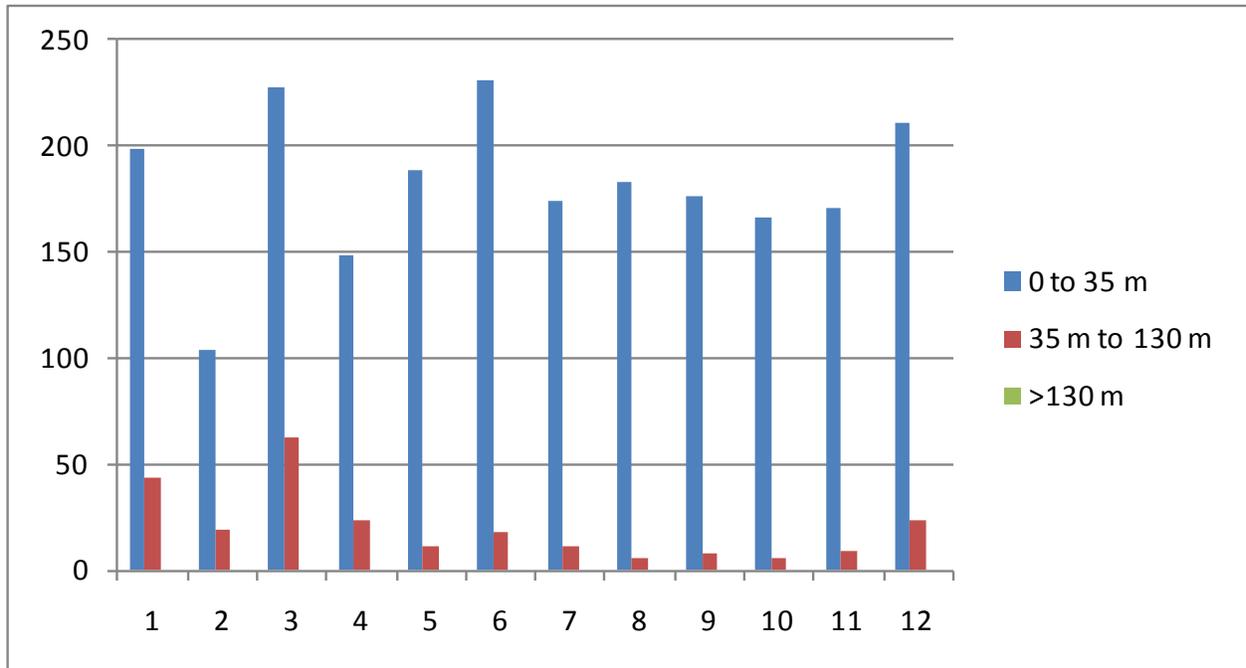


Figure 2-6. Observations of flights heights by location at Naval Station Newport, spring 2010.

The greatest number of observations during morning surveys occurred at point 3 ($n=180$) and on afternoon surveys at points 3 ($n=109$) and 12 ($n=109$) (Table 2-3).

Table 2-3. Observations during morning and afternoon surveys by point location, spring 2010.

Point	Morning	Afternoon	Total
1	143	98	241
2	75	48	123
3	180	109	289
4	96	75	171
5	123	77	200
6	162	87	249
7	114	71	185
8	109	80	189
9	130	54	184
10	103	69	172
11	102	78	180
12	126	109	235
Total	1463	955	2418

Observers submitted 45 checklists from around Newport County during the month of April and documented 1,982 individuals of 80 species. In May, 55 surveys reported 125 species and 2,722 individuals (eBird 2011).

Breeding Bird Surveys – 2010

During breeding bird surveys, three surveys were performed between June 4 and 18. 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 facility. No listed species were observed flying at heights between 35 and 130 m. No birds were observed flying greater than 130 m. Five percent ($n=43$) of all observations were of 12 species flying at heights equal to the rotor-swept zone 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 observations were documented flying at equal heights to the rotor-swept zone. The most common bird species were European starling ($n=126$), herring gull ($n=99$), rock pigeon ($n=71$), and red-winged blackbird (*Agelaius phoeniceus*) ($n=69$) (Appendix C, Table C-1).

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 (42) on June 4 (Appendix C, Table C-2). The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on April 5 when 44 percent ($n=19$) of all observations within the rotor-swept zone were documented (Figure 2-7). Peregrine falcon (RA=0.3, $f=33\%$) was detected on June 18. 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, $f=100\%$) (Appendix C, Table C-1).

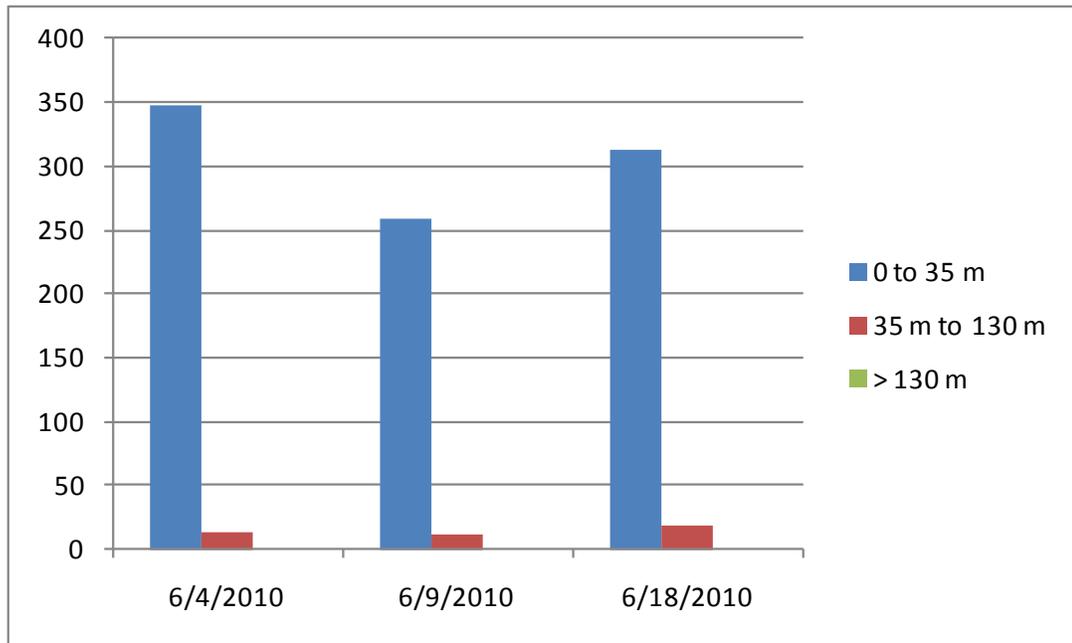


Figure 2-7. Observations of flights heights by date at Naval Station Newport, BBS 2010.

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 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 at location 4, to 20 species at location 8 in shrubland habitat. The greatest number of observations of birds flying within the rotor-swept zone were at point count location 8 in shrubland habitat ($n=15$) and point 6 in rip-rapped coastal habitat ($n=6$) (Figure 2-8). 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 ($RA=5.7$, $f=75\%$) (Appendix C, Table C-3).

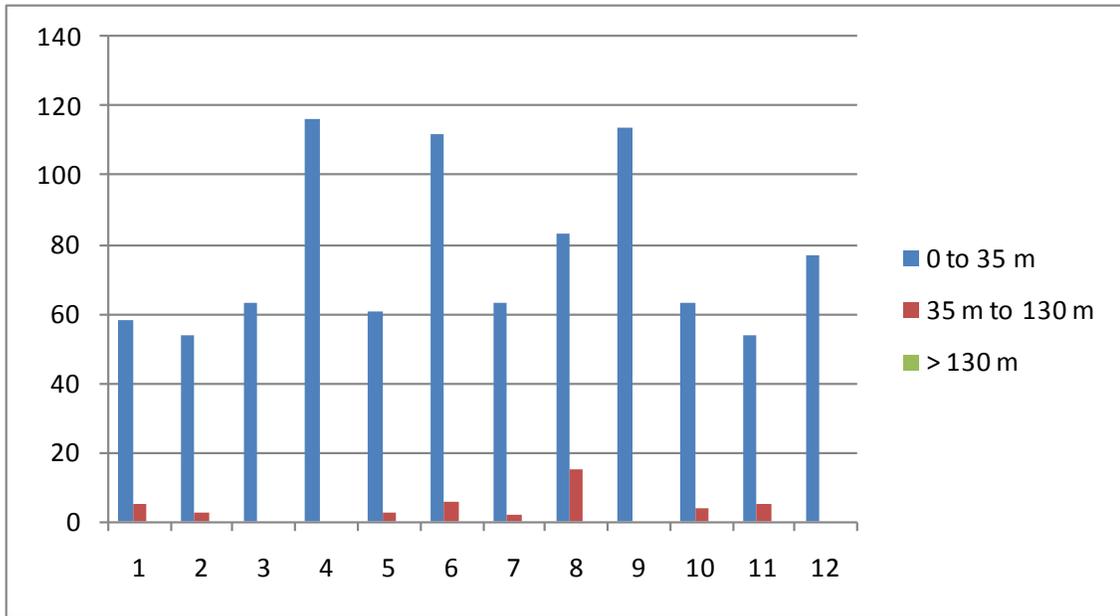


Figure 2-8. Observations of flights heights by location at Naval Station Newport, BBS 2010.

During the 44 surveys in June, observers documented 2,382 individuals of 81 species (eBird). USGS BBS surveys at Wallum Lake, RI (BBS Route 77004) recorded 492 individuals of 61 species, and surveys at Block Island (BBS Route 77800) documented 1,068 individuals of 39 species (USGS 2011).

Summer Resident Surveys – 2010

Summer resident surveys consisted of five surveys at 12 locations between June 3 and August 6 and yielded 1,407 detections of 52 species. No federally threatened or endangered species were detected. 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 rotor-swept zone. The most commonly observed species flying within the rotor-swept zone was herring gull ($n=40$) and rock pigeon ($n=23$). The most common species detected were European starling ($n=194$), herring gull ($n=233$), rock pigeon ($n=121$), and barn swallow (*Hirundo rustica*) ($n=99$) (Appendix D, Table D-1).

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 August 6 and the greatest species richness (SR=38) on June 17 (Appendix D, Table D-2). The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on October 28 when 48 percent ($n=52$) of all individuals flying at heights equal to the rotor-swept zone were documented (Figure 2-9). Peregrine falcon (RA=0.2, $f=20\%$) was recorded on June 17. 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, $f=100\%$) (Appendix D, Table D-1)

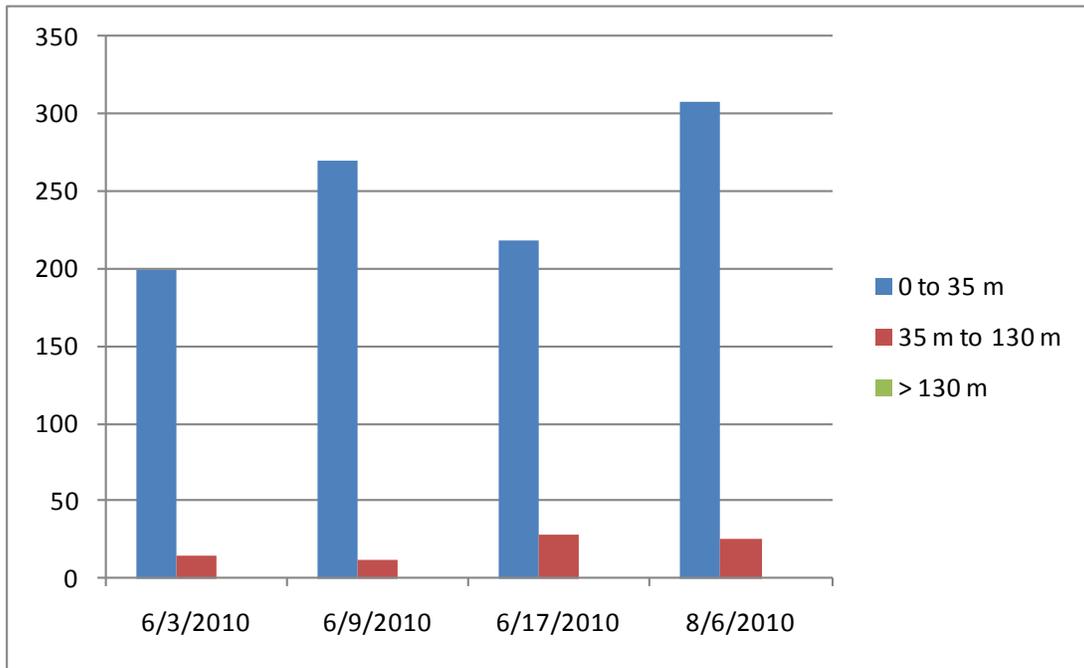


Figure 2-9. Observations of flights heights by date at Naval Station Newport, summer 2010.

One survey was conducted during the morning on August 6, and four surveys were performed during afternoon hours between June 3 and August 6. There was a difference of 683 individuals observed during afternoon surveys ($n=1,045$) and morning surveys ($n=362$) over the summer resident period. The highest number of afternoon observations ($n=306$) was documented on August 6, which was the only date morning surveys were performed (Table 2-4).

Table 2-4. Observations during morning and afternoon surveys by date, summer 2010.

Date	Morning	Afternoon	Total
6/3/2010		214	214
6/9/2010		281	281
6/17/2010		246	246
8/6/2010	362	304	666
Grand Total	362	1045	1407

Spatial results indicate an overall relative abundance 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 rotor-swept zone were at point count locations 6 ($n=29$) and 4 ($n=18$) (Figure 2-10). 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, $f=75\%$) (Appendix D, Table D-3).

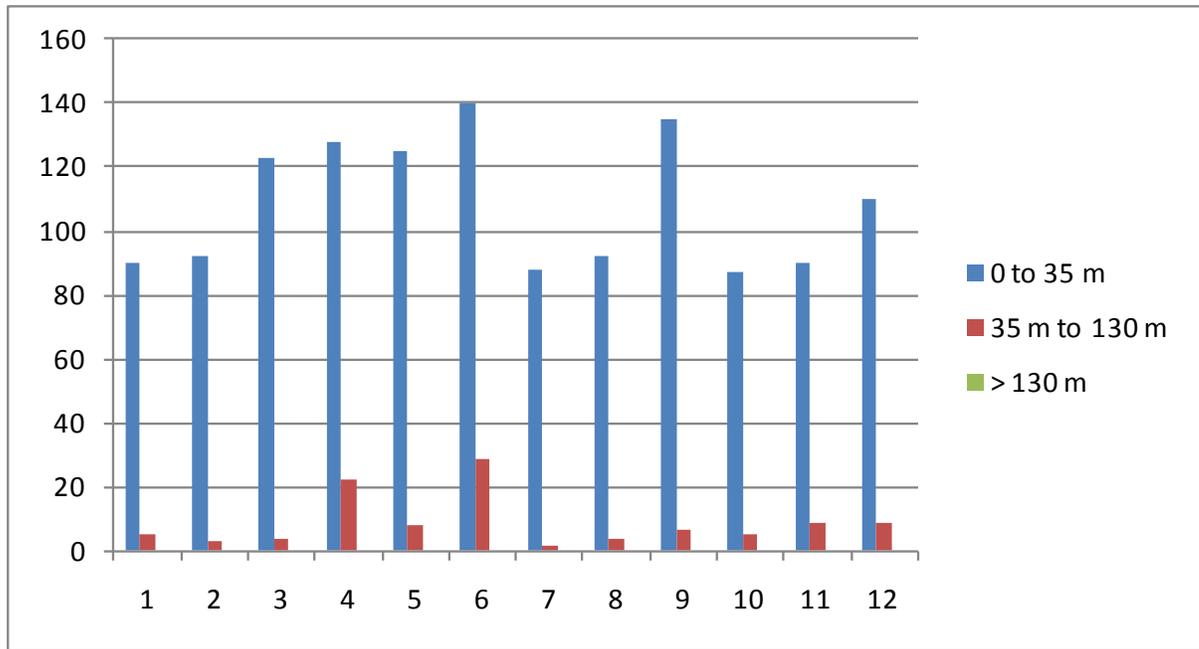


Figure 2-10. Observations of flights heights by point location at Naval Station Newport, summer 2010.

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 ($n=105$) (Figure 3-15).

Table 2-5. Observations during morning and afternoon surveys by point location, summer 2010.

Point	Morning	Afternoon	Total
1	37	58	95
2	21	74	95
3	27	100	127
4	59	91	150
5	28	105	133
6	52	117	169
7	17	73	90
8	16	80	96
9	38	104	142
10	32	60	92
11	19	80	99
12	16	103	119
Grand Total	362	1045	1407

In June, independent observers documented 2,382 individuals of 81 species during 44 surveys around Newport County. During the first week of August, five checklists were submitted with 622 individuals representing 31 species observed (eBird 2011).

Fall Bird Surveys – 2010

In the fall, Tetra Tech biologists performed seven surveys to document migration within the Project Area between August 27 and October 7. 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 (*Circus cyaneus*) ($n=2$) were observed flying between 35 and 130 m in the Project Area. Twenty percent ($n=589$) of all observations were of birds recorded flying at heights within the rotor-swept zone. 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 ($n=291$) (Appendix E, Table E-1).

The overall relative abundance for the fall migration period was 429 birds/survey. Observers documented 19 percent ($n=585$) of all observations on September 23 and the greatest species richness (SR=37) on October 7 (Appendix E, Table E-2). The survey period with the greatest number of flights recorded at heights between 35 and 130 m was on September 8 when 29 percent ($n=172$) of all observations within the rotor-swept zone were documented (Figure 2-11). Peregrine falcon (RA=0.9, $f=43\%$) was recorded on September 8, 9, and 23. Northern harrier (RA=0.3, $f=28.6\%$) was observed on September 23 and October 7. 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, $f=83\%$) (Appendix E, Table E-1).

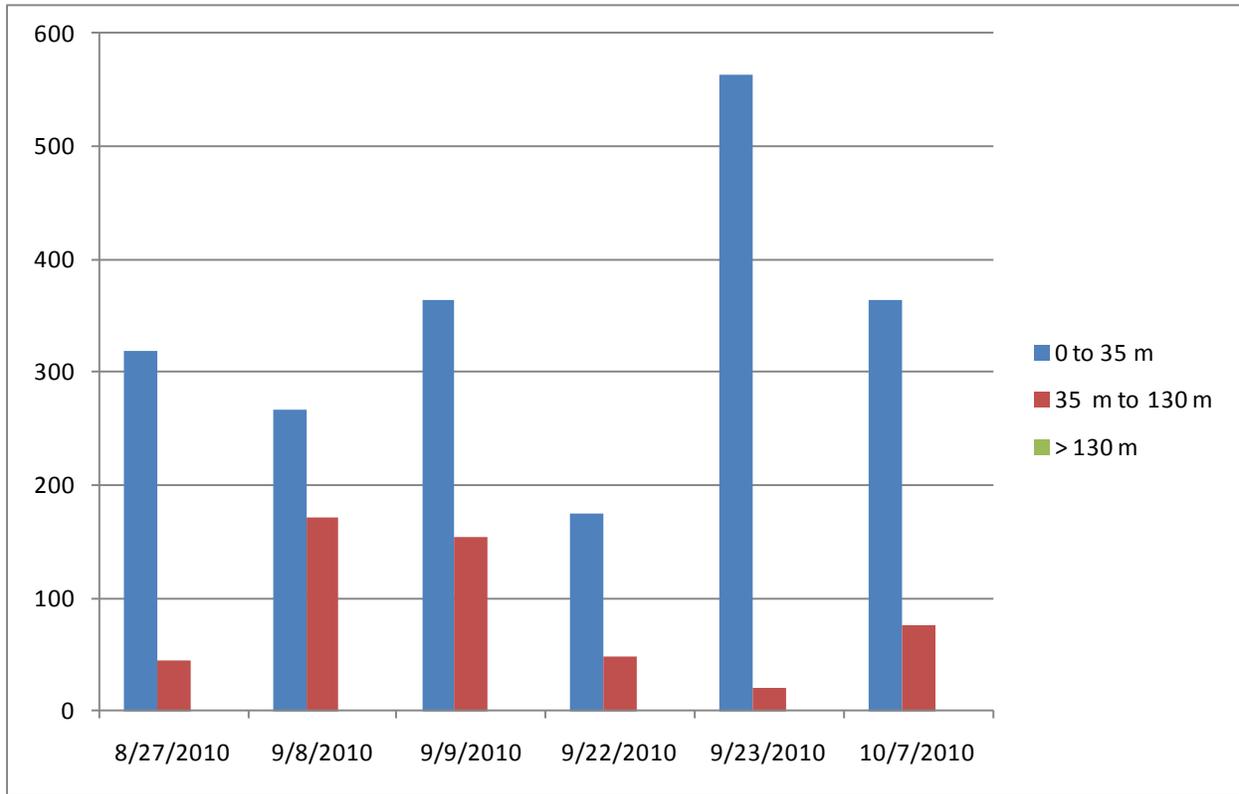


Figure 2-11. Observations of flights heights by date at Naval Station Newport, fall 2010.

Three surveys were conducted during the morning and four surveys were performed during afternoon hours between August 27 and October 7. There was a difference of 167 individuals observed during morning surveys ($n=1,585$) and afternoon surveys ($n=1,418$) over the fall migration period. The highest number of morning observations ($n=585$) were documented on September 23, whereas the highest number of birds observed during afternoon surveys ($n=438$) was on September 8 (Figure 2-12).

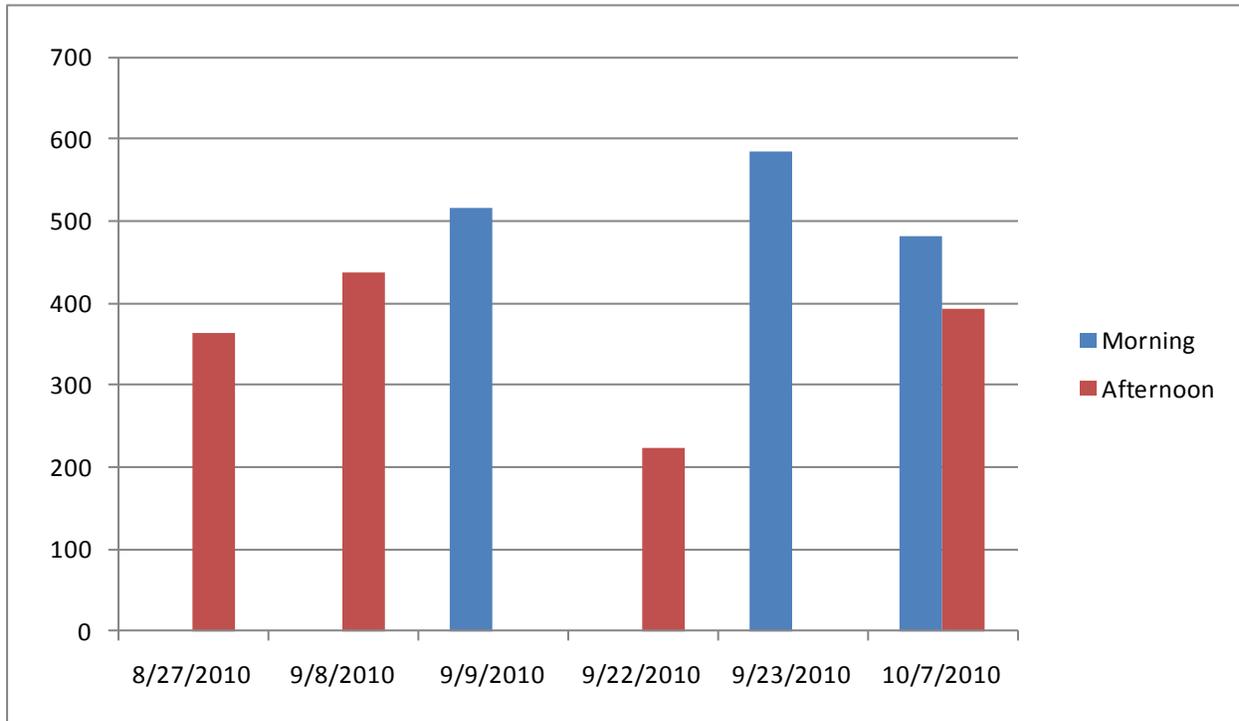


Figure 2-12. Observations during morning and afternoon surveys by date at Naval Station Newport, fall 2010.

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 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 rotor-swept zone 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 2-13). 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, $f=100\%$) (Appendix A, Table E-3).

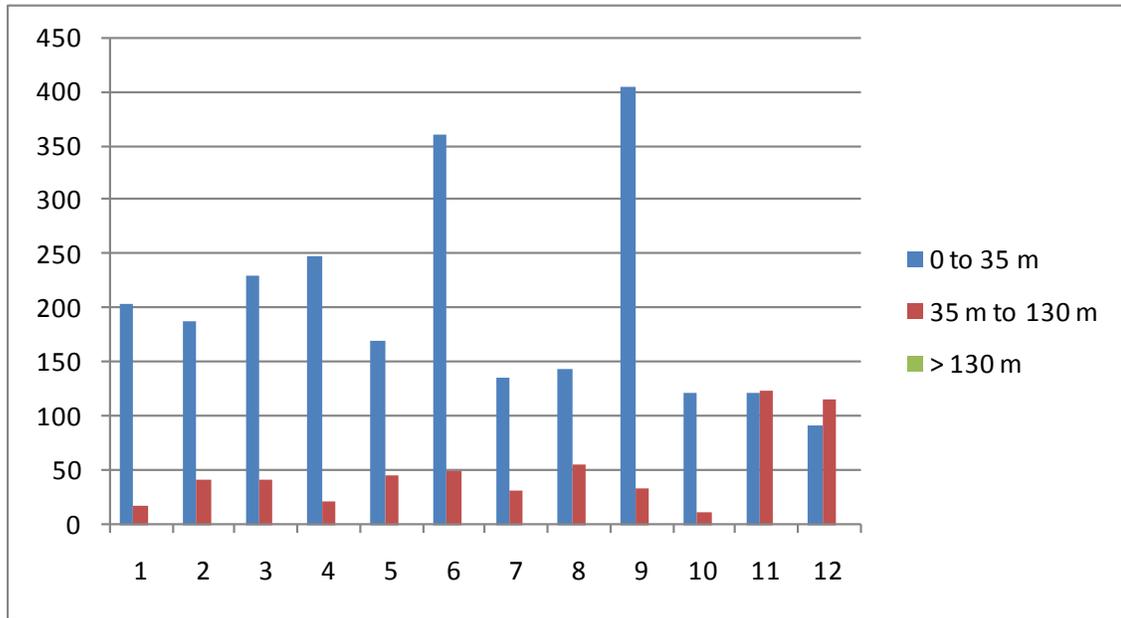


Figure 2-13. Observations of flights heights by point at Naval Station Newport, fall 2010.

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 ($n=162$) (Table 2-6).

Table 2-6. Bird observations during morning and afternoon surveys by point, fall 2010.

Point	Morning	Afternoon	Total
1	117	104	221
2	107	122	229
3	181	89	270
4	146	123	269
5	98	117	215
6	249	162	411
7	68	99	167
8	72	127	199
9	268	170	438
10	49	84	133
11	79	165	244
12	151	56	207
Total	1585	1418	3003

In the last week of August, independent observers documented 2,143 individuals of 50 species during 11 surveys around Newport County. During the month of September, 39 checklists were submitted with 10,047 individuals representing 39 species observed. In the first week of October, 3,055 individuals of 88 species were reported on 88 surveys (eBird 2011).

2.4 Overall Results

In 2010, 26 surveys were completed in the Project Area from January 13 to October 7 (Figure 2-14). A total of 10,620 individual observations of 96 known and 4 unknown species were recorded. Overall abundance over the survey period was 408.5 birds/survey. Of these, 12 percent ($n=1,238$) were detected flying between 35 and 130m (Figure 2-14) (Appendix F, Table F-1). Very low numbers of birds flew at heights greater than 130 m within the Project Area, most of which occurred during winter surveys.

Commonly observed species flying between 35 and 130 m included herring gull ($n=357$), Canada goose ($n=172$), and European starling ($n=160$). The most commonly recorded species included herring gull ($n=2134$), European starling ($n=1123$), Canada goose ($n=1065$), and rock pigeon ($n=983$). The frequency and relative abundance for common species for the survey period were herring gull (RA=82.1, $f=100\%$), European starling (RA=43.2, $f=96\%$), Canada goose (RA=41, $f=73.1\%$), and rock pigeon (RA=37.8, $f=96\%$) (Appendix F, Table F-1).

Afternoon surveys on February 3 ($n=779$) documented the greatest number of individuals, and morning surveys on June 4 documented the greatest species richness (SR=42) (Appendix F, Table F-2). Surveys conducted on September 8 ($n=172$) and 9 ($n=153$) documented the greatest number of birds observed flying within the rotor-swept zone.

Two state endangered species, peregrine falcon ($n=12$) and northern harrier ($n=2$), were documented in the Project Area. Two peregrine falcons (RA=0.5, $f=34.6$) were detected during surveys in February ($n=2$), April ($n=2$), June ($n=2$), and September ($n=6$). Northern harriers (RA=0.08, $f=7.7\%$) were detected on September 23 ($n=1$) and October 7 ($n=1$) (Figure 2-14).

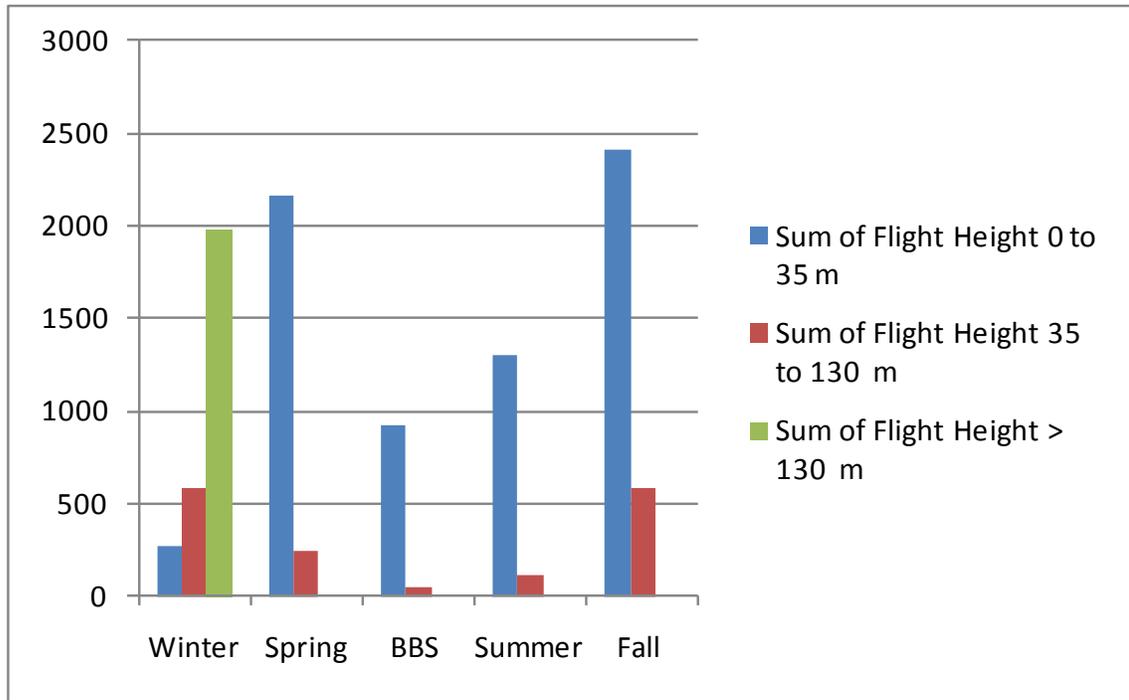


Figure 2-14. Observations of flights heights by season at Naval Station Newport, 2010.

Morning surveys documented 6,423 observations, while 4,197 observations were recorded during afternoon surveys. January 13 recorded the highest morning observation total ($n=749$), and February 3 recorded the highest afternoon observation total ($n=779$) (Table 2-7).

Table 2-7. Observations during morning and afternoon surveys at Naval Station Newport, 2010.

Date	Morning	Afternoon
1/13/2010	749	
1/14/2010	651	
2/3/2010		779
2/4/2010	652	
4/7/2010		267
4/8/2010	355	
4/23/2010	312	
5/4/2010		289
5/5/2010	396	
5/20/2010		399
5/21/2010	400	
6/3/2010		214
6/4/2010	360	
6/9/2010	269	281
6/17/2010		246
6/18/2010	332	
8/6/2010	362	304

Date	Morning	Afternoon
8/27/2010		364
9/8/2010		438
9/9/2010	517	
9/22/2010		223
9/23/2010	585	
10/7/2010	483	393
Total	6423	4197

The twelve points surveyed resulted in an overall relative abundance of 885 birds/location. Point count locations 6 ($n=1423$) and 12 ($n=1353$) documented the greatest number of individuals, and locations 11 (SR=55) and 8 (SR=47) documented the greatest species richness. In 2010 peregrine falcons (RA=1.0, $f=25%$) were detected at point count locations 2 ($n=1$), 3 ($n=3$), and 6 ($n=8$). Point count locations that documented the highest number of observations within the rotor-swept zone were points 12 ($n=184$) and 3 ($n=155$) (Figure 2-15). The frequency and abundance of common bird species among point count locations were herring gull (RA=177.8, $f=100%$), European starling (RA=93.6, $f=100%$), Canada goose (RA=91.7, $f=89%$), and rock pigeon (RA=81.9, $f=83%$) (Appendix F, Table F-3).

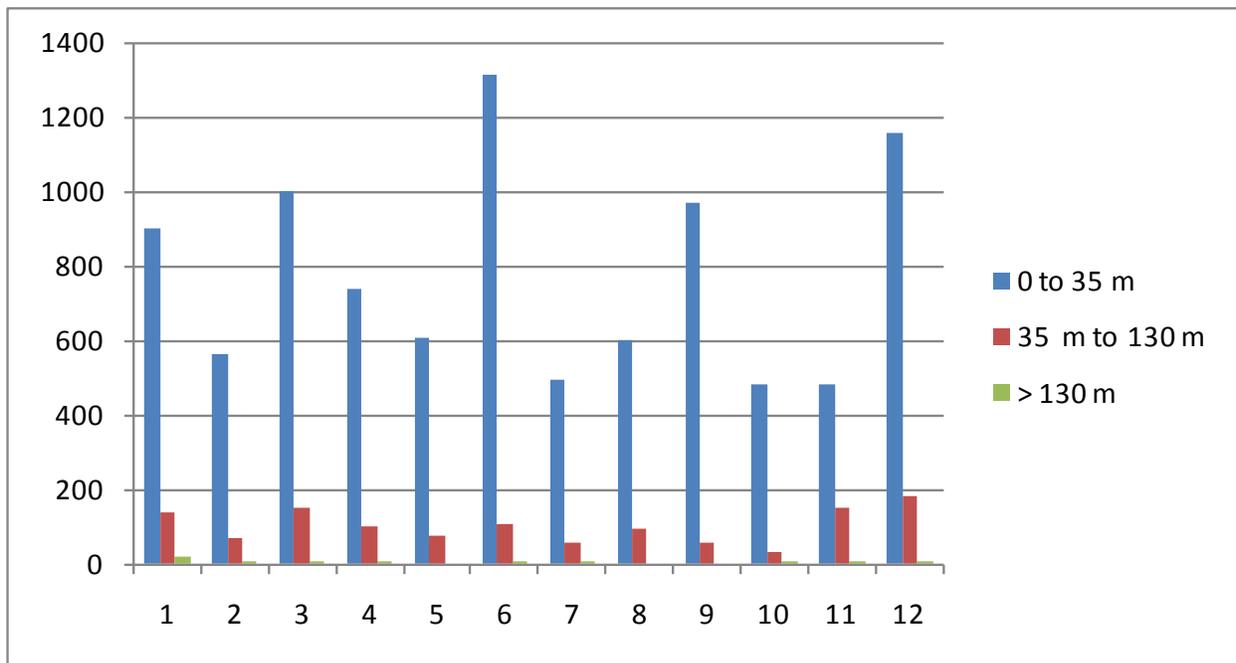


Figure 2-15. Flights height observations by location at Naval Station Newport, 2010.

The greatest number of observations during morning surveys occurred at point 6 ($n=875$) and point 12 ($n=864$). The highest number of observations during afternoon surveys also occurred at points 9 ($n=548$) and 6 ($n=489$) (Figure 2-16).

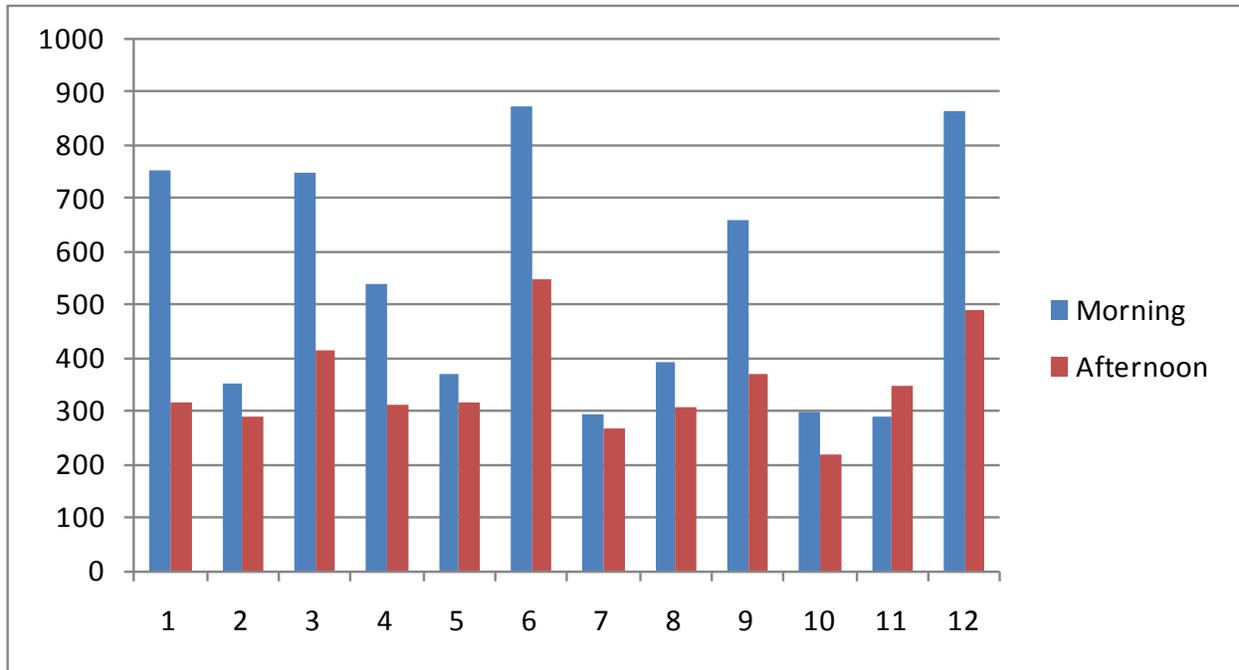


Figure 2-16. Summary of morning and afternoon bird observations at Naval Station Newport - 2010.

In 2010, independent observers conducted 692 surveys around Newport County and recorded 119,358 individuals of 239 species (eBird 2011). USGS BBS surveys at Wallum Lake, RI (BBS Route 77004) recorded 492 individuals of 61 species, and surveys at Block Island (BBS Route 77800) documented 1,068 individuals of 39 species (USGS 2011). Forty-five participants in Audubon’s Christmas Bird Count (CBC) on December 18, 2010 reported 37,476 individuals of 140 species in Newport County (Audubon 2011).

2.5 Discussion

The relatively few federally threatened and endangered avian species that are known to occur in the general vicinity of the Project Area include the piping plover (*Charadrius melodus*) and roseate tern (*Sterna dougallii*). Piping plover is known from only a few sites in Rhode Island and is more restricted to sand beach habitat. Known breeding areas in Rhode Island for piping plovers include: Maschaug Pond and Beach (largest population of piping plovers in Rhode Island), Block Island, Quicksand Pond/Goosewing Beach Preserve, Sachuest NWR, Weekapaug Beach, Ninigret Beach Management Area, and Moonstone Beach (Audubon 2010).

The last breeding record of roseate terns in Rhode Island dates back to 1984, although several colonies are located in neighboring states. A large population nests in Buzzards Bay at Bird and Ram Islands, located 51.5 km to the E and 50 km to the ESE, respectively. Smaller populations nest at Nashawena Island and Penikese Island, located approximately 34 and 35.5 km to the SE (BioDiversity 2011). Occasionally, there are sightings of roseate terns in Rhode Island during restricted seasonal and diurnal

movements along the immediate coast; however, there were no records of this in 2010 (Audubon 2011, eBird 2011, and USGS 2011).

Neither the piping plover nor the roseate tern was observed during the survey period. This result was not unexpected since the Project Area contains no suitable habitat for either federally listed bird species.

Two state endangered species, peregrine falcon ($n=12$) and northern harrier ($n=2$), were detected at Naval Station Newport. Peregrine falcon was detected during surveys in February ($n=2$), April ($n=2$), June ($n=2$), and September ($n=6$) at point count locations 2 ($n=1$), 3 ($n=3$), and 6 ($n=8$), and was detected flying within the rotor-swept zone on September 8 and 9 at point 6. Northern harrier ($n=2$) was detected during fall migration surveys in September ($n=1$) and October ($n=1$) at points 8 ($n=1$) and 10 ($n=1$), and was observed flying through the rotor-swept zone on September 23 at point 10. No suitable habitat occurs on the base for any state listed avian species, with the exception of the peregrine falcon. Peregrine falcons were observed at the naval station from the shoreline during surveys and are utilizing manmade structures in the area for roosting and foraging. It is assumed that peregrine falcons are breeding on the nearby Jamestown Bridge. Northern harrier was detected twice during fall surveys, perhaps indicating that this species may move through the area during diurnal or seasonal movements.

For comparison data, 19 peregrine falcons and 228 northern harriers were reported on eBird, and 2 peregrine falcons and 32 northern harriers were documented during the Audubon CBC surveys in 2010 (Audubon 2011, eBird 2011).

These studies considered the potential use of the Project Area by eagles with regards to regulations set forth in the Bald Eagle Protection Act (BEPA) of 1940 (16 U.S.C. 668-668d, 54 Stat. 250). No eagles were detected at Naval Station Newport during the 2010 surveys. Only one pair of bald eagles (*Haliaeetus leucocephalus*) has nested in Rhode Island since 2003. The bald eagle nest is located approximately 37 km to the northeast in Scituate, MA (USFWS 2010b). Audubon CBC and eBird reported one bald eagle observation for Newport County in 2010 (Audubon 2011 and eBird 2011).

Although the federal Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) does not explicitly contain specific compliance measures, avian surveys performed at Naval Station Newport compiled 1 year of baseline migratory data to demonstrate “a good faith effort” to comply with the Act. Based on direct qualitative comparison of area records and facility surveys, the proposed Project Area supports an assemblage of birds typical for greater Newport County. The most commonly encountered species in the spring were herring gull, rock pigeon, and European starling. Ten percent of all observations were of 16 species flying at heights equal to the rotor-swept zone during surveys. Analyses indicate that 23 percent of herring gull, 52 percent of double-crested cormorant and 29 percent of glossy ibis observations were documented flying at heights equal to the rotor-swept zone. During fall surveys, commonly recorded species included herring gull, European starling, Canada goose, and rock pigeon. Twelve percent of all birds flew between 35 and 130m. Commonly observed species that flew within 35 and 130 m included herring gull, Canada goose, and European starling.

Avian and bat surveys were designed to provide adequate data and analysis to support the National Environmental Policy Act (NEPA). Observations made at the Naval Station Newport Project Area during

the 2010 calendar year during point count surveys are analyzed and presented as data on individual totals, species richness, spatial and temporal relative abundance, and frequency of occurrence of species documented. A total of 10,620 individual observations of 96 known and 4 unknown species (unable to be identified) were recorded. Overall abundance over the survey period was 408.5 birds/survey. Afternoon surveys on February 3, 2010 documented the greatest number of individuals, and morning surveys on June 4, 2010 documented the greatest species richness. The twelve points surveyed resulted in an overall relative abundance of 885 birds/location. Point count locations 6 and 12, both coastal habitats, documented the greatest number of individuals. Two shrubland locations, points 11 and 8, documented the greatest species richness. This could be attributed to a number of factors including habitat, species behavior, survey point location, and observer views, each of which can influence detection probabilities during surveys. The fact that the greatest species richness was recorded in shrubland habitat is likely due to the number of migrants utilizing these areas during migration periods. The flocking and staging behavior of many water birds could account for the higher number of individuals observed in coastal habitats compared with other areas that were surveyed.

3.0 BAT ACOUSTIC SURVEYS

3.1 Introduction

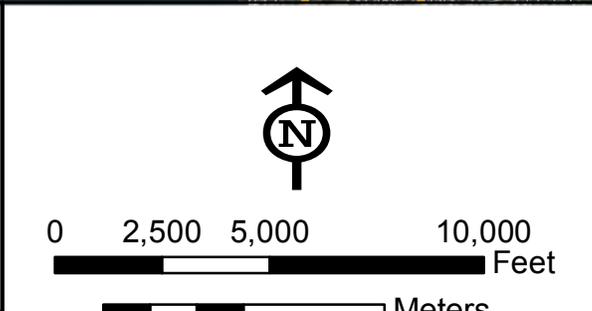
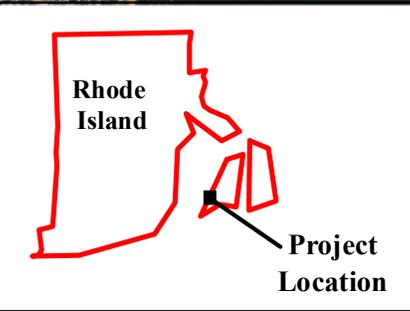
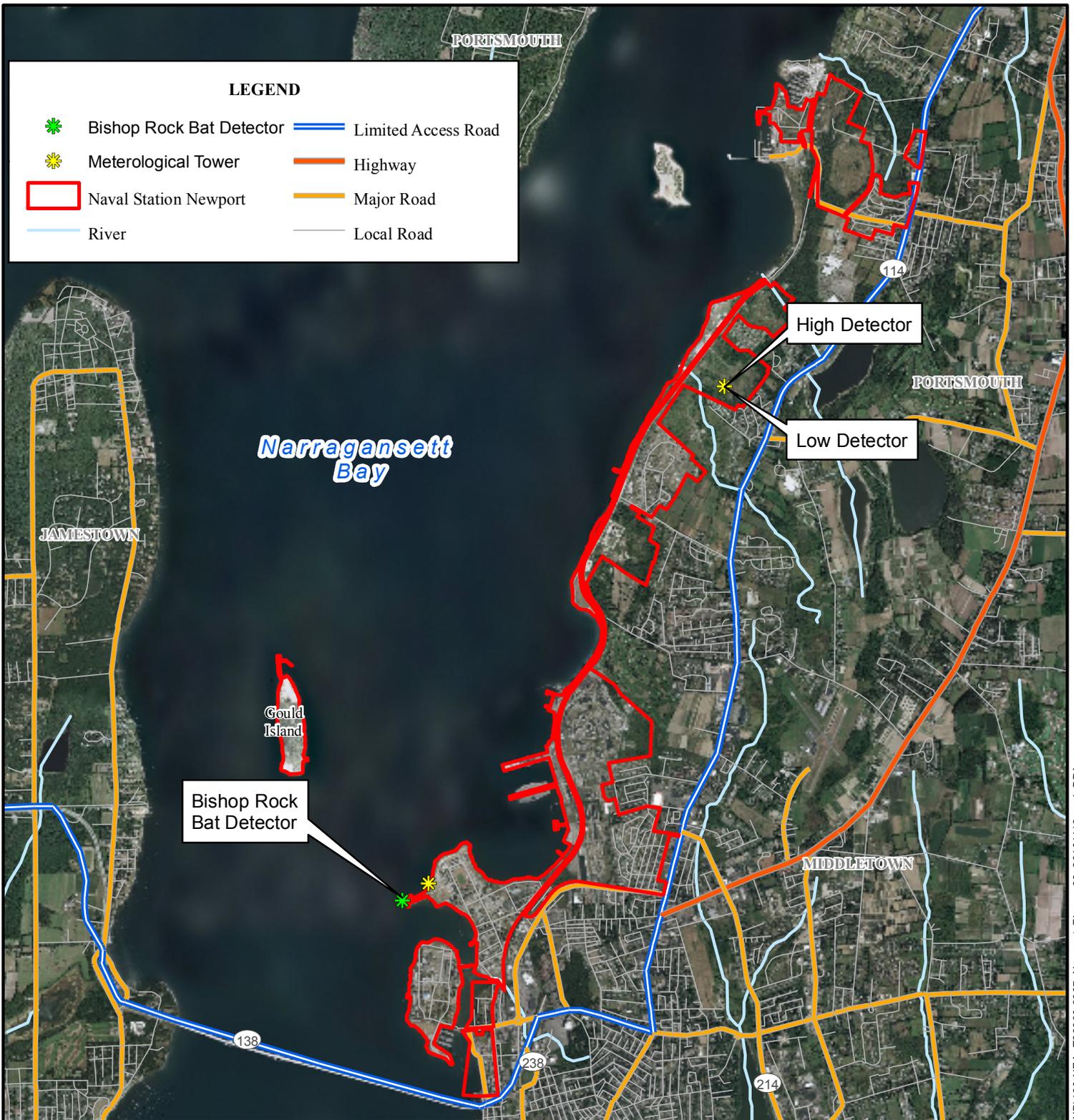
Tetra Tech resumed bat acoustic surveys at the Naval Station Newport Project Area in the spring, summer, and fall of 2010 following a 2-month bat acoustic survey conducted in late fall 2009. The goals of the study were to further assess and quantify bat use of the Project Area and to identify potential for impact to bats associated with building and operating the proposed wind facility. Bat activity was monitored using ultrasonic acoustic recorders (Anabat SD-1, Titley Scientific, Inc.) at three different monitoring stations throughout the Project Area. This section presents the results of nearly 7 months of bat activity recorded during the spring migration, summer residency period, and fall migration of 2010, as well as a brief summary of the 2009 survey effort results.

3.2 Methods

Three bat acoustic monitoring stations were established at different heights in the Project Area for the 2010 survey (Figure 3-1). The duration of the deployment period for the three detector stations varied. Initially, one detector was deployed at Bishop Rock on April 7, 2010 at a height of 1.5 m (Figure 3-2). On August 13, 2010 two detectors were deployed in the Tank Farm 4 met tower at heights below and within the rotor-swept zone of the proposed turbines (Figures 3-3 and 3-4). The two met tower detectors ('High detector' and 'Low detector') sampled bat activity within the airspace of the proposed Project Area considered to be of highest risk to migratory bats. These detectors were deployed on the guy wires of the on-site met tower and were suspended at heights of 30 m and 15 m, respectively. It is important to note that the location of the met tower detectors changed from 2009 to 2010. During the 2009 surveys the met tower detectors were deployed in the Bishop Rock met tower, and in 2010 the detectors were deployed in the Tank Farm 4 met tower located approximately 5.6 km to the northeast. The location of the Bishop Rock detector remained the same from 2009 to 2010.

To ensure that the greatest period of bat activity was surveyed, each detector was programmed to begin recording 45 minutes before sunset and to stop recording 45 minutes after sunrise each day.

Each detector station consisted of an Anabat SD-1 bat acoustic detector powered by a 5-watt solar panel and a 12-volt battery encased in a waterproof housing. The housing suspended the Anabat microphone downward. A plastic deflector shield angled at 45 degrees below the microphone facilitated recording of the airspace above and adjacent to the detector. Each detector was manually checked by Tetra Tech staff every 2 weeks during the entire survey period.



**Figure 3-1. Bat Acoustic Survey Locations
Newport, Rhode Island
Fall 2010**

Prepared For:	 Naval Facilities Engineering Command
Prepared By:	 TETRA TECH
Date:	11/2010

Source: ESRI Data and Maps on CD-ROM, 2007



Figure 3-2. Location of the Bishop Rock detector at Naval Station Newport, 2010.



Figure 3-3. Forested edge habitat near the Tank Farm 4 met tower at Naval Station Newport, 2010.

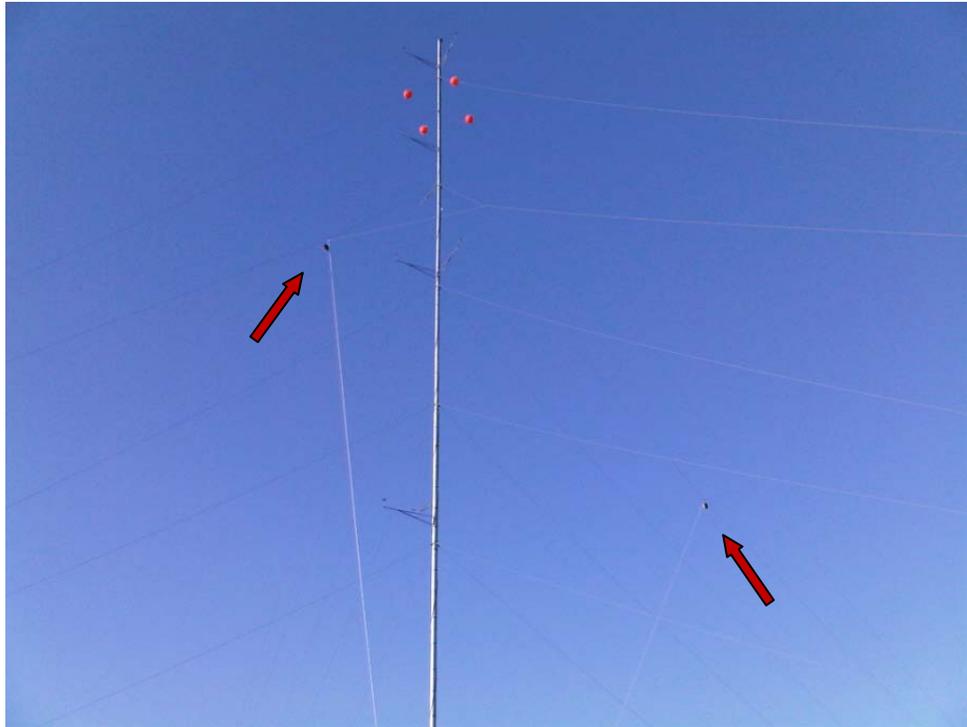


Figure 3-4. The Tank Farm 4 met tower high and low detectors at Naval Station Newport, fall 2010.

Data Analysis

Potential bat call files were extracted from data files using CFCread[®] software. CFCread[®] software screens all data recorded by the bat detector and extracts call files using a filter. To ensure comparability between datasets, the default settings for the CFCread[®] software were used during the file extraction process. These settings include a maximum time between calls (TBC) of 5 seconds, a minimum pulse fragment line length of 5 milliseconds, and a smoothing factor of 50. The smoothing factor refers to whether or not adjacent pixels can be connected with a smooth line. The higher the smoothing factor, the less restrictive the filter, resulting in more noise files and poor quality call sequences retained within the dataset. A call is defined as a single pulse of sound produced by a bat. A call sequence is defined as a combination of two or more pulses recorded in a single call file.

A qualitative visual comparison was made between recorded bat call sequences and established reference libraries of bat calls. This technique allows for relatively accurate identification of bat species (O'Farrell et al. 1999, O'Farrell and Gannon 1999). All call sequences were also run through a series of conservative filters based on call sequence characteristics outlined in Szwczak et al. (2008). A call sequence was considered of suitable quality and duration to be included in data analysis if the individual call pulse(s) exhibited the full spectrum of frequency modulation produced by a bat (i.e., consisted of sharp, distinct lines) with a minimum of five pulses.

Relative abundance, or the magnitude of each species' contribution to recorded activity levels, was obtained by calculating an Index of Activity (IA) modified from Miller (2001). The method is based on the presence/absence of a species' vocalizations within 1-minute time increments. IA was calculated as the sum of minute-increments with a species presence divided by the unit effort (IA=# of minutes/detector-nights * 100). The IA calculation allows for samples with different levels of effort (i.e., different total number of detector-nights) to be accurately compared, thereby reducing the potential bias associated with comparing results from detectors with different study efforts.

3.3 Bat Acoustic Results

Summary of Results from 2010

The 2010 bat acoustic monitoring survey started on April 7 and ended on November 22 (Table 3-1). During the 230-night survey period detectors operated for 434 detector-nights (number of detectors multiplied by the number of nights that detectors were operational). Detectors were operational for every night of deployment with no loss of data over the entire survey period. A total of 2,059 bat call sequences and 1,703 minutes of bat activity were recorded during this period (Table 3-1 and 3-2).

The number of detector-nights recorded by each detector was variable (Table 3-1). The longest duration of monitoring was at the Bishop Rock detector ($n=230$). The Low detector and High detectors each operated for 102 detector-nights.

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 3-1).

Pooled IA values were calculated for the two met tower detectors (Low detector and High detector). The IA value for the met tower detectors combined (284.3) was substantially lower than the IA for the Bishop Rock detector (488.3).

The total duration of recorded bat activity was variable across detector locations. The greatest duration of bat activity was recorded at the Bishop Rock detector ($n=1,123$ minutes). This detector operated the longest (230 detector-nights) and recorded the greatest number of call sequences ($n=1,311$). The next greatest duration of bat activity was recorded by the met tower Low detector, which recorded 369 minutes of activity. The least activity was recorded by the met tower High detector ($n=211$ minutes), which operated for 102 detector-nights (Table 3-1).

Table 3-1. Summary of acoustic monitoring survey effort by detector in the Project Area, 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							

Bat call sequences were identified to the lowest possible taxonomic level (Tables 3-2 and 3-3). 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 (*Lasiurus borealis*) (Table 3-2). 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.’ These Unknown Species Groups consisted of bat call sequences with insufficient quality to identify to species or ‘Known Species Group’ level (Table 3-2). The High Frequency Unknown category could contain call sequences from tri-colored bat (*Perimyotis subflavus*), Eastern red bat, Eastern small-footed myotis (*Myotis leibii*), little brown myotis (*Myotis lucifugus*), or northern myotis (*Myotis septentrionalis*). It is likely that since the majority of known species high frequency calls were attributable to Eastern red bat, that the majority of High Frequency Unknown calls were simply fragments of Eastern red bat calls. The Middle Frequency Unknown group may contain call sequences from either silver-haired bat (*Lasionycteris noctivagans*) or big brown bat (*Eptesicus fuscus*). Both of these species were recorded, and therefore it is likely that calls grouped as Middle Frequency Unknown were fragments of big brown and silver-haired calls.

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 (*Lasiurus cinereus*), silver-haired bat, and Eastern red bat. A small number of calls ($n=26$) were identified as little brown bat. 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 two 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.

Table 3-2. Summary of bat call sequences and species recorded in the Project Area, 2010.

Group	Characteristic Frequencies*	Species	Count of Minutes with Activity	Total Call Sequences
Low Frequency	12 kHz–24 kHz	Hoary bat	67	73
		Unknown low frequency call seq.	30	32
Middle Frequency	24 kHz–38 kHz	Big brown bat	41	43
		Silver-haired bat	140	142
		Silver-haired bat/ Big brown bat	369	387
		Unknown middle frequency call seq.	188	199
Eastern red bat	44–45 kHz	Eastern red bat	296	319
High Frequency (<i>Myotis</i> species)	46–52 kHz	Northern myotis	--	--
		Eastern small-footed myotis	--	--
		Little brown myotis	26	26
		Unknown <i>Myotis</i> species	2	2
		Unknown high frequency call seq.	544	836

* Characteristic frequency (Fc) is generally defined as the frequency of the call pulse at the lowest slope, or the lowest frequency of the consistent frequency modulation sweeps. Fc represents the single most useful parameter for species identification.

Table 3-3. Summary of Index of Activity by species recorded in the Project Area, 2010.

Detector Location		Species									Overall	
		Hoary bat	Silver-haired bat	Big brown/ Silver-haired bat	Big brown bat	Eastern red bat	Little brown myotis	<i>Myotis</i> 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

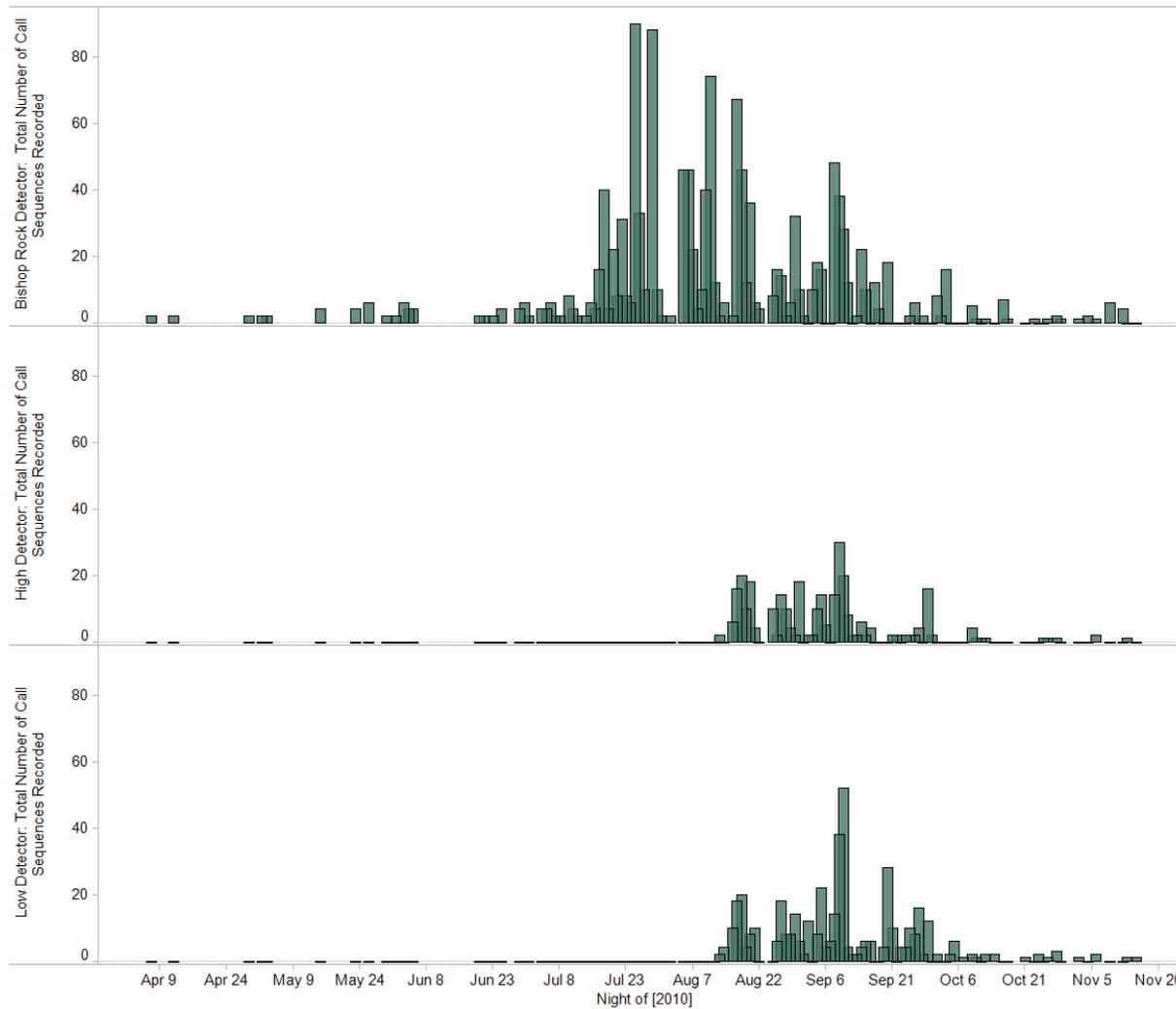


Figure 3-5. Total number of recorded call sequences by detector, 2010.

Relative activity levels for each species and species group across sampling locations was calculated (Table 3-3). Eastern red bat was the most active single species, as represented by IA, at the Low detector and the Bishop Rock detector (Table 3-3). Silver-haired bat was the most active species at the High detector, followed by Eastern red bat and hoary bat. Little brown myotis was the least active species at the Bishop Rock detector and Low detector and was not recorded by the High detector. Big brown bat had the greatest activity recorded by the Bishop Rock detector followed by the Low detector; big brown bat activity recorded by the High detector was relatively low in comparison.

Bat activity varied between nights and between detector locations (Figure 3-5). Overall, bat activity was consistently recorded for the duration of the survey. The Bishop Rock detector recorded the spring, summer, and fall periods while the met tower High and Low detectors recorded late summer through fall. At the Bishop Rock detector activity was relatively low through the spring and began increasing in late July. Peak summer activity at the Bishop Rock detector was recorded on July 25 and July 29. During the late summer and early fall bats were active and present at all detectors at relatively consistent levels. Fall activity rates increased through late August with the met tower High and Low detectors recording peak fall activity on September 9 and September 10, respectively. Similarly the Bishop Rock detector recorded fall peaks on September 8, 9, and 10. At all detectors bat activity generally increased through August and September and began to decrease in early October. Activity continued to decrease through November with the last bats recorded on November 12 at Bishop Rock, November 13 at the High detector, and November 15 at the Low detector.

Summary of Results from 2009

During the late fall 2009 survey the three acoustic detectors operated from October 1 to December 10, 2009 for a total of 191 detector-nights (Table 3-4). This resulted in a total of 2,292 detector-hours and 107 call sequences recorded. Eastern red bat was recorded most frequently ($n=37$ call sequences) during the study and had the second highest overall IA (20.2). Silver-haired bat was recorded nearly as often as eastern red bat ($n=20$ call sequences) but had a higher IA (22.8). Big brown bat calls were infrequently recorded ($n=8$), but the species had a high IA rate of 13. A total of 10 hoary bat call sequences were recorded, but the species had a low overall IA of 5.2. Activity was generally inconsistent during the early survey period (October) and was sporadic in November with the last recording occurring on November 26, 2009.

Bat activity levels in 2009, as measured by IA, were highest overall at the Bishop Rock detector (IA=98.6). The Middle detector recorded an IA of 63.9 and the High detector recorded an IA of 30.9.

Big brown bat was most active near the Middle detector (IA=4.8) and was active at similar levels at the Bishop Rock detector and High detector (IA=4.5 and 4.8, respectively). The greatest concentration of eastern red bat activity was at the Bishop Rock detector (IA=49.5). This detector accounted for 71 percent of all eastern red bat activity. The High detector recorded an IA of 11.6 of red bat activity (17 percent), and the Middle detector recorded an IA of 8.4 (12 percent).

Table 3-4. Summary of acoustic monitoring survey effort by detector in the Project Area, 2009.

Detector Location		Period of Operation 2009	Detector Nights	Activity Minutes	Call Sequences	*Overall Index of Activity	Pooled Index of Activity
Bishop Rock Met Tower	High	October 1 - December 10	71	29	36	40.8	54.4
	Middle	October 1 - December 10	71	48.2	45	67.9	
Bishop Rock		October 1 - December 10	49	48.3	26	98.6	98.6
Total			191	125.5	107	65.7	65.7
* (# of Mins Activity/ Detector-Nights)*100							

3.4 Discussion

Current research has demonstrated that tree-roosting migratory bat species have been the predominant species found during post-construction mortality studies at operational wind farms in North America (Arnett et al. 2008). Results from these mortality studies show the three bat species most commonly encountered during ground searches are long-distance migratory bats: Eastern red bat, hoary bat, and silver-haired bat (Kunz et. al 2007, Arnett et al. 2008). Silver-haired bat, Eastern red bat, and hoary bat were positively identified from recordings during the 2010 survey period. These species were recorded more frequently than non-migratory *Myotis* species. This demonstrates that the bat community of the Project Area likely consists of summer resident *Myotis* species and migratory bats during the migration periods, as well as during the summer.

Overall bat activity at the Project Area during the 2010 survey was greatest at the Bishop Rock detector and lowest at the met tower High detector. This variability in IA rates across detector heights is likely a function of the amount of open airspace adjacent to the detectors, food resource stratification, and the types of echolocation calls of recorded species. The stratification of insect abundance in the atmosphere could have affected the distribution of foraging bats, with higher rates of foraging occurring in areas of greater insect concentration. The greater amount of tidal edge on the peninsula near the Bishop Rock detector may have provided more productive foraging, and presumably there was greater insect abundance at a lower height because that was where the majority of call activity was recorded. The greater amount of activity at the Bishop Rock detector may also have been a function of the type of species recorded during the survey period. Twenty-six percent of the recorded activity at the Bishop Rock detector was from long-distance migratory tree-roosting bats: silver-haired bat, hoary bat, and Eastern red bat. In comparison 37 percent of the activity recorded at the High met tower detector and 34 percent at the Low detector was from these long-distance migratory species. These species tend to forage more frequently in uncluttered airspace because they have relatively higher wing aspect ratios than non-migratory species making them more likely to occur in open habitat (Swartz 2003). It is important to note that the exclusion of the potential silver-haired bat call sequences within the ‘silver-haired/big brown bat’ species group from the final silver-haired bat total may have slightly underestimated silver-haired bat activity in the area. Activity of *Myotis* species at all detectors was

relatively low in comparison with the activity levels of the long-distance migratory species. *Myotis* species tend to forage in more cluttered airspace in more densely vegetated habitat (DeGraaf and Yamasaki 2001) than the areas surrounding the Bishop Rock or met tower detectors. Overall bat activity was greatest below the rotor-swept zone and lowest within the rotor-swept zone during the 2010 survey effort.

The results of the 2009 survey also indicated that during the late fall migration period the Bishop Rock detector had substantially more activity than either of the met tower detectors. At the met tower location the Middle detector recorded more activity than the High detector. During 2009 the IA rates at the High detector were nearly half that of the IA recorded at Bishop Rock detector. Overall bat activity was greatest below the rotor-swept zone and lowest within the rotor-swept zone during the 2009 survey effort. The results from the 2010 survey supported this trend.

It is expected that weather conditions, including mean nightly temperature and wind speed, contributed to the patterns of activity recorded by the acoustic detectors. Overall, the increase in bat call sequences recorded in June and July correlated with (1) increased foraging activity near the detectors due to a rise in mean nightly temperatures (Racey and Swift 1985, O'Donnell 2000, Kusch et al. 2004); (2) increases in food resource concentrations near the detectors; or (3) the area possibly being located in a transit corridor for bats leaving a roost and moving locally to an established area of concentrated food resource. The occurrence of hoary bat, Eastern red bat, and silver-haired bat at the detectors late in the season was almost certainly attributable to migration (Cryan and Veilleux 2007) and is consistent with the migratory strategy of these species (DeGraaf and Yamasaki 2001, Cryan 2003). The presence of migratory tree bat species late in the fall was not unexpected; especially the comparatively large proportion of Eastern red bat calls in the dataset. Eastern red bat, and to a lesser extent hoary bat and silver-haired bat, are known to migrate along coastal areas, especially during the fall (Cryan 2003, Johnson and Gates 2008). The cessation of bat activity late in November was likely a result of the low mean nightly temperatures (Racey and Swift 1985).

There is an inherent difficulty in attempting to interpret the number of recorded call sequences as an indication of activity levels; however, detection rates, recorded minutes of activity and IA values do provide a relative measure of bat activity near sampling locations. The limited maximum range of a single Anabat detector (approximately 30 m) makes the characterization of landscape-scale movements, such as migration, difficult to assess. However, a comparative assessment of the results from detectors placed at varying heights in different areas of the Project Area facilitates the characterization of localized bat occurrence and phenology.

The total number of bat call sequences and minutes of activity recorded each night by a given detector may or may not reflect the absolute level of bat activity present in the Project Area, although some studies have suggested that there may be a relationship between the numbers of calls recorded and bat activity levels (Gorresen et al. 2008). The bias in passive acoustic surveys of this type stems from the unknowns associated with recorded call sequences. For example, a single foraging individual may produce a large number of call sequences that are within the range of a given detector set. Conversely, a large number of individual bats may pass the detector set and produce an equally large number of call sequences. It is important to note that the survey results are a sample of bat activity in the airspace surrounding the detectors and are not necessarily indicative of bat activity throughout the entire Project Area. In addition, the variability in sampling effort between the Bishop Rock detector and the met tower

detectors may have slightly skewed the results between sampling locations. However, by calculating an IA coefficient, a comparison between sampling locations with different levels of effort becomes more valid.

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APPENDICES

A. Winter Resident Data

Table A-1 Species Totals, maximum, observations of within rotor-swept zone, frequencies, and abundances per survey at Naval Station Newport - Winter 2010

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
American Black Duck	40	6	100.00%	10.00
American Crow	108	9	100.00%	27.00
American Goldfinch	4	0	50.00%	1.00
American Robin	18	2	100.00%	4.50
American Tree Sparrow	7	0	50.00%	1.75
Atlantic Brant	8	0	50.00%	2.00
Black-capped Chickadee	16	3	75.00%	4.00
Blue Jay	20	5	100.00%	5.00
Bufflehead	53	2	100.00%	13.25
Canada Goose	600	72	100.00%	150.00
Common Eider	17	3	50.00%	4.25
Common Goldeneye	146	27	100.00%	36.50
Common Loon	3	0	75.00%	0.75
Cooper's Hawk	2	1	25.00%	0.50
Eastern Tufted Titmouse	1	0	25.00%	0.25
European Starling	155	0	100.00%	38.75
Fish Crow	1	1	25.00%	0.25
Gadwall	2	0	25.00%	0.50
Gray Catbird	5	0	50.00%	1.25
Great Black-backed Gull	80	18	100.00%	20.00
Herring Gull	799	72	100.00%	199.75
Horned Grebe	1	0	25.00%	0.25
Horned Lark	1	0	25.00%	0.25
House Sparrow	3	0	50.00%	0.75
Laughing Gull	3	2	50.00%	0.75
Mallard	25	0	50.00%	6.25
Mourning Dove	4	3	50.00%	1.00
Northern Cardinal	5	0	100.00%	1.25
Northern Flicker	8	3	75.00%	2.00
Northern Mockingbird	11	1	100.00%	2.75
Peregrine Falcon	2	0	50.00%	0.50
Red-breasted Merganser	260	12	100.00%	65.00
Red-tailed Hawk	6	3	100.00%	1.50
Ring-billed Gull	28	9	75.00%	7.00
Rock Pigeon	322	3	100.00%	80.50
Sharp-shinned Hawk	1	0	25.00%	0.25

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Song Sparrow	26	0	100.00%	6.50
Unidentified Duck	10	0	25.00%	2.50
Unidentified Sparrow	2	0	25.00%	0.50
White-throated Sparrow	27	2	100.00%	6.75
White-winged Scoter	1	0	25.00%	0.25
Species Richness	39	22		
Total	2831	259		707.75

Date	1/13/2010	1/14/2010	2/3/2010	2/4/2010	Total
Species Richness	25	30	27	26	39
Total	749	651	779	652	2831

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
American Black Duck	6	3		3		11						17	40	41.67%	3.33
American Crow	8		17	1			5	7	11	10	16	33	108	75.00%	9.00
American Goldfinch							1	1		2			4	25.00%	0.33
American Robin				1			10	5		2			18	33.33%	1.50
American Tree Sparrow										4	3		7	16.67%	0.58
Atlantic Brant				4	4								8	16.67%	0.67
Black-capped Chickadee							2	5		2	6	1	16	41.67%	1.33
Blue Jay							2	8	1		8	1	20	41.67%	1.67
Bufflehead	4	5	42			2							53	33.33%	4.42
Canada Goose	216							7	84	5	1	287	600	50.00%	50.00
Common Eider	4	1		12									17	25.00%	1.42
Common Goldeneye	4	32	2	15	6	41						46	146	58.33%	12.17
Common Loon		1			2								3	16.67%	0.25
Cooper's Hawk							1					1	2	16.67%	0.17
Eastern Tufted Titmouse								1					1	8.33%	0.08
European Starling	7	40	53					50	5				155	41.67%	12.92
Fish Crow	1												1	8.33%	0.08
Gadwall						2							2	8.33%	0.17
Gray Catbird								2		2	1		5	25.00%	0.42

Table A-3 Abundance and Species Richness by point count location at the Naval Station Newport - winter 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
Great Black-backed Gull	12	5	17	16	6	5					1	18	80	66.67%	6.67
Herring Gull	128	14	248	32	17	37	10	1	14	10	2	286	799	100.00%	66.58
Horned Grebe		1											1	8.33%	0.08
Horned Lark				1									1	8.33%	0.08
House Sparrow					1				2				3	16.67%	0.25
Laughing Gull								1				2	3	16.67%	0.25
Mallard	16		7					2					25	25.00%	2.08
Mourning Dove							4						4	8.33%	0.33
Northern Cardinal								2	1	1	1	0	5	41.67%	0.42
Northern Flicker								2	3		1	2	8	33.33%	0.67
Northern Mockingbird								2	3		2	4	11	33.33%	0.92
Peregrine Falcon			1			1							2	16.67%	0.17
Red-breasted Merganser	39	31	18	49	23	95						5	260	58.33%	21.67
Red-tailed Hawk							3		2		1		6	25.00%	0.50
Ring-billed Gull			5	7				4				12	28	33.33%	2.33
Rock Pigeon	2		4			280		6	30				322	41.67%	26.83
Sharp-shinned Hawk									1				1	8.33%	0.08
Song Sparrow		2	1	1	1	2	4	2		4	5	4	26	83.33%	2.17
Unidentified Duck					10								10	8.33%	0.83
Unidentified Sparrow					2								2	8.33%	0.17
White-throated Sparrow							4	7		10	3	3	27	41.67%	2.25
White-winged Scoter					1								1	8.33%	0.08
Species Richness	13	11	12	12	9	10	14	19	10	13	15	13	39		
Number of observations	447	135	415	142	73	476	52	116	151	55	54	715	2831		235.92

B. Spring Migration

Table B-1 Species Totals, maximum, observations of within rotor-swept zone, frequencies, and abundances per survey at Naval Station Newport - spring 2010				
Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
American Crow	80	4	100.00%	11.43
American Goldfinch	121	0	100.00%	17.29
American Oystercatcher	5	0	42.86%	0.71
American Redstart	10	0	28.57%	1.43
American Robin	109	0	100.00%	15.57
Atlantic Brant	20	0	14.29%	2.86
Barn Swallow	56	1	57.14%	8.00
Belted Kingfisher	2	0	28.57%	0.29
Black-and-White Warbler	1	0	14.29%	0.14
Black-capped Chickadee	18	0	100.00%	2.57
Blue Jay	12	0	85.71%	1.71
Brown-headed Cowbird	33	0	100.00%	4.71
Bufflehead	4	0	14.29%	0.57
Canada Goose	49	1	85.71%	7.00
Carolina Wren	6	0	28.57%	0.86
Chipping Sparrow	3	0	28.57%	0.43
Common Grackle	18	0	100.00%	2.57
Common Loon	4	0	57.14%	0.57
Common Yellowthroat	14	0	28.57%	2.00
Cooper's Hawk	2	2	28.57%	0.29
Double-crested Cormorant	126	65	100.00%	18.00
Eastern Towhee	3	0	28.57%	0.43
Eastern Tufted Titmouse	1	0	14.29%	0.14
Eastern Wood-Pewee	1	0	14.29%	0.14
European Starling	128	3	100.00%	18.29
Glossy Ibis	17	5	42.86%	2.43
Gray Catbird	49	0	71.43%	7.00
Great Black-backed Gull	107	4	100.00%	15.29
Great Blue Heron	1	1	14.29%	0.14
Great Crested Flycatcher	2	0	14.29%	0.29
Great Egret	4	3	28.57%	0.57
Herring Gull	574	133	100.00%	82.00
House Sparrow	38	0	85.71%	5.43
House Wren	1	0	14.29%	0.14
Killdeer	7	0	71.43%	1.00
Laughing Gull	3	0	14.29%	0.43
Mallard	11	0	71.43%	1.57
Mourning Dove	34	2	100.00%	4.86

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Mute Swan	1	0	14.29%	0.14
Northern Cardinal	52	0	100.00%	7.43
Northern Flicker	1	0	14.29%	0.14
Northern Mockingbird	44	0	100.00%	6.29
Northern Rough-winged Swallow	3	0	28.57%	0.43
Osprey	16	4	71.43%	2.29
Peregrine Falcon	2	0	28.57%	0.29
Purple Finch	6	0	42.86%	0.86
Red-breasted Merganser	77	0	57.14%	11.00
Red-tailed Hawk	5	4	42.86%	0.71
Red-winged Blackbird	140	0	100.00%	20.00
Rock Pigeon	178	5	100.00%	25.43
Ruby-throated Hummingbird	1	0	14.29%	0.14
Savannah Sparrow	12	0	57.14%	1.71
Song Sparrow	99	0	100.00%	14.14
Tree Swallow	3	0	28.57%	0.43
Turkey Vulture	4	3	42.86%	0.57
White-throated Sparrow	5	0	42.86%	0.71
Winter Wren	1	0	14.29%	0.14
Yellow Warbler	88	0	57.14%	12.57
Yellow-rumped warbler	6	0	42.86%	0.86
Species Richness	39	16		
Total	2418	240		345.43

Date	4/7/2010	4/8/2010	4/23/2010	5/4/2010	5/5/2010	5/20/2010	5/21/2010	Total
Species Richness	267	355	312	289	396	399	400	2418
Total	28	36	31	31	36	33	31	59

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
American Crow	10	2	10	6	5	2	9	11	9	6	6	4	80	100.00%	6.67
American Goldfinch			8	2	4	4	19	27	6	16	26	9	121	83.33%	10.08
American Oystercatcher	3				2								5	16.67%	0.42



Bird and Bat Biological Survey Report – 2010
Naval Station Newport, Rhode Island

Table B-3 Abundance and Species Richness by point count location at Naval Station Newport - spring 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
American Redstart			1				2	2		3	2		10	41.67%	0.83
American Robin	1	4	6	1	4	4	12	12	17	18	16	14	109	100.00%	9.08
Atlantic Brant												20	20	8.33%	1.67
Barn Swallow	4	5	18		5			5	5	9	5		56	66.67%	4.67
Belted Kingfisher			2										2	8.33%	0.17
Black-and-White Warbler										1			1	8.33%	0.08
Black-capped Chickadee							6	4		5	2	1	18	41.67%	1.50
Blue Jay							2	3		2	4	1	12	41.67%	1.00
Brown-headed Cowbird							8	5	6	3	7	4	33	50.00%	2.75
Bufflehead			4										4	8.33%	0.33
Canada Goose		4	30			8				2	1	4	49	50.00%	4.08
Carolina Wren								2		2	2		6	25.00%	0.50
Chipping Sparrow							1	1			1		3	25.00%	0.25
Common Grackle			4			2	2	3	4			3	18	50.00%	1.50
Common Loon				1	3								4	16.67%	0.33
Common Yellowthroat					1	1	2	2		3	3	2	14	58.33%	1.17
Cooper's Hawk							1	1					2	16.67%	0.17
Double-crested Cormorant	35	7	41	13	10	5	1			1		13	126	75.00%	10.50
Eastern Towhee								2		1			3	16.67%	0.25
Eastern Tufted Titmouse							1						1	8.33%	0.08
Eastern Wood-Pewee												1	1	8.33%	0.08
European Starling	4	6	20	11	2	6	17	7	44	5	3	3	128	100.00%	10.67
Glossy Ibis											2	15	17	16.67%	1.42
Gray Catbird							7	17		10	15		49	33.33%	4.08
Great Black-backed Gull	40	8	8	14	14	12						11	107	58.33%	8.92
Great Blue Heron			1										1	8.33%	0.08
Great Crested Flycatcher								1			1		2	16.67%	0.17
Great Egret	1				1	1						1	4	33.33%	0.33
Herring Gull	94	55	84	73	80	53	17	4	21	6	3	84	574	100.00%	47.83
House Sparrow	11	5	4		3	6	4		5				38	58.33%	3.17
House Wren											1		1	8.33%	0.08
Killdeer	2			3	1				1				7	33.33%	0.58
Laughing Gull		1	2										3	16.67%	0.25
Mallard			9			1		1					11	25.00%	0.92
Mourning Dove			3			4	3	3	5	9	3	4	34	66.67%	2.83
Mute Swan												1	1	8.33%	0.08



Table B-3 Abundance and Species Richness by point count location at Naval Station Newport - spring 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance						
Northern Cardinal	1			2			10	14	5	12	7	1	52	66.67%	4.33						
Northern Flicker	1												1	8.33%	0.08						
Northern Mockingbird	2			2			1	11	4	9	2	8	5	44	75.00%	3.67					
Northern Rough-winged Swallow	3												3	8.33%	0.25						
Osprey	2	2			5			1		2			4	16	50.00%	1.33					
Peregrine Falcon	1			1															2	16.67%	0.17
Purple Finch											2	2	2	6	25.00%	0.50					
Red-breasted Merganser	3	7	25			40								2	77	41.67%	6.42				
Red-tailed Hawk											1	4		5	16.67%	0.42					
Red-winged Blackbird	5			11			26			31	20	23	11	13	140	66.67%	11.67				
Rock Pigeon	27	9	11	2	8	11		9	2						178	58.33%	14.83				
Ruby-throated Hummingbird	1												1	8.33%	0.08						
Savannah Sparrow	1					11							12	16.67%	1.00						
Song Sparrow	2	9	7	8	13	9	11	12	8	2	8	10	99	100.00%	8.25						
Tree Swallow	2									1				3	16.67%	0.25					
Turkey Vulture	2							2					4	16.67%	0.33						
White-throated Sparrow											1	4		5	16.67%	0.42					
Winter Wren	1											1	8.33%	0.08							
Yellow Warbler	6			2			10		8	6	23	28	5	88	66.67%	7.33					
Yellow-rumped warbler	3										2		1	6	25.00%	0.50					
Species Richness	16	14	25	14	19	21	25	29	19	27	30	27	59								
Number of observations	24	12	28	17	20	24	18	18	18	17	18	23	2418		201.50						
	1	3	9	1	0	9	5	9	4	2	0	5									

C. Breeding Bird Surveys

Table C-1 Species Totals, maximum, observations of within rotor-swept zone, frequencies and abundances per survey at Naval Station Newport - BBS 2010				
Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Alder Flycatcher	10	0	100.00%	3.33
American Crow	21	3	100.00%	7.00
American Goldfinch	64	0	100.00%	21.33
American Oystercatcher	8	0	33.33%	2.67
American Robin	58	0	100.00%	19.33
Barn Swallow	26	1	100.00%	8.67
Black-capped Chickadee	4	0	66.67%	1.33
Black-crowned Night-Heron	1	0	33.33%	0.33
Blue Jay	2	0	66.67%	0.67
Bobolink	2	0	33.33%	0.67
Brown Thrasher	3	0	100.00%	1.00
Brown-headed Cowbird	15	0	100.00%	5.00
Canada Goose	41	0	66.67%	13.67
Cedar Waxwing	7	0	100.00%	2.33
Chimney Swift	2	2	33.33%	0.67
Chipping Sparrow	3	0	66.67%	1.00
Common Eider	4	0	66.67%	1.33
Common Grackle	3	0	66.67%	1.00
Common Yellowthroat	11	0	66.67%	3.67
Double-crested Cormorant	46	10	100.00%	15.33
Downy Woodpecker	1	0	33.33%	0.33
Eastern Phoebe	3	0	100.00%	1.00
Eastern Tufted Titmouse	2	0	33.33%	0.67
European Starling	126	0	100.00%	42.00
Glossy Ibis	7	6	66.67%	2.33
Golden-winged Warbler	1	0	33.33%	0.33
Gray Catbird	21	0	100.00%	7.00
Great Black-backed Gull	22	1	100.00%	7.33
Great Blue Heron	1	0	33.33%	0.33
Great Egret	2	0	66.67%	0.67
Herring Gull	99	6	100.00%	33.00
House Finch	7	0	66.67%	2.33
House Sparrow	21	0	100.00%	7.00
Killdeer	2	0	66.67%	0.67
Mallard	6	1	66.67%	2.00
Mourning Dove	9	0	100.00%	3.00
Northern Cardinal	24	0	100.00%	8.00
Northern Mockingbird	25	0	100.00%	8.33



Table C-1 Species Totals, maximum, observations of within rotor-swept zone, frequencies and abundances per survey at Naval Station Newport - BBS 2010				
Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Northern Rough-winged Swallow	3	0	66.67%	1.00
Osprey	6	1	100.00%	2.00
Peregrine Falcon	1	0	33.33%	0.33
Red-tailed Hawk	5	1	100.00%	1.67
Red-winged Blackbird	69	0	100.00%	23.00
Ring-billed Gull	1	0	33.33%	0.33
Rock Pigeon	71	10	100.00%	23.67
Rose-breasted Grosbeak	2	0	66.67%	0.67
Ruby-throated Hummingbird	1	0	33.33%	0.33
Savannah Sparrow	2	0	66.67%	0.67
Snowy Egret	1	1	33.33%	0.33
Song Sparrow	44	0	100.00%	14.67
Spotted Sandpiper	1	0	33.33%	0.33
Willow Flycatcher	3	0	33.33%	1.00
Yellow Warbler	41	0	100.00%	13.67
Species Richness	53	12		
Total	961	43		320.33

Table C-2 Abundance and Species Richness by date location at Naval Station Newport – BBS 2010				
Date	1/14/2010	2/3/2010	2/4/2010	Total
Species Richness	42	33	41	53
Total	360	269	332	961

Table C-3 Abundance and Species Richness by point count location at Naval Station Newport - BBS 2010																
Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance	
Alder Flycatcher			3				1		2	2	2		10	41.67%	0.83	
American Crow	4		1		2	1	2	4	3	2		2	21	75.00%	1.75	
American Goldfinch		6	4		4	8	12	6	5	9	3	7	64	83.33%	5.33	
American Oystercatcher	7					1							8	16.67%	0.67	
American Robin		1	2		4		9	12	5	9	3	13	58	75.00%	4.83	
Barn Swallow	1		3	5	3	3		4	4	2	1		26	75.00%	2.17	
Black-capped Chickadee								2				1	1	4	25.00%	0.33
Black-crowned Night-Heron					1									1	8.33%	0.08
Blue Jay									1			1	2	16.67%	0.17	

Table C-3 Abundance and Species Richness by point count location at Naval Station Newport - BBS 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance			
Bobolink	2												2	8.33%	0.17			
Brown Thrasher	1 2												3	16.67%	0.25			
Brown-headed Cowbird	3			1				9		2			15	33.33%	1.25			
Canada Goose	41												41	8.33%	3.42			
Cedar Waxwing	2 3 2												7	25.00%	0.58			
Chimney Swift	2												2	8.33%	0.17			
Chipping Sparrow	1 2												3	16.67%	0.25			
Common Eider	4												4	8.33%	0.33			
Common Grackle	2			1									3	16.67%	0.25			
Common Yellowthroat	2 2 7												11	25.00%	0.92			
Double-crested Cormorant	6	5	1	8	6	5	9		1 5			46	75.00%	3.83				
Downy Woodpecker	1												1	8.33%	0.08			
Eastern Phoebe	1	1													1	3	25.00%	0.25
Eastern Tufted Titmouse	1												1	2	16.67%	0.17		
European Starling	5	2	6	37	9	9	5	5	27	6	15		126	91.67%	10.50			
Glossy Ibis	3			1				1		2			7	33.33%	0.58			
Golden-winged Warbler	1												1	8.33%	0.08			
Gray Catbird	2 3 7 1 4 3 1												21	58.33%	1.75			
Great Black-backed Gull	6	6	4	3	3											22	41.67%	1.83
Great Blue Heron	1												1	8.33%	0.08			
Great Egret	1				1								2	16.67%	0.17			
Herring Gull	18	23	13	11	14	8	2 3		7			99	75.00%	8.25				
House Finch	1 1 0 5												7	33.33%	0.58			
House Sparrow	6	2	5	2	1	2				3			21	58.33%	1.75			
Killdeer	1	1														2	16.67%	0.17
Mallard	3			2				1					6	25.00%	0.50			
Mourning Dove	1				2				0		3 3		9	41.67%	0.75			
Northern Cardinal	1	1		1		4		7	2	3	5			24	66.67%	2.00		
Northern Mockingbird	1		1		4	3		5	4	2	3	2	25	75.00%	2.08			
Northern Rough-winged Swallow	3												3	8.33%	0.25			
Osprey	3												3	6	16.67%	0.50		
Peregrine Falcon	1												1	8.33%	0.08			
Red-tailed Hawk	1 4												5	16.67%	0.42			
Red-winged Blackbird	4			3		1	7	4	38	7	2	3	69	75.00%	5.75			
Ring-billed Gull	1												1	8.33%	0.08			
Rock Pigeon	2	64				5								71	25.00%	5.92		



Table C-3 Abundance and Species Richness by point count location at Naval Station Newport - BBS 2010															Frequency	Abundance	
Species	1	2	3	4	5	6	7	8	9	10	11	12	Total				
Rose-breasted Grosbeak	1 1											2	16.67%	0.17			
Ruby-throated Hummingbird	1											1	8.33%	0.08			
Savannah Sparrow	2											2	8.33%	0.17			
Snowy Egret	1											1	8.33%	0.08			
Song Sparrow	4	5	4	2	3	6	4	5	3	3	3	2	44	100.00%	3.67		
Spotted Sandpiper	1											1	8.33%	0.08			
Willow Flycatcher	1 2											3	16.67%	0.25			
Yellow Warbler	2		3			5		12			10		6	3	41	58.33%	3.42
Species Richness	14	13	19	12	17	17	19	20	19	17	25	17	53				
Number of observations	63	57	63	116	64	118	65	98	114	67	59	77	961		80.08		

D. Summer Resident Surveys

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Alder Flycatcher	2	0	40.00%	0.40
American Crow	26	8	100.00%	5.20
American Goldfinch	83	0	100.00%	16.60
American Oystercatcher	2	0	20.00%	0.40
American Robin	90	0	100.00%	18.00
Barn Swallow	99	7	100.00%	19.80
Belted Kingfisher	1	0	20.00%	0.20
Black-capped Chickadee	1	0	20.00%	0.20
Black-crowned Night-Heron	1	1	20.00%	0.20
Blue Jay	4	0	60.00%	0.80
Brown Thrasher	6	0	100.00%	1.20
Brown-headed Cowbird	10	0	60.00%	2.00
Canada Goose	7	0	20.00%	1.40
Cedar Waxwing	15	0	80.00%	3.00
Chimney Swift	3	1	40.00%	0.60
Common Eider	2	0	20.00%	0.40
Common Grackle	25	0	100.00%	5.00
Common Tern	23	3	40.00%	4.60
Common Yellowthroat	15	0	60.00%	3.00
Cooper's Hawk	1	1	20.00%	0.20
Double-crested Cormorant	40	4	100.00%	8.00
Downy Woodpecker	1	0	20.00%	0.20
Eastern Phoebe	1	0	20.00%	0.20
Eastern Towhee	1	0	20.00%	0.20
European Starling	194	8	100.00%	38.80
Glossy Ibis	8	6	40.00%	1.60
Gray Catbird	21	0	100.00%	4.20
Great Black-backed Gull	47	1	100.00%	9.40
Great Egret	2	0	20.00%	0.40
Herring Gull	233	40	100.00%	46.60
House Finch	4	0	40.00%	0.80
House Sparrow	51	0	100.00%	10.20
Killdeer	4	0	60.00%	0.80
Mourning Dove	41	0	100.00%	8.20
Northern Cardinal	40	0	100.00%	8.00
Northern Mockingbird	34	0	100.00%	6.80
Osprey	6	1	60.00%	1.20
Peregrine Falcon	1	0	20.00%	0.20

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Red-breasted Merganser	1	0	20.00%	0.20
Red-tailed Hawk	4	2	60.00%	0.80
Red-winged Blackbird	38	0	100.00%	7.60
Ring-billed Gull	12	0	40.00%	2.40
Rock Pigeon	121	23	100.00%	24.20
Rose-breasted Grosbeak	2	0	40.00%	0.40
Ruby-throated Hummingbird	1	0	20.00%	0.20
Savannah Sparrow	1	0	20.00%	0.20
Semipalmated Plover	2	0	40.00%	0.40
Snowy Egret	4	1	60.00%	0.80
Song Sparrow	42	0	100.00%	8.40
White-winged Scoter	3	0	20.00%	0.60
Yellow Warbler	30	0	80.00%	6.00
Yellow-rumped warbler	1	0	20.00%	0.20
Species Richness	52	15		
Total	1407	107		281.40

Date	6/3/2010	6/9/2010	6/17/2010	8/6/2010	Total
Species Richness	34	26	38	31	52
Total	214	281	246	666	1407

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
Alder Flycatcher			1									1	2	16.67%	0.17
American Crow	1		2	2	1	3	6	4	2		4	1	26	83.33%	2.17
American Goldfinch	4	6	4	10	4	7	11	13	9	7	5	3	83	100.00%	6.92
American Oystercatcher			2										2	8.33%	0.17
American Robin		2	6	9	10	1	7	8	14	9	10	14	90	91.67%	7.50
Barn Swallow	12		14	17	14	2		4	23	11	2		99	75.00%	8.25
Belted Kingfisher												1	1	8.33%	0.08
Black-capped Chickadee								1					1	8.33%	0.08
Black-crowned Night-Heron										1			1	8.33%	0.08
Blue Jay												4	4	8.33%	0.33
Brown Thrasher							1	2		2	1		6	33.33%	0.50
Brown-headed Cowbird							4		4		2		10	25.00%	0.83



Table D-3 Abundance and Species Richness by point count location at Naval Station Newport – summer 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
Canada Goose		4	3										7	16.67%	0.58
Cedar Waxwing							7			8			15	16.67%	1.25
Chimney Swift					2				1				3	16.67%	0.25
Common Eider		2											2	8.33%	0.17
Common Grackle	2		5		3	2	1	5	2	3	2		25	75.00%	2.08
Common Tern	3			13	7								23	25.00%	1.92
Common Yellowthroat							5	2		2	6		15	33.33%	1.25
Cooper's Hawk							1						1	8.33%	0.08
Double-crested Cormorant	8	6		12	5	2			2	1		4	40	66.67%	3.33
Downy Woodpecker											1		1	8.33%	0.08
Eastern Phoebe							1						1	8.33%	0.08
Eastern Towhee											1		1	8.33%	0.08
European Starling	3	3	36	9	14	26	7	15	53	7	11	10	194	100.00%	16.17
Glossy Ibis									2		4	2	8	25.00%	0.67
Gray Catbird							5	5		4	5	2	21	41.67%	1.75
Great Black-backed Gull	5	5		7	2	3						25	47	50.00%	3.92
Great Egret			2										2	8.33%	0.17
Herring Gull	26	41	16	54	35	27			4	1	2	27	233	83.33%	19.42
House Finch					4							0	4	16.67%	0.33
House Sparrow	10	7	7	4	6	2			7	2		6	51	75.00%	4.25
Killdeer	2				2								4	16.67%	0.33
Mourning Dove		2	3	3		5	7	5		4	12		41	66.67%	3.42
Northern Cardinal			5		2		12	5	1	3	7	5	40	66.67%	3.33
Northern Mockingbird	1	1		1	6		6	4	3	7	2	3	34	83.33%	2.83
Osprey					1	1						4	6	25.00%	0.50
Peregrine Falcon						1							1	8.33%	0.08
Red-breasted Merganser												1	1	8.33%	0.08
Red-tailed Hawk							1				3		4	16.67%	0.33
Red-winged Blackbird			7			1	11	2	5	4	2	6	38	66.67%	3.17
Ring-billed Gull		2		4	2	4							12	33.33%	1.00
Rock Pigeon	15	12	5	1	10	74			4				121	58.33%	10.08
Rose-breasted Grosbeak											2		2	8.33%	0.17
Ruby-throated Hummingbird							1						1	8.33%	0.08
Savannah Sparrow									1				1	8.33%	0.08
Semipalmated Plover				2									2	8.33%	0.17
Snowy Egret	1		1			2							4	25.00%	0.33



Table D-3 Abundance and Species Richness by point count location at Naval Station Newport – summer 2010															Frequency	Abundance
Species	1	2	3	4	5	6	7	8	9	10	11	12	Total			
Song Sparrow	2	2	5	2	2	6		6	3	8	3	3	42	91.67%	3.50	
White-winged Scoter	3												3	8.33%	0.25	
Yellow Warbler	3					4		5	2	7	7	2	30	58.33%	2.50	
Yellow-rumped warbler	1											1	8.33%	0.08		
Species Richness	15	14	19	16	20	18	16	20	19	20	24	19	52			
Number of observations	95	95	127	150	133	169	90	96	142	92	99	119	1407		117.25	

E. Fall Migration

Table E-1 Species Totals, maximum, observations of within rotor-swept zone, frequencies and abundances per survey at Naval Station Newport - fall 2010

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
American Crow	110	22	85.71%	15.71
American Goldfinch	131	10	100.00%	18.71
American Robin	66	0	100.00%	9.43
Barn Swallow	18	3	14.29%	2.57
Belted Kingfisher	3	0	42.86%	0.43
Black-bellied Plover	1	0	14.29%	0.14
Black-capped Chickadee	20	0	71.43%	2.86
Blue Jay	29	3	100.00%	4.14
Blue-winged Warbler	1	0	14.29%	0.14
Brown Thrasher	1	0	14.29%	0.14
Brown-headed Cowbird	5	0	14.29%	0.71
Canada Goose	368	99	85.71%	52.57
Carolina Wren	10	0	28.57%	1.43
Cedar Waxwing	18	0	71.43%	2.57
Chestnut-sided Warbler	1	0	14.29%	0.14
Chipping Sparrow	11	0	42.86%	1.57
Common Eider	36	0	57.14%	5.14
Common Grackle	26	5	85.71%	3.71
Common Tern	58	5	71.43%	8.29
Common Yellowthroat	11	0	42.86%	1.57
Cooper's Hawk	4	2	57.14%	0.57
Double-crested Cormorant	214	14	100.00%	30.57
Downy Woodpecker	2	0	28.57%	0.29
Eastern Kingbird	7	0	28.57%	1.00
Eastern Phoebe	1	0	14.29%	0.14
Eastern Towhee	1	0	14.29%	0.14
Eastern Tufted Titmouse	2	0	14.29%	0.29
European Starling	520	149	85.71%	74.29
Gray Catbird	44	0	100.00%	6.29
Great Black-backed Gull	58	0	85.71%	8.29
Great Blue Heron	3	0	42.86%	0.43
Great Cormorant	2	0	28.57%	0.29
Herring Gull	429	106	100.00%	61.29
House Finch	4	0	28.57%	0.57
House Sparrow	30	0	57.14%	4.29
Indigo Bunting	1	0	14.29%	0.14
Killdeer	9	2	42.86%	1.29
Laughing Gull	58	3	85.71%	8.29
Mallard	9	0	28.57%	1.29

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Mourning Dove	75	17	100.00%	10.71
Northern Cardinal	31	0	100.00%	4.43
Northern Flicker	13	1	85.71%	1.86
Northern Harrier	2	1	28.57%	0.29
Northern Mockingbird	35	0	100.00%	5.00
Osprey	3	2	28.57%	0.43
Peregrine Falcon	6	2	42.86%	0.86
Purple Finch	9	0	42.86%	1.29
Red-breasted Merganser	2	0	14.29%	0.29
Red-tailed Hawk	11	9	85.71%	1.57
Red-winged Blackbird	8	0	42.86%	1.14
Ring-billed Gull	14	6	42.86%	2.00
Rock Pigeon	291	56	85.71%	41.57
Semipalmated Plover	5	0	28.57%	0.71
Snowy Egret	3	1	42.86%	0.43
Solitary Sandpiper	1	0	14.29%	0.14
Song Sparrow	67	0	100.00%	9.57
Tree Swallow	71	65	42.86%	10.14
Tufted titmouse	2	0	28.57%	0.29
Turkey Vulture	1	1	14.29%	0.14
Unidentified Gull	3	0	14.29%	0.43
Unidentified Sparrow	4	0	28.57%	0.57
Unidentified Warbler	5	5	14.29%	0.71
Warbling Vireo	1	0	14.29%	0.14
White-throated Sparrow	2	0	14.29%	0.29
Willow Flycatcher	1	0	14.29%	0.14
Yellow Warbler	4	0	28.57%	0.57
Yellow-rumped warbler	11	0	42.86%	1.57
Species Richness	64	25		
Total	3003	589		429

Date	8/27/2010	9/8/2010	9/9/2010	9/22/2010	9/23/2010	10/7/2010	Total
Species Richness	26	28	36	27	34	45	64
Total	364	438	517	223	585	876	3003

Table E-3 Abundance and Species Richness by point count location at Naval Station Newport - fall 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
American Crow	3	5	11	4	4	2	5	9	47	6	7	7	110	100.00%	9.17
American Goldfinch	10		10	3	13	4	19	19	5	15	25	8	131	91.67%	10.92
American Robin		6	6		5		9	10	10	9	8	3	66	75.00%	5.50
Barn Swallow									9			9	18	16.67%	1.50
Belted Kingfisher			1		1	1							3	25.00%	0.25
Black-bellied Plover				1									1	8.33%	0.08
Black-capped Chickadee							2	7		4	3	4	20	41.67%	1.67
Blue Jay			3				6	3	5	4	7	1	29	58.33%	2.42
Blue-winged Warbler												1	1	8.33%	0.08
Brown Thrasher										1			1	8.33%	0.08
Brown-headed Cowbird						5							5	8.33%	0.42
Canada Goose	11	6			12			35	232			72	368	50.00%	30.67
Carolina Wren							2	1		3	4		10	33.33%	0.83
Cedar Waxwing							10	7		1			18	25.00%	1.50
Chestnut-sided Warbler												1	1	8.33%	0.08
Chipping Sparrow					4			4				2	11	33.33%	0.92
Common Eider	24	2			10								36	25.00%	3.00
Common Grackle			6		2			4	3	10	1		26	50.00%	2.17
Common Tern	3	15		28	12								58	33.33%	4.83
Common Yellowthroat			1		1		1	4				4	11	41.67%	0.92
Cooper's Hawk			1					1	1			1	4	33.33%	0.33
Double-crested Cormorant	34	44	8	48	25	45	1	1				8	214	75.00%	17.83
Downy Woodpecker								1					2	16.67%	0.17
Eastern Kingbird							2	2		2	1		7	33.33%	0.58
Eastern Phoebe												1	1	8.33%	0.08
Eastern Towhee										1			1	8.33%	0.08
Eastern Tufted Titmouse												2	2	8.33%	0.17
European Starling	5	18	137	36	16	51	39	13	65	17	14	109	520	100.00%	43.33
Gray Catbird			1				11	11	3	3	10	5	44	58.33%	3.67
Great Black-backed Gull	14	15	1	19	4	2							58	58.33%	4.83
Great Blue Heron			2			1							3	16.67%	0.25
Great Cormorant				2									2	8.33%	0.17
Herring Gull	68	79	38	93	64	36	2	5	5		3	36	429	91.67%	35.75
House Finch					1		3						4	16.67%	0.33
House Sparrow	5	7	5	1		2	2		5	2		1	30	75.00%	2.50
Indigo Bunting							1						1	8.33%	0.08



Table E-3 Abundance and Species Richness by point count location at Naval Station Newport - fall 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
Killdeer	2		7										9	16.67%	0.75
Laughing Gull	10	15		16	6	10						1	58	50.00%	4.83
Mallard			9										9	8.33%	0.75
Mourning Dove		2	7		1	3	11	8	13	16	12	2	75	83.33%	6.25
Northern Cardinal					1		7	12	5	4	2		31	50.00%	2.58
Northern Flicker							1	5	2	2	1	2	13	50.00%	1.08
Northern Harrier								1		1			2	16.67%	0.17
Northern Mockingbird		1	1	1	3		5	5	4	9	3	3	35	83.33%	2.92
Osprey						1			1	1			3	25.00%	0.25
Peregrine Falcon			2			4							6	16.67%	0.50
Purple Finch				6			2				1		9	25.00%	0.75
Red-breasted Merganser		2											2	8.33%	0.17
Red-tailed Hawk							3	1		2	5		11	33.33%	0.92
Red-winged Blackbird									2		1	5	8	25.00%	0.67
Ring-billed Gull	3	2	2		4	1				1	1		14	58.33%	1.17
Rock Pigeon	26	3	5		13	230		1		5	8		291	66.67%	24.25
Semipalmated Plover	2	1		2									5	25.00%	0.42
Snowy Egret	1		1							1			3	25.00%	0.25
Solitary Sandpiper		1											1	8.33%	0.08
Song Sparrow			5	9	4	13	7	9	6	3	8	3	67	83.33%	5.58
Tree Swallow					9		15	13	15	5	14		71	50.00%	5.92
Tufted titmouse								1			1		2	16.67%	0.17
Turkey Vulture											1		1	8.33%	0.08
Unidentified Gull										1		2	3	16.67%	0.25
Unidentified Sparrow							1	1		2			4	25.00%	0.33
Unidentified Warbler		5											5	8.33%	0.42
Warbling Vireo											1		1	8.33%	0.08
White-throated Sparrow											2		2	8.33%	0.17
Willow Flycatcher											1		1	8.33%	0.08
Yellow Warbler										2	1	1	4	25.00%	0.33
Yellow-rumped warbler							5				6		11	16.67%	0.92
Species Richness	16	18	24	15	23	17	24	29	20	27	37	22	64		
Number of observations	221	229	270	269	215	411	167	199	438	133	244	207	3003		250.25

F. Overall Results

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Alder Flycatcher	12	0	19.23%	0.46
American Black Duck	40	6	15.38%	1.54
American Crow	345	46	96.15%	13.27
American Goldfinch	403	10	92.31%	15.50
American Oystercatcher	15	0	19.23%	0.58
American Redstart	10	0	7.69%	0.38
American Robin	341	2	100.00%	13.12
American Tree Sparrow	7	0	7.69%	0.27
Atlantic Brant	28	0	11.54%	1.08
Barn Swallow	199	12	50.00%	7.65
Belted Kingfisher	6	0	23.08%	0.23
Black-and-White Warbler	1	0	3.85%	0.04
Black-bellied Plover	1	0	3.85%	0.04
Black-capped Chickadee	59	3	69.23%	2.27
Black-crowned Night-Heron	2	1	7.69%	0.08
Blue Jay	67	8	84.62%	2.58
Blue-winged Warbler	1	0	3.85%	0.04
Bobolink	2	0	3.85%	0.08
Brown Thrasher	10	0	34.62%	0.38
Brown-headed Cowbird	63	0	53.85%	2.42
Bufflehead	57	2	19.23%	2.19
Canada Goose	1065	172	73.08%	40.96
Carolina Wren	16	0	15.38%	0.62
Cedar Waxwing	40	0	46.15%	1.54
Chestnut-sided Warbler	1	0	3.85%	0.04
Chimney Swift	5	3	11.54%	0.19
Chipping Sparrow	17	0	26.92%	0.65
Common Eider	59	3	34.62%	2.27
Common Goldeneye	146	27	15.38%	5.62
Common Grackle	72	5	76.92%	2.77
Common Loon	7	0	26.92%	0.27
Common Tern	81	8	26.92%	3.12
Common Yellowthroat	51	0	38.46%	1.96
Cooper's Hawk	9	6	30.77%	0.35
Double-crested Cormorant	426	93	84.62%	16.38
Downy Woodpecker	4	0	15.38%	0.15
Eastern Kingbird	7	0	7.69%	0.27
Eastern Phoebe	5	0	19.23%	0.19
Eastern Towhee	5	0	15.38%	0.19

Table F-1 Species Totals, maximum, observations of within rotor-swept zone, frequencies, and abundances per survey at Naval Station Newport - 2010				
Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Eastern Tufted Titmouse	6	0	15.38%	0.23
Eastern Wood-Pewee	1	0	3.85%	0.04
European Starling	1123	160	96.15%	43.19
Fish Crow	1	1	3.85%	0.04
Gadwall	2	0	3.85%	0.08
Glossy Ibis	32	17	26.92%	1.23
Golden-winged Warbler	1	0	3.85%	0.04
Gray Catbird	140	0	84.62%	5.38
Great Black-backed Gull	314	24	96.15%	12.08
Great Blue Heron	5	1	19.23%	0.19
Great Cormorant	2	0	7.69%	0.08
Great Crested Flycatcher	2	0	3.85%	0.08
Great Egret	8	3	19.23%	0.31
Herring Gull	2134	357	100.00%	82.08
Horned Grebe	1	0	3.85%	0.04
Horned Lark	1	0	3.85%	0.04
House Finch	15	0	23.08%	0.58
House Sparrow	143	0	76.92%	5.50
House Wren	1	0	3.85%	0.04
Indigo Bunting	1	0	3.85%	0.04
Killdeer	22	2	50.00%	0.85
Laughing Gull	64	5	34.62%	2.46
Mallard	51	1	42.31%	1.96
Mourning Dove	163	22	92.31%	6.27
Mute Swan	1	0	3.85%	0.04
Northern Cardinal	152	0	100.00%	5.85
Northern Flicker	22	4	38.46%	0.85
Northern Harrier	2	1	7.69%	0.08
Northern Mockingbird	149	1	100.00%	5.73
Northern Rough-winged Swallow	6	0	15.38%	0.23
Osprey	31	8	50.00%	1.19
Peregrine Falcon	12	2	34.62%	0.46
Purple Finch	15	0	23.08%	0.58
Red-breasted Merganser	340	12	38.46%	13.08
Red-tailed Hawk	31	19	73.08%	1.19
Red-winged Blackbird	255	0	69.23%	9.81
Ring-billed Gull	55	15	34.62%	2.12
Rock Pigeon	983	97	96.15%	37.81
Rose-breasted Grosbeak	4	0	15.38%	0.15
Ruby-throated Hummingbird	3	0	11.54%	0.12
Savannah Sparrow	15	0	26.92%	0.58
Semipalmated Plover	7	0	15.38%	0.27

Species	Species Total	Number within rotor-swept zone	Frequency	Abundance
Sharp-shinned Hawk	1	0	3.85%	0.04
Snowy Egret	8	3	26.92%	0.31
Solitary Sandpiper	1	0	3.85%	0.04
Song Sparrow	278	0	100.00%	10.69
Spotted Sandpiper	1	0	3.85%	0.04
Tree Swallow	74	65	19.23%	2.85
Tufted titmouse	2	0	7.69%	0.08
Turkey Vulture	5	4	15.38%	0.19
Unidentified Duck	10	0	3.85%	0.38
Unidentified Gull	3	0	3.85%	0.12
Unidentified Sparrow	6	0	11.54%	0.23
Unidentified Warbler	5	5	3.85%	0.19
Warbling Vireo	1	0	3.85%	0.04
White-throated Sparrow	34	2	30.77%	1.31
White-winged Scoter	4	0	7.69%	0.15
Willow Flycatcher	4	0	7.69%	0.15
Winter Wren	1	0	3.85%	0.04
Yellow Warbler	163	0	50.00%	6.27
Yellow-rumped warbler	18	0	26.92%	0.69
Species Richness	96	42		
Total	10620	1238		408.46

Date	Species Total	Species Richness
1/13/2010	749	25
1/14/2010	651	30
2/3/2010	779	27
2/4/2010	652	26
4/7/2010	267	28
4/8/2010	355	36
4/23/2010	312	31
5/4/2010	289	31
5/5/2010	396	36
5/20/2010	399	33
5/21/2010	400	31
6/3/2010	214	34
6/4/2010	360	42
6/9/2010	550	34
6/17/2010	246	38
6/18/2010	332	41
8/6/2010	666	31
8/27/2010	364	26

Date	Abundance	Species Richness
9/8/2010	438	28
9/9/2010	517	36
9/22/2010	223	27
9/23/2010	585	34
10/7/2010	876	45
Total	10620	96

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance	
Alder Flycatcher			4				1		2	2	3		12	41.67%	1.00	
American Black Duck	6	3		3		11							17	40	41.67%	3.33
American Crow	26	7	41	13	12	8	27	35	72	24	33	47	345	100.00%	28.75	
American Goldfinch	14	12	26	15	25	23	62	66	25	49	59	27	403	100.00%	33.58	
American Oystercatcher	10		2		2	1							15	33.33%	1.25	
American Redstart			1				2	2		3	2		10	41.67%	0.83	
American Robin	1	13	20	11	23	5	47	47	46	47	37	44	341	100.00%	28.42	
American Tree Sparrow										4	3		7	16.67%	0.58	
Atlantic Brant				4	4								20	28	25.00%	2.33
Barn Swallow	17	5	35	22	22	5		13	41	22	17		199	83.33%	16.58	
Belted Kingfisher			3		1	1							6	33.33%	0.50	
Black-and-White Warbler										1			1	8.33%	0.08	
Black-bellied Plover				1									1	8.33%	0.08	
Black-capped Chickadee							10	19		11	12	7	59	41.67%	4.92	
Black-crowned Night-Heron						1				1			2	16.67%	0.17	
Blue Jay			3				10	14	7	6	24	3	67	58.33%	5.58	
Blue-winged Warbler											1		1	8.33%	0.08	
Bobolink									2				2	8.33%	0.17	
Brown Thrasher							2	4		3	1		10	33.33%	0.83	
Brown-headed Cowbird			3			5	13	5	19	3	11	4	63	66.67%	5.25	
Bufflehead	4	5	46			2							57	33.33%	4.75	
Canada Goose	227	14	33	41	12	8		42	316	7	74	291	1065	91.67%	88.75	
Carolina Wren							2	3		5	6		16	33.33%	1.33	
Cedar Waxwing							10	16		12	2		40	33.33%	3.33	
Chestnut-sided Warbler											1		1	8.33%	0.08	
Chimney Swift							4		1				5	16.67%	0.42	
Chipping Sparrow					4		2	5			3	3	17	41.67%	1.42	
Common Eider	28	5		16	10								59	33.33%	4.92	

Bird and Bat Biological Survey Report – 2010
Naval Station Newport, Rhode Island

Table F-3 Abundance and Species Richness by point count location at Naval Station Newport - fall 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance	
Common Goldeneye	4	32	2	15	6	41							46	146	58.33%	12.17
Common Grackle	2		17		5	5	3	12	9	13	6			72	75.00%	6.00
Common Loon		1		1	5									7	25.00%	0.58
Common Tern	6	15		41	19									81	33.33%	6.75
Common Yellowthroat			1		2	1	10	10		5	20	2		51	66.67%	4.25
Cooper's Hawk			1				2	3	1			2		9	41.67%	0.75
Double-crested Cormorant	83	62	50	81	46	57	2	10	2	2	1	30		426	100.00%	35.50
Downy Woodpecker								1				2	1	4	25.00%	0.33
Eastern Kingbird							2	2		2	1			7	33.33%	0.58
Eastern Phoebe	1	1						1	1				1	5	41.67%	0.42
Eastern Towhee								2		2	1			5	25.00%	0.42
Eastern Tufted Titmouse		1					1	1				3		6	33.33%	0.50
Eastern Wood-Pewee													1	1	8.33%	0.08
European Starling	24	69	252	93	41	92	68	90	194	35	28	137		1123	100.00%	93.58
Fish Crow	1													1	8.33%	0.08
Gadwall						2								2	8.33%	0.17
Glossy Ibis		3						1	2	1	8	17		32	50.00%	2.67
Golden-winged Warbler												1		1	8.33%	0.08
Gray Catbird			1		2		26	42	4	23	34	8		140	66.67%	11.67
Great Black-backed Gull	77	39	30	59	29	22						1	57	314	66.67%	26.17
Great Blue Heron			4			1								5	16.67%	0.42
Great Cormorant				2										2	8.33%	0.17
Great Crested Flycatcher								1				1		2	16.67%	0.17
Great Egret	1		2	1	1	2							1	8	50.00%	0.67
Herring Gull	334	21	399	3	0	161	29	10	46	20	10	440		2134	100.00%	177.83
Horned Grebe		1												1	8.33%	0.08
Horned Lark				1										1	8.33%	0.08
House Finch					6		3		1		0	5		15	41.67%	1.25
House Sparrow	32	21	21	7	11	10	6		21	4		10		143	83.33%	11.92
House Wren												1		1	8.33%	0.08
Indigo Bunting							1							1	8.33%	0.08
Killdeer	7		7	3	4				1					22	41.67%	1.83
Laughing Gull	10	16	2	16	6	10		1				3		64	66.67%	5.33
Mallard	16		28			3		3				1		51	41.67%	4.25
Mourning Dove		4	14	3	1	12	25	18	18	29	30	9		163	91.67%	13.58



Table F-3 Abundance and Species Richness by point count location at Naval Station Newport - fall 2010

Species	1	2	3	4	5	6	7	8	9	10	11	12	Total	Frequency	Abundance
Mute Swan												1	1	8.33%	0.08
Northern Cardinal	1		7		4	2	35	39	14	23	21	6	152	83.33%	12.67
Northern Flicker							4	8	2	3	3	2	22	50.00%	1.83
Northern Harrier								1		1			2	16.67%	0.17
Northern Mockingbird	1	3	3	3	15	1	27	21	20	22	20	13	149	100.00%	12.42
Northern Rough-winged Swallow						6							6	8.33%	0.50
Osprey	2		2		1	10		1	1	1	2	11	31	75.00%	2.58
Peregrine Falcon		1	3			8							12	25.00%	1.00
Purple Finch				6			2			2	3	2	15	41.67%	1.25
Red-breasted Merganser	42	40	18	74	63	95						8	340	58.33%	28.33
Red-tailed Hawk							8	1	2	3	17		31	41.67%	2.58
Red-winged Blackbird			16	11	3	2	44	37	65	34	16	27	255	83.33%	21.25
Ring-billed Gull	3	5	7	11	6	5		4		1	1	12	55	83.33%	4.58
Rock Pigeon	72	24	25	3	31	767		14	34	5	8		983	83.33%	81.92
Rose-breasted Grosbeak										1	3		4	16.67%	0.33
Ruby-throated Hummingbird							1	2					3	16.67%	0.25
Savannah Sparrow				1					14				15	16.67%	1.25
Semipalmated Plover	2	1		4									7	25.00%	0.58
Sharp-shinned Hawk									1				1	8.33%	0.08
Snowy Egret	3		2			2				1			8	33.33%	0.67
Solitary Sandpiper		1											1	8.33%	0.08
Song Sparrow	8	18	22	22	23	36	26	34	20	20	27	22	278	100.00%	23.17
Spotted Sandpiper				1									1	8.33%	0.08
Tree Swallow	2				9		15	13	16	5	14		74	58.33%	6.17
Tufted titmouse								1			1		2	16.67%	0.17
Turkey Vulture							2					3	5	16.67%	0.42
Unidentified Duck					10								10	8.33%	0.83
Unidentified Gull										1		2	3	16.67%	0.25
Unidentified Sparrow					2		1	1		2			6	33.33%	0.50
Unidentified Warbler		5											5	8.33%	0.42
Warbling Vireo											1		1	8.33%	0.08
White-throated Sparrow							4	7	1	14	5	3	34	50.00%	2.83
White-winged Scoter					4								4	8.33%	0.33
Willow Flycatcher							1	2				1	4	25.00%	0.33
Winter Wren										1			1	8.33%	0.08

Table F-3 Abundance and Species Richness by point count location at Naval Station Newport - fall 2010														Total	Frequency	Abundance
Species	1	2	3	4	5	6	7	8	9	10	11	12				
Yellow Warbler	11			5			19	25	8	42	42	11	163	66.67%	13.58	
Yellow-rumped warbler								8		1	8	1	18	33.33%	1.50	
Species Richness	33	30	39	33	37	36	39	47	35	45	55	40	96			
Number of observations	106	63	116	84	68	142	55	69	102	51	63	135	1062		885.00	
	7	9	4	8	5	3	9	8	9	9	6	3	0			