



Narragansett Bay

Research Reserve

Technical Report

2004:4

Monitoring Wildlife in the Narragansett Bay National Estuarine Research Reserve Using Weekly Driving Surveys

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Introduction

The function of the Narragansett Bay National Estuarine Research Reserve (NBNERR or Reserve) is to provide a protected natural setting representative of the Virginian bioregion for the purposes of research and monitoring. To ensure that this setting is provided and that the Reserve is fulfilling its mandate, it is necessary to practice science-based stewardship and management, which in turn often rely on basic data obtained from long-term natural resources monitoring. Unfortunately, these kinds of data do not exist for most of the biological resources present within the NBNERR. To address this, weekly driving surveys on Prudence Island, RI were initiated in 2003 to gather basic information on wildlife, including species composition, distribution, and seasonal and long-term abundance patterns. The purpose of this paper is to describe the survey methodology and to summarize the basic findings from the first year of the survey.

Methods

The survey was conducted by one person driving a standardized route on Prudence Island, in both the NBNERR and on other properties (Figure 1). The driving route totaled 20.3 miles. The survey always began at the South End NBNERR lab, but the order in which different areas of the island were surveyed was randomly selected for each trip. On each survey, the driver covered the pre-designated route, driving approximately 10 miles hr^{-1} while recording all targeted wildlife that were observed. When necessary, binoculars were used to observe and identify wildlife. All observed wildlife were identified to species, counted, and the general location on Prudence Island was noted. Later in the year, the exact locations of some species were noted on a hardcopy geographic information system (GIS) map of the island and later entered into an ArcView shapefile. Using this method, distribution maps were developed for the following species: eastern box turtle, feral cat, red fox, American kestrel, merlin, mink, northern harrier, osprey, red-tailed hawk, sharp-shinned hawk, and snapping turtle.

In 2003, four surveys (dawn, mid-day, dusk, and night) were conducted on one day each week throughout the year, except on February 17 and December 10, 2003 when only two and three surveys were conducted respectively. A total of 205 driving surveys were conducted in 2003, totaling 4157 miles surveyed.

Results and Discussion

A total of 48 species were observed on the weekly driving surveys in 2003, including species from wildlife groups such as mammals, reptiles, raptors, wading birds, waterfowl, and others (Table 1). Ten species made up over 90% of all individuals that were observed, including (in order of decreasing sighting frequency) white-tailed deer, herring gull, Canada goose, American black duck, common goldeneye, brant, bufflehead, red-breasted merganser, greater black-backed gull, and American crow. It is important to note that the data presented in Table 1 are sighting data and not abundance data since the

same individuals may have been observed on multiple surveys during the same day or on different days of the year.

Most species were not observed equally among surveys driven at different times of the day, although dawn, mid-day, and dusk surveys generally had a similar number of sightings, while many fewer sightings were observed at night (Table 1). Most of the 48 species were sighted less often at night either due to behavior patterns or to reduced visibility of the observer at night. Alternatively, species such as raccoon and American woodcock were sighted more often at night, reflecting their nocturnal nature. In general, the least amount of information per survey effort was obtained at night. In addition, little new information was obtained from mid-day surveys when both dawn and dusk surveys were conducted; for these reasons surveys in future years should only be conducted at dawn and dusk.

Most species exhibited strong seasonal patterns in sighting frequency. This is particularly true for seasonally migrating birds including most waterfowl and wading bird species, and some raptors. However, even permanent residents, such as white-tailed deer, showed seasonal patterns that were in part due to breeding activities and recruitment of young into the population. However, part of the seasonal patterns that were observed for some species was surely due to changes in observer visibility. For example, mink are present throughout the year in Rhode Island, but were only observed during the winter months during this study, presumably because these small reclusive species are easier to observe during this time of year when leaves of off deciduous trees and when snow may be on the ground. Figure 2 shows the seasonal patterns for all species observed in this survey.

Figure 3 shows GIS maps of the distribution of selected species. These species were chosen either because they were deemed relatively important ecologically or because they were not abundant; determining the exact locations for very abundant species such as herring gulls and white-tailed deer was not possible for the lone observer without substantially increasing the length of individual surveys. While some species, such as feral cats, were relatively ubiquitous on Prudence Island, others were present only in specific areas. For example, most raptors were more frequently sighted around the southwest corner of the island where there is a diverse mix of habitats including pine and oak forests, shrubland, and open meadows, while red fox were conspicuously absent from the residentially developed east side of the island.

In summary, weekly driving surveys were effective for gathering basic data on the species composition, relative abundance and distribution patterns of targeted wildlife species around the NBNERR on Prudence Island, despite some obvious flaws inherent to these kinds of surveys (e.g., reduced observed visibility during different times of the day and during different seasons). As these surveys are continued over the long-term, abundance patterns for species will function as indicators and hopefully lead to better stewardship and management of the NBNERR for research and monitoring.

Figure 1. Wildlife driving survey route on Prudence Island.

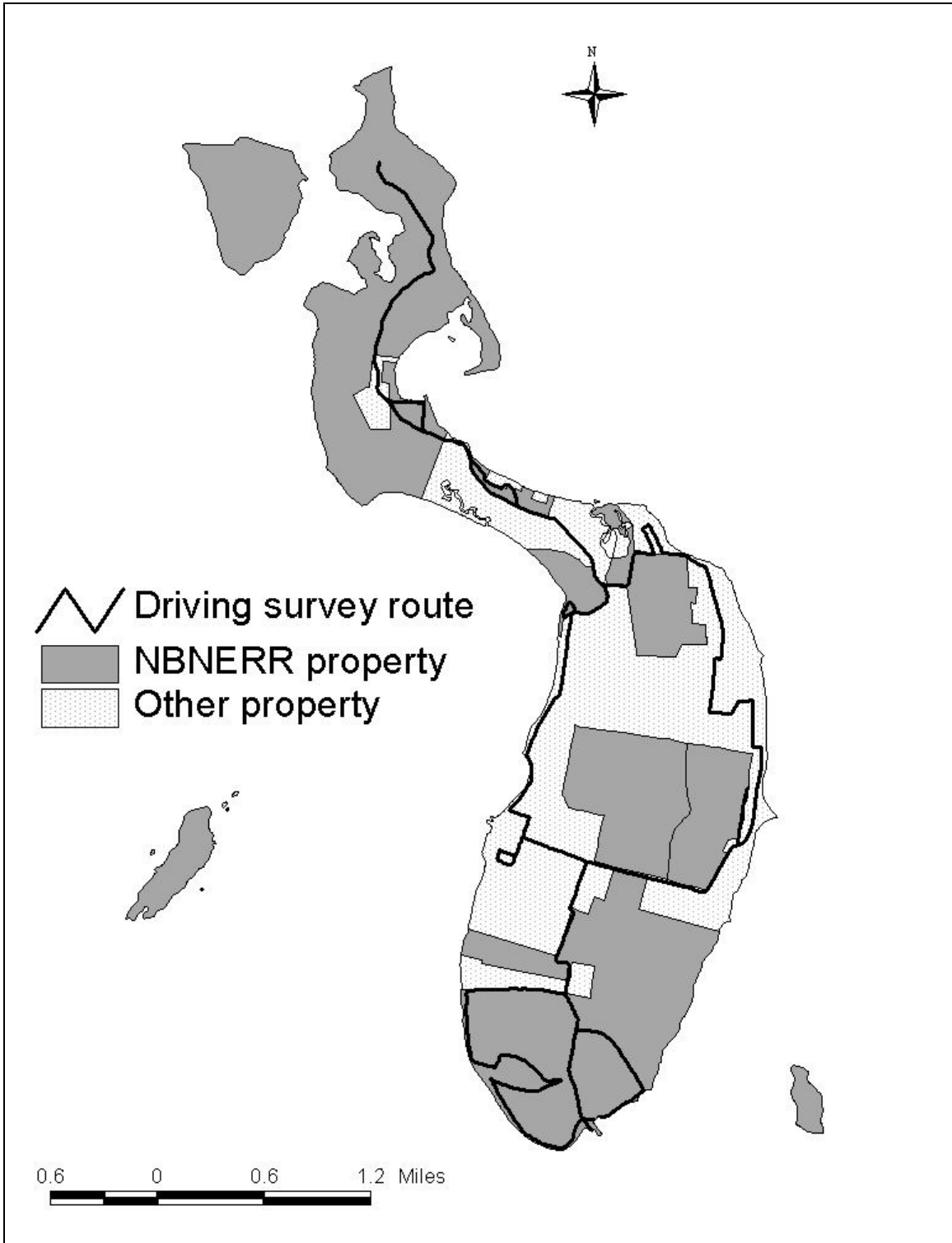
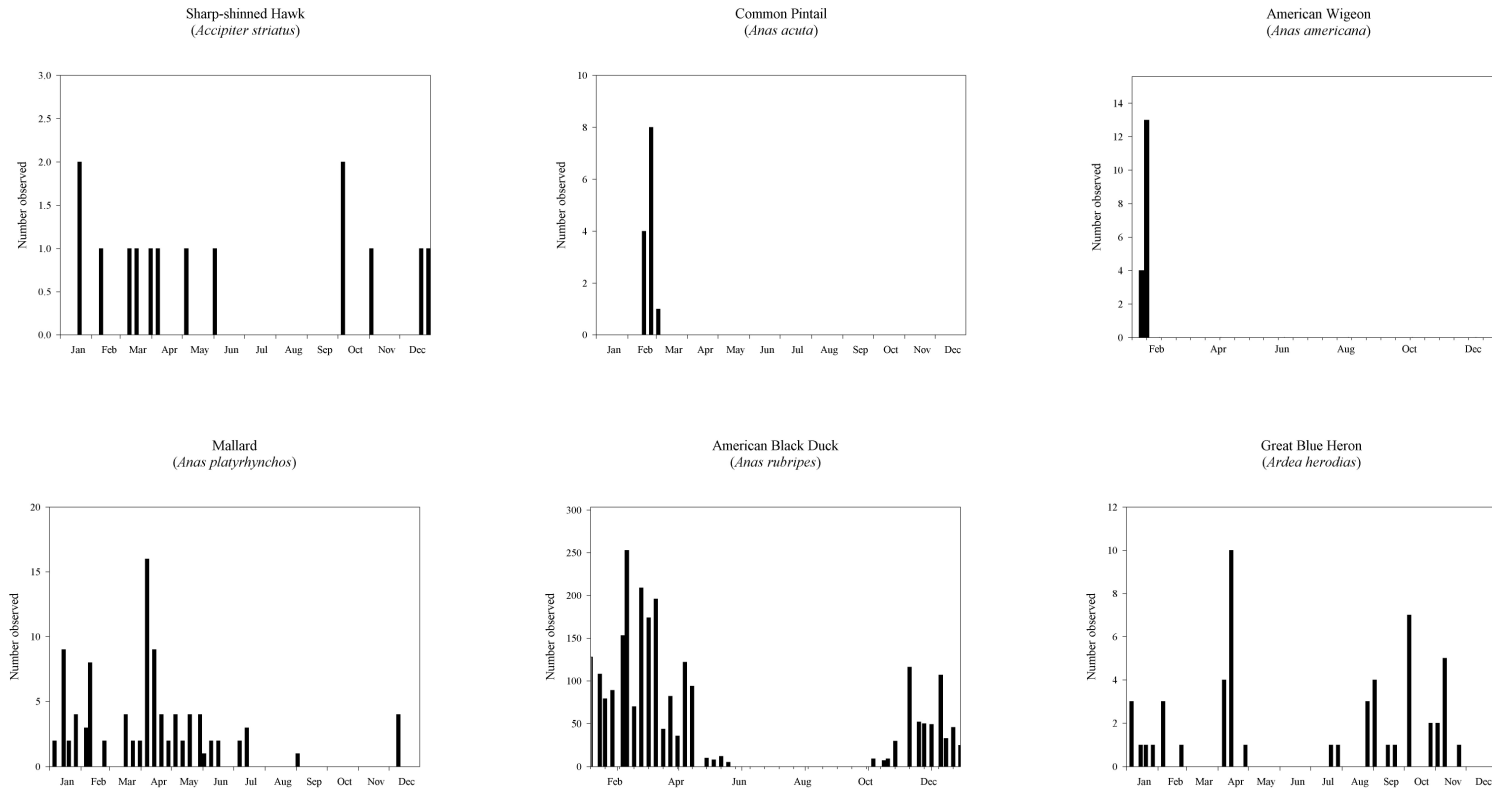


Table 1. Wildlife species observed during 2003 driving surveys. Survey data are presented as the number observed per survey, averaged over the year. Also provided is the % of the total for each species, which is a measure of the relative abundance for each species.

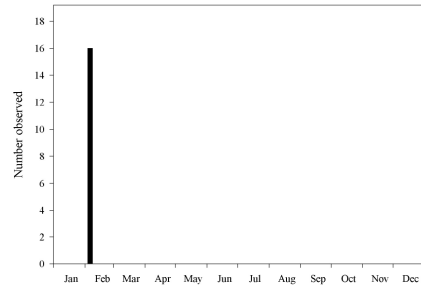
Species	Common name	Number observed per survey				Total	% of Total
		Dawn	Mid-day	Dusk	Night		
<i>Odocoileus virginianus</i>	White-tailed deer	54.48	8.52	66.06	23.86	38.23	29.93
<i>Larus argentatus</i>	Herring gull	54.42	47.54	25.12	0.00	32.11	25.14
<i>Branta canadensis</i>	Canada goose	19.10	17.90	10.61	0.00	12.02	9.41
<i>Anas ruprides</i>	American black duck	17.12	15.87	13.53	0.00	11.73	9.18
<i>Bucephala clangula</i>	Common goldeneye	13.98	7.92	7.22	0.00	7.35	5.75
<i>Branta bernicla</i>	Brant	8.79	2.69	4.20	0.00	3.96	3.10
<i>Bucephala albeola</i>	Bufflehead	5.06	3.50	4.71	0.00	3.34	2.62
<i>Mergus serrator</i>	Red-breasted merganser	5.25	4.27	2.10	0.00	2.94	2.30
<i>Larus marinus</i>	Greater black-backed gull	4.27	4.77	2.29	0.00	2.86	2.24
<i>Corvus brachyrhynchos</i>	American crow	3.48	4.04	1.45	0.00	2.27	1.78
<i>Sylvilagus floridanus</i>	Eastern cottontail	2.25	0.27	1.65	0.80	1.24	0.97
<i>Phalacrocorax auritus</i>	Double-crested cormorant	0.62	3.08	1.18	0.00	1.23	0.96
<i>Phoca vitulina</i>	Harbor seal	2.04	2.04	0.53	0.00	1.17	0.91
<i>Sciurus carolinensis</i>	Eastern gray squirrel	2.02	0.96	0.61	0.00	0.91	0.71
<i>Lophodytes cucullatus</i>	Hooded merganser	1.35	0.58	0.94	0.00	0.72	0.57
<i>Casmerodius albus</i>	Great egret	0.71	1.25	0.57	0.00	0.64	0.50
<i>Larus atricilla</i>	Laughing gull	0.06	1.06	1.06	0.00	0.55	0.43
<i>Anas platyrhynchos</i>	Mallard	0.37	0.94	0.59	0.00	0.48	0.37
<i>Buteo jamaicensis</i>	Red-tailed hawk	0.52	0.71	0.49	0.00	0.43	0.34
<i>Vulpes vulpes</i>	Red fox	0.60	0.21	0.06	0.86	0.43	0.34
<i>Procyon lotor</i>	Common raccoon	0.29	0.04	0.08	1.30	0.42	0.33
<i>Cygnus olor</i>	Mute swan	0.44	0.69	0.47	0.04	0.41	0.32
<i>Felis domestica</i>	Feral cat	0.27	0.21	0.61	0.18	0.32	0.25
<i>Ardea herodias</i>	Great blue heron	0.38	0.48	0.16	0.00	0.26	0.20
<i>Egretta thula</i>	Snowy egret	0.23	0.48	0.14	0.00	0.21	0.17
<i>Cathartes aura</i>	Turkey vulture	0.38	0.31	0.16	0.00	0.21	0.17
<i>Podiceps auritus</i>	Horned grebe	0.13	0.54	0.02	0.00	0.18	0.14

<i>Pandion haliaetus</i>	Osprey	0.13	0.31	0.18	0.00	0.16	0.12
<i>Falco sparverius</i>	American kestrel	0.12	0.15	0.14	0.00	0.10	0.08
<i>Bucephala islandica</i>	Barrow's goldeneye	0.12	0.25	0.00	0.00	0.09	0.07
<i>Anas americana</i>	American wigeon	0.13	0.08	0.12	0.00	0.08	0.06
<i>Circus cyaneus</i>	Northern harrier	0.10	0.15	0.08	0.00	0.08	0.06
<i>Aythya marila</i>	Greater scaup	0.31	0.00	0.00	0.00	0.08	0.06
<i>Melanitta deglandi</i>	White-winged scoter	0.08	0.13	0.08	0.00	0.07	0.06
<i>Accipiter striatus</i>	Sharp-shinned hawk	0.08	0.10	0.10	0.00	0.07	0.05
<i>Gavia immer</i>	Common loon	0.21	0.02	0.02	0.00	0.06	0.05
<i>Anas acuta</i>	Common pintail	0.10	0.00	0.16	0.00	0.06	0.05
<i>Philohela minor</i>	American woodcock	0.02	0.00	0.00	0.18	0.05	0.04
<i>Megaceryle alcyon</i>	Belted kingfisher	0.10	0.06	0.02	0.00	0.04	0.03
<i>Mustela vison</i>	Mink	0.10	0.02	0.02	0.02	0.04	0.03
<i>Terrapene carolina</i>	Eastern box turtle	0.02	0.06	0.02	0.00	0.02	0.02
<i>Nycticorax nycticorax</i>	Black-crowned night heron	0.04	0.00	0.00	0.04	0.02	0.02
<i>Phalacrocorax carbo</i>	Great cormorant	0.00	0.02	0.06	0.00	0.02	0.02
<i>Haematopus palliatus</i>	American oystercatcher	0.00	0.06	0.02	0.00	0.02	0.02
<i>Falco columbarius</i>	Merlin	0.02	0.00	0.02	0.00	0.01	0.01
<i>Melanitta perspicillata</i>	Surf scoter	0.04	0.00	0.00	0.00	0.01	0.01
<i>Lutra canadensis</i>	Northern river otter	0.02	0.00	0.00	0.00	0.00	0.00
<i>Chelydra serpentina</i>	Snapping turtle	0.00	0.00	0.02	0.00	0.00	0.00

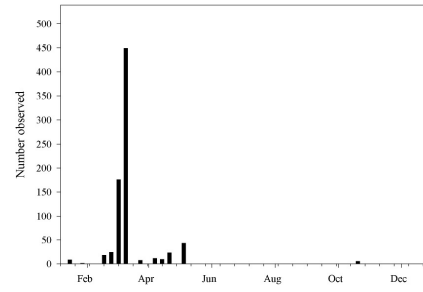
Figure 2. Seasonal observation patterns for wildlife on Prudence Island. The number of observations on each date is the total from all surveys conducted on that date. Species are presented in alphabetical order based on genus.



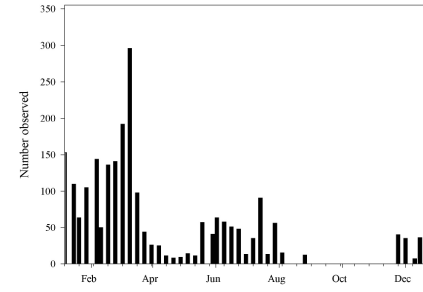
Greater Scaup
(*Aythya marila*)



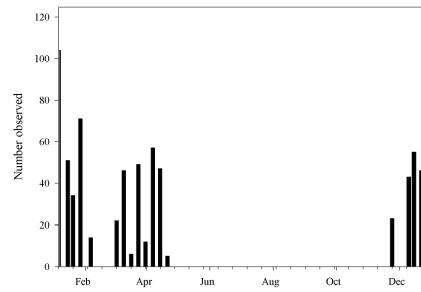
Brant
(*Branta bernicla*)



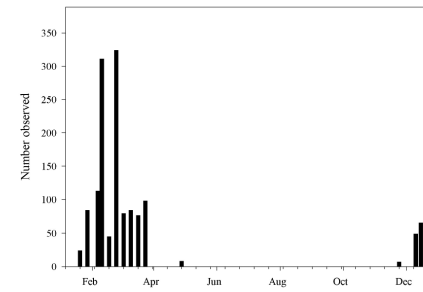
Canada Goose
(*Branta canadensis*)



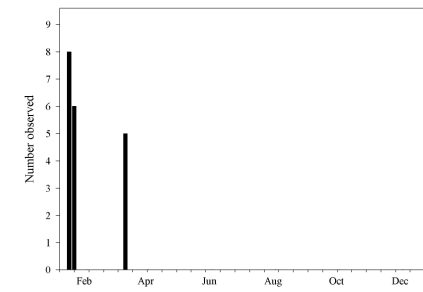
Bufflehead
(*Bucephala albeola*)



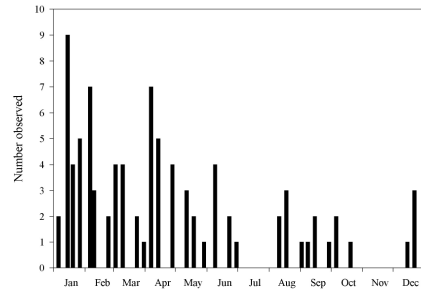
Common Goldeneye
(*Bucephala clangula*)



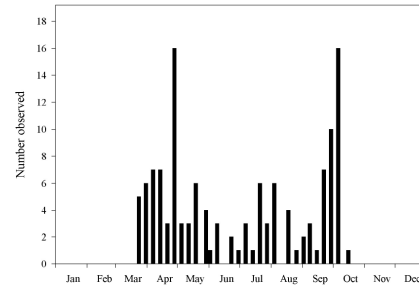
Barrow's Goldeneye
(*Bucephala islandica*)



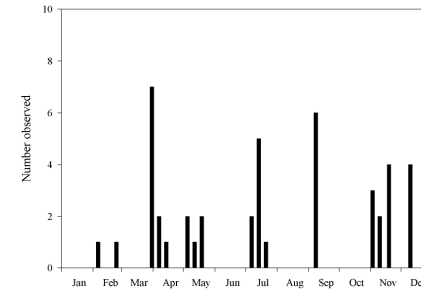
Red-tailed Hawk
(*Buteo jamaicensis*)



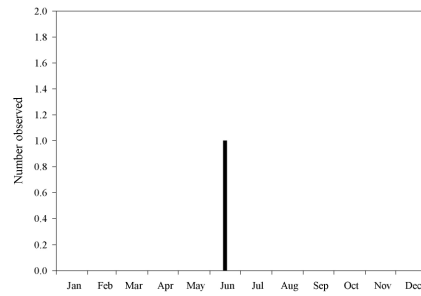
Great Egret
(*Casmerodius albus*)



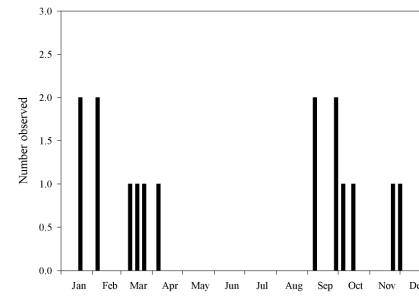
Turkey Vulture
(*Cathartes aura*)



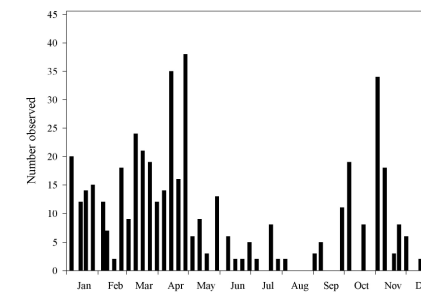
Snapping Turtle
(*Chelydra serpentina*)



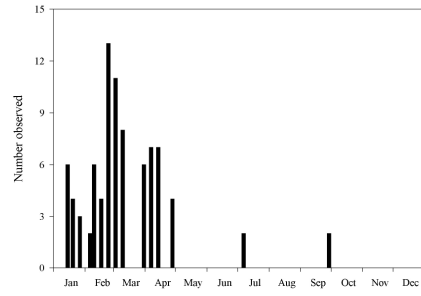
Northern Harrier
(*Circus cyaneus*)



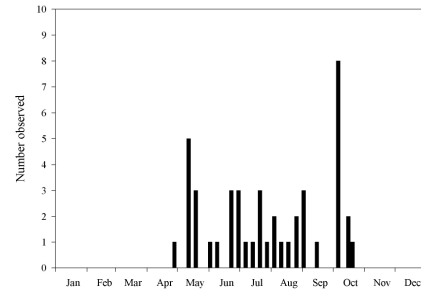
American Crow
(*Corvus brachyrhynchos*)



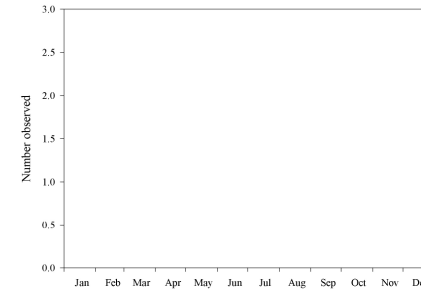
Mute Swan
(*Cygnus olor*)



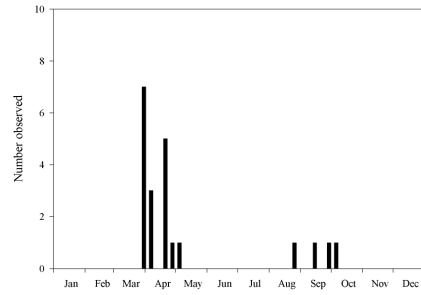
Snowy Egret
(*Egretta thula*)



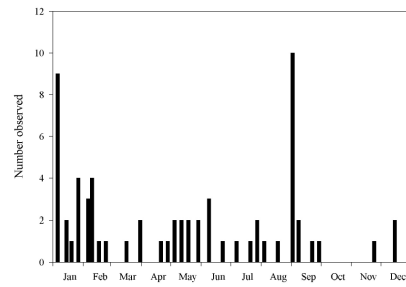
Merlin
(*Falco columbarius*)



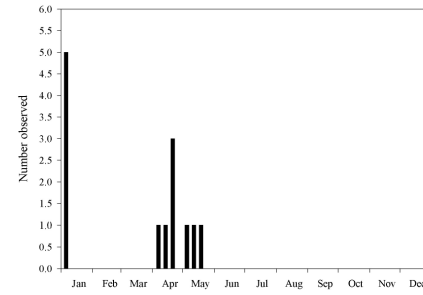
American Kestrel
(*Falco sparverius*)



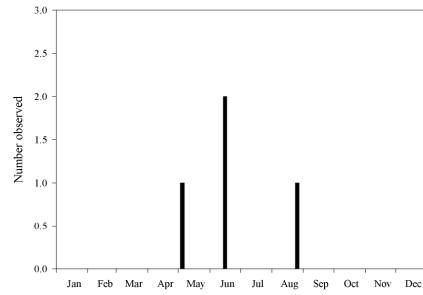
Feral Cat
(*Felis domestica*)



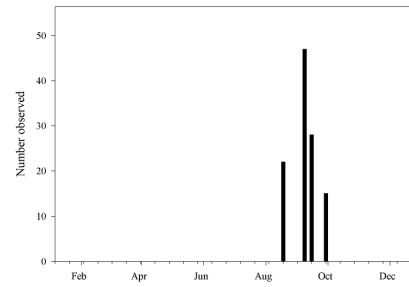
Common Loon
(*Gavia immer*)



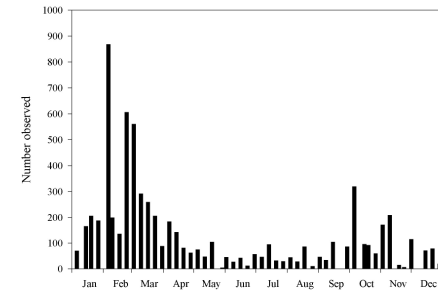
American Oystercatcher
(*Haematopus palliatus*)



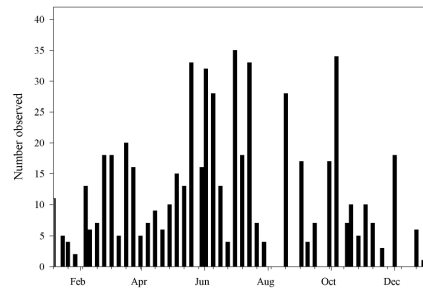
Laughing Gull
(*Larus atricilla*)



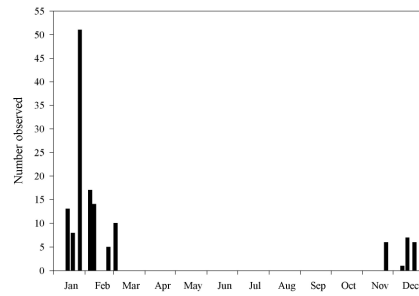
Herring Gull
(*Larus argentatus*)



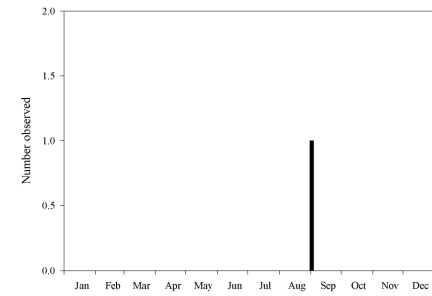
Greater Black-Backed Gull
(*Larus marinus*)



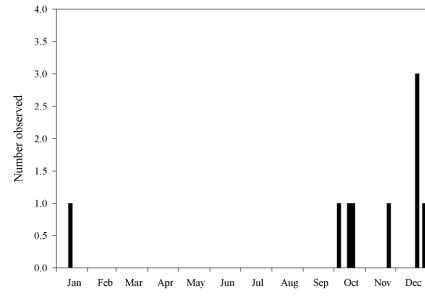
Hooded Merganser
(*Lophodytes cucullatus*)



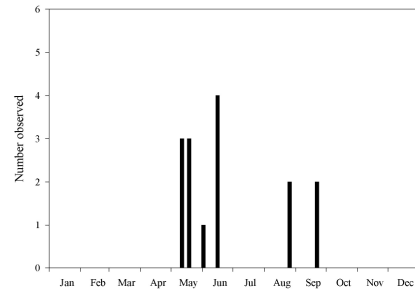
Northern River Otter
(*Lutra canadensis*)



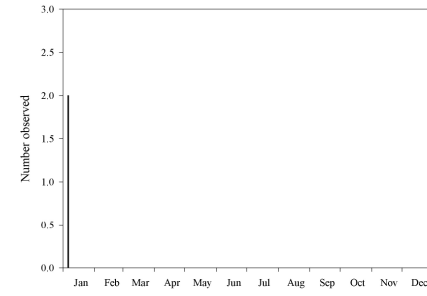
Belted Kingfisher
(Megasceryle alcyon)



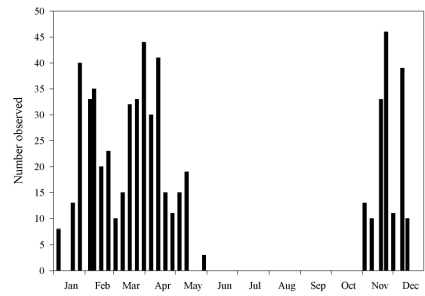
White-winged Scoter
(Melanitta deglandi)



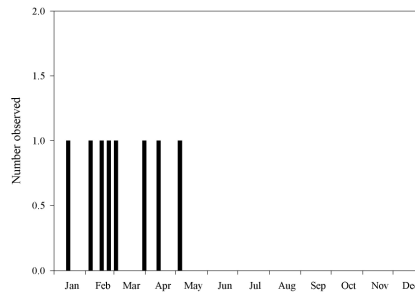
Surf Scoter
(Melanitta perspicillata)



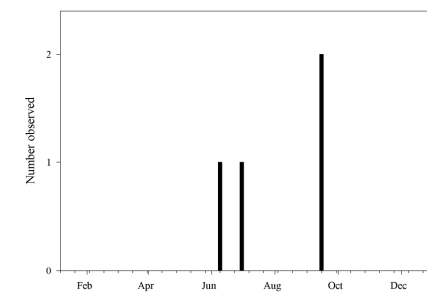
Red-breasted Merganser
(Mergus serrator)



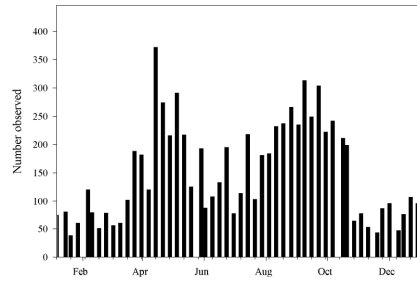
Mink
(Mustela vison)



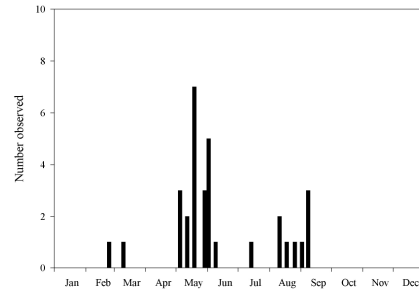
Black-Crowned Night Heron
(Nycticorax nycticorax)



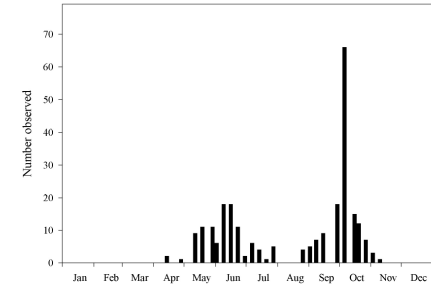
White-tailed Deer
(*Odocoileus virginianus*)



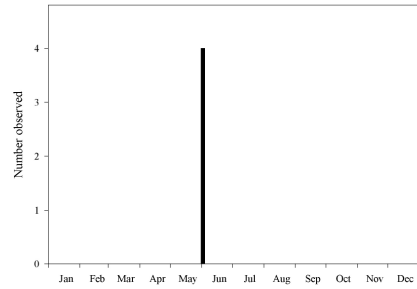
Osprey
(*Pandion haliaetus*)



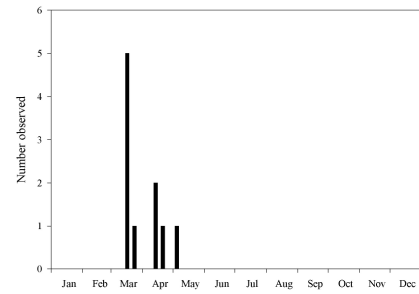
Double-Crested Cormorant
(*Phalacrocorax auritus*)



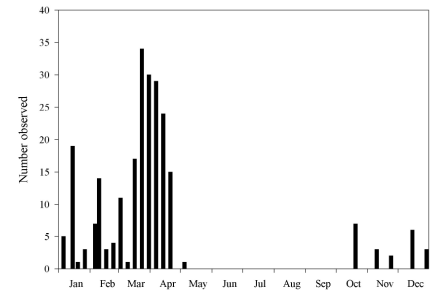
Great Cormorant
(*Phalacrocorax carbo*)



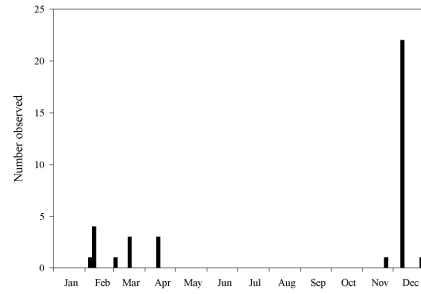
American Woodcock
(*Philohela minor*)



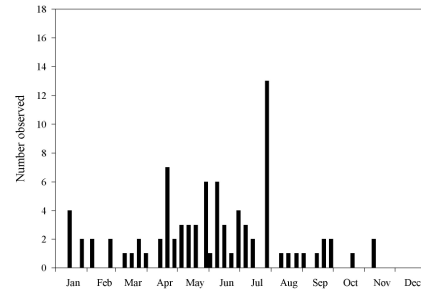
Harbor Seal
(*Phoca vitulina*)



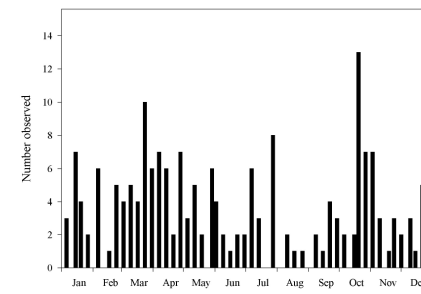
Horned Grebe
(*Podiceps auritus*)



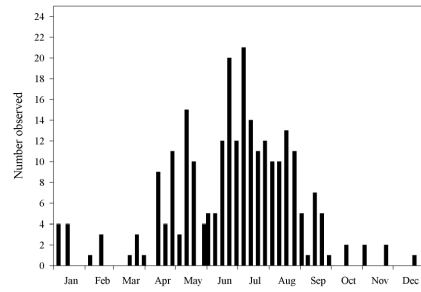
Common Raccoon
(*Procyon lotor*)



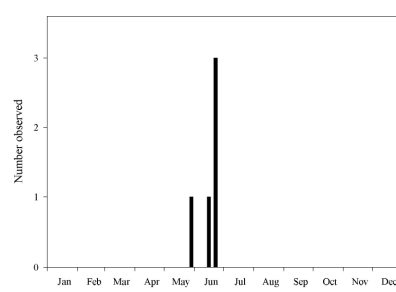
Eastern Gray Squirrel
(*Sciurus carolinensis*)



Eastern Cottontail
(*Sylvilagus floridanus*)



Eastern Box Turtle
(*Terrapene carolina*)



Red fox
(*Vulpes vulpes*)

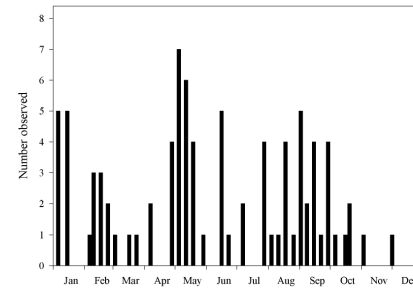


Figure 3. Distribution maps for selected species from the 2003 wildlife driving survey. For each species, one dot represents one individual sighted.

