

# **Bird Surveys of Fort Monroe 2009-2010**



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## INTRODUCTION

This document presents the results of bird surveys conducted on Fort Monroe from May 2009 through June 2010. The data presented in this report includes observations made on Fort Monroe on given survey dates by U.S. Fish and Wildlife Service (Service) personnel, and does not include observations made outside of the survey dates or from previous reports or literature (e.g. the 1998 report prepared by U.S. Fish and Wildlife Service documenting flora and fauna on Fort Monroe and Bethel Reservoir). The purpose of this project was to provide an inventory of bird species present at different times of the year (i.e., during breeding and migration seasons) on Fort Monroe. Survey information may be used by the Army to facilitate management actions and assist with the Base Realignment and Closure process. This work was authorized under the Sikes Act 16 U.S.C. 670 *et seq* and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) in accordance with the Economy Act (31 U.S.C. 1535). Funding for the study was provided by Military Interdepartmental Purchase Request number MIPR9HP3ENV001.

## METHODS

### Site

Fort Monroe is located in Hampton, Virginia at the tip of the Virginia Peninsula (at approximately 37.00 °N, -76.30 °W), and comprises an area of approximately 570 acres (Figure 1). The habitat of Fort Monroe consists primarily of developed areas, coastal dunes and beaches, patches of manicured grass/parks, tidal and non-tidal wetlands, and small patches of early successional forest consisting primarily of live oak (*Quercus virginiana*), loblolly pine (*Pinus taeda*), eastern red cedar (*Juniperus virginiana*) and southern hackberry (*Celtis laevigata*).

The Service's Virginia Field Office conducted avian surveys focusing on the Dog Beach area (per the April 22, 2009 Scope of Work), located at the north end of Fort Monroe (Figure 2; approximately 68 acres). Point counts during the breeding season, and mist netting were focused on the Dog Beach area. However, the entire Fort was routinely surveyed, both by driving surveys and walking surveys. Mist-nets were also used at the "bunker area" located south of Dog Beach (Figure 2). Figure 2 highlights some of the other focus areas where surveys were performed.

### Survey Methods

Survey methods included mist-netting, point counts in specific areas and Fort-wide visual/aural surveys. Breeding surveys took place in June 2009 and migration surveys took place in September/October 2009 and April/May 2010. Visual surveys were performed using 10x42 binoculars and a 20-60x zoom spotting scope. No audio playback equipment was used as part of the surveys.

Point count surveys were initiated approximately at sunrise and typically required two hours to

complete. Eight (8) points were set up along the small wooded area paralleling Dog Beach (Figure 3 and 4). Each point was approximately 150 m apart. Observers spent 5 minutes per point, and counted birds both visually or aurally within 360° of a 150 m radius around the point, identifying species and number. Birds flying through or over the point area, as well as birds detected between points, were also counted. Point counts were utilized in June 2009 and April 2010, when most species were expected to be singing (many of the birds identified on point count surveys were detected aurally). During the fall (September/October 2009) surveys, formal point counts were not conducted because the birds were less vocal. Instead, more time was spent detecting species visually during the fall surveys.

Mist-netting was used during all survey periods, weather permitting. Mist nets (5-6) were set up and opened within an hour of sunrise, and were typically left open for up to 4 hours. Mist nets were 6, 9 or 12 m in length, with 30 or 36 mm mesh size. Nets were placed along edges and within gaps in habitat in the Dog Beach wooded area (Figure 5). For the May 2010 survey, access was granted to the locked Bunker area, enabling mist-netting at that location. Nets were monitored from nearby and checked at least every 30 minutes. When birds were captured, they were removed from the net and identified to species. Age and sex were also identified when possible (from plumage, presence of a brood patch or cloacal protuberance, or by skulling). No morphology measurements were taken. Mist-nets were not employed in rain or when the wind was sufficient to cause the net pockets to billow (usually > 12 mph).

Surveys focused on the Dog Beach area because this area contained the most wooded habitat, and was most suitable for conducting point counts and mist-netting. However, bird species were observed throughout the Fort and several other areas were covered by walking surveys. After completing point counts or mist-netting, surveyors would drive slowly down Fenwick Road and stop at several vantage points to survey the various grassy areas, beaches, buildings/structures, wetlands, and parks for bird activity. These less structured audio/visual surveys typically lasted 2-4 additional hours depending on level of activity and weather constraints, and were often very productive in identifying more species. Point counts and mist-netting usually did not take place on the same day, but the Fort-wide surveys were usually conducted every visit. Bird species and number were recorded for each general area identified in Figure 2.



Figure 1. Fort Monroe, outlined in a red dashed line.



Figure 2. Some of the general focal survey areas on Fort Monroe are outlined in yellow.





Figure 3. Survey points at Dog Beach area.



Figure 4. Photos of six (6) survey points (no photos of the remaining two)



Figure 5. Mist net (left), removing bird from mist net (upper right), yellow-rumped warbler in net (lower right).

## RESULTS

A total of 10 days were spent surveying (Table 1). Using all three survey methods, a total of 89 species were observed: 52 species were observed in the summer, 61 in the fall and 56 in the spring (Table 2). Most species were observed during multiple seasons; however, 19 species were only observed in the fall, 9 only in the summer and 13 only in the spring. In 1996, 78 species were recorded, 56 of which overlapped with those observed in 2009-2010 (see Table 2 and 3 for comparison; Galvez et al. 1998).

Forty (40) species were observed on the point counts (Appendix 1), and 17 were caught in mist-netting operations (Appendix 2). Most birds caught in mist nets were also detected on point counts or Fort-wide surveys, with the exception of the winter wren and wood thrush. Fort-wide surveys yielded 85 species (Appendix 3). An American kestrel (*Falco sparverius*) was observed several days after the mist netting operation ceased (Grady Wesson, pers. comm., July 26, 2010).

Table 1. Survey dates and technique used.

Date			Season	Point Count	Mist-Net	Fort-wide survey
June	17	2009	Breeding	x		x
June	19	2009	Breeding	x	x	x
September	16	2009	Fall Migration			x
September	17	2009	Fall Migration		x	x
October	20	2009	Fall Migration		x	x
October	21	2009	Fall Migration		x	x
April	14	2010	Spring Migration	x		x
April	15	2010	Spring Migration		x	x
April	16	2010	Spring Migration		x	x
May	21	2010	Spring Migration		x	x

Table 2. List of species observed in 2009-2010 during each season, and whether it was observed in 1996.

Species	Scientific Name	Summer	Fall	Spring	Observed 1996
American Black Duck	<i>Anas rubripes</i>		x		x
American Crow	<i>Corvus brachyrhynchos</i>	x	x	x	x
American Goldfinch	<i>Spinus tristis</i>	x	x	x	x
American Redstart	<i>Setophaga ruticilla</i>		x		
American Robin	<i>Turdus migratorius</i>	x	x	x	x
Bald Eagle	<i>Haliaeetus leucocephalus</i>		x	x	
Barn Swallow	<i>Hirundo rustica</i>	x		x	x
Black Skimmer	<i>Rynchops niger</i>	x	x		x
Blackburnian Warbler	<i>Dendroica fusca</i>		x		



<b>Black-throated Green Warbler</b>	<i>Dendroica virens</i>		x			
<b>Blue Grosbeak</b>	<i>Passerina caerulea</i>		x			
<b>Blue Jay</b>	<i>Cyanocitta cristata</i>	x	x	x		x
<b>Blue-headed Vireo</b>	<i>Vireo solitarius</i>		x			
<b>Boat-tailed Grackle</b>	<i>Quiscalus major</i>	x	x	x		x
<b>Bonaparte's Gulls</b>	<i>Chroicocephalus philadelphia</i>			x		x
<b>Brown Creeper</b>	<i>Certhia americana</i>		x			
<b>Brown Pelican</b>	<i>Pelecanus occidentalis</i>	x	x			x
<b>Brown Thrasher</b>	<i>Toxostoma rufum</i>	x	x	x		x
<b>Brown-headed Cowbird</b>	<i>Molothrus ater</i>	x	x	x		x
<b>Bufflehead</b>	<i>Bucephala albeola</i>			x		x
<b>Canada Goose</b>	<i>Branta canadensis</i>	x	x	x		x
<b>Carolina Chickadee</b>	<i>Poecile carolinensis</i>	x	x	x		x
<b>Carolina Wren</b>	<i>Thryothorus ludovicianus</i>	x	x	x		
<b>Cedar Waxwing</b>	<i>Bombycilla cedrorum</i>		x	x		
<b>Chimney Swift</b>	<i>Chaetura pelagica</i>	x				
<b>Chipping Sparrow</b>	<i>Spizella passerina</i>			x		x
<b>Clapper Rail</b>	<i>Rallus longirostris</i>	x	x	x		x
<b>Common Grackle</b>	<i>Quiscalus quiscula</i>	x		x		x
<b>Common Loon</b>	<i>Gavia immer</i>			x		x
<b>Common Tern</b>	<i>Sterna hirundo</i>	x				x
<b>Common Yellowthroat</b>	<i>Geothlypis trichas</i>	x	x	x		x
<b>Cooper's Hawk</b>	<i>Accipiter cooperii</i>			x		
<b>Double-crested Cormorant</b>	<i>Phalacrocorax auritus</i>	x	x	x		x
<b>Downy Woodpecker</b>	<i>Picoides pubescens</i>	x	x			
<b>Eastern Bluebird</b>	<i>Sialia sialis</i>	x				
<b>Eastern Kingbird</b>	<i>Tyrannus tyrannus</i>	x		x		x
<b>Eastern Phoebe</b>	<i>Sayornis phoebe</i>		x			
<b>Eastern Towhee</b>	<i>Pipilo erythrophthalmus</i>	x	x	x		x
<b>European Starling</b>	<i>Sturnus vulgaris</i>	x	x	x		x
<b>Field Sparrow</b>	<i>Spizella pusilla</i>		x			
<b>Fish Crow</b>	<i>Corvus ossifragus</i>	x				x
<b>Golden-crowned Kinglet</b>	<i>Regulus satrapa</i>		x			
<b>Great Black-backed Gull</b>	<i>Larus marinus</i>	x	x	x		x
<b>Great Blue Heron</b>	<i>Ardea herodias</i>	x	x	x		x
<b>Great Egret</b>	<i>Ardea alba</i>	x	x	x		x
<b>Great-crested Flycatcher</b>	<i>Myiarchus crinitus</i>	x		x		
<b>Greater Yellowlegs</b>	<i>Tringa melanoleuca</i>			x		
<b>Green Heron</b>	<i>Butorides virescens</i>	x				x
<b>Grey Catbird</b>	<i>Dumetella carolinensis</i>	x	x			x
<b>Hairy Woodpecker</b>	<i>Picoides villosus</i>	x				
<b>Herring Gull</b>	<i>Larus argentatus</i>	x	x	x		x

<b>Hooded Merganser</b>	<i>Lophodytes cucullatus</i>				x	
<b>House Finch</b>	<i>Carpodacus mexicanus</i>	x	x	x		x
<b>House Sparrow</b>	<i>Passer domesticus</i>	x	x	x		x
<b>Killdeer</b>	<i>Charadrius vociferus</i>	x	x	x		x
<b>Laughing Gull</b>	<i>Leucophaeus atricilla</i>	x	x	x		x
<b>Least Tern</b>	<i>Sternula antillarum</i>	x		x		x
<b>Mallard</b>	<i>Anas platyrhynchos</i>	x	x	x		x
<b>Mourning Dove</b>	<i>Zenaida macroura</i>	x	x	x		x
<b>Northern Cardinal</b>	<i>Cardinalis cardinalis</i>	x	x	x		x
<b>Northern Flicker</b>	<i>Colaptes auratus</i>		x			x
<b>Northern Mockingbird</b>	<i>Mimus polyglottos</i>	x	x	x		x
<b>Northern Rough-winged Swallow</b>	<i>Stelgidopteryx serripennis</i>	x		x		
<b>Osprey</b>	<i>Pandion haliaetus</i>	x	x	x		x
<b>Purple Martin</b>	<i>Progne subis</i>	x				x
<b>Red-bellied Woodpecker</b>	<i>Melanerpes carolinus</i>		x			
<b>Red-breasted Merganser</b>	<i>Mergus serrator</i>			x		x
<b>Red-winged Blackbird</b>	<i>Agelaius phoeniceus</i>	x	x	x		x
<b>Ring-billed Gull</b>	<i>Larus delawarensis</i>	x	x			x
<b>Rock Pigeon</b>	<i>Columba livia</i>	x	x	x		x
<b>Rose-breasted Grosbeak</b>	<i>Pheucticus ludovicianus</i>		x			
<b>Royal Tern</b>	<i>Thalasseus maximus</i>	x	x	x		x
<b>Ruby-crowned Kinglet</b>	<i>Regulus calendula</i>		x			
<b>Sanderling</b>	<i>Calidris alba</i>		x	x		x
<b>Savannah Sparrow</b>	<i>Passerculus sandwichensis</i>		x			x
<b>Semipalmated Plover</b>	<i>Charadrius semipalmatus</i>		x			
<b>Semipalmated Sandpiper</b>	<i>Calidris pusilla</i>			x		
<b>Sharp-shinned Hawk</b>	<i>Accipiter striatus</i>			x		
<b>Song Sparrow</b>	<i>Melospiza melodia</i>	x	x	x		x
<b>Swamp Sparrow</b>	<i>Melospiza georgiana</i>			x		
<b>White-crowned Sparrow</b>	<i>Zonotrichia leucophrys</i>		x			
<b>White-throated Sparrow</b>	<i>Zonotrichia albicollis</i>		x	x		x
<b>Willet</b>	<i>Tringa semipalmata</i>			x		x
<b>Willow Flycatcher</b>	<i>Empidonax traillii</i>	x				
<b>Winter Wren</b>	<i>Troglodytes troglodytes</i>		x			
<b>Wood Thrush</b>	<i>Hylocichla mustelina</i>			x		
<b>Yellow-bellied Sapsucker</b>	<i>Sphyrapicus varius</i>		x			
<b>Yellow-crowned Night Heron</b>	<i>Nyctanassa violacea</i>	x				x
<b>Yellow-rumped Warbler</b>	<i>Dendroica coronata</i>		x	x		x

Table 3. Comparison of 1996 data with 2009/2010 data

<b>Observed in 1996, but not 2009/2010</b>	<b>Observed in 2009/2010, but not in 1996</b>
American Coot	American Redstart
American Kestrel	Bald Eagle
American Wigeon	Blackburnian Warbler
Barn Owl	Black-throated Green Warbler
Black-bellied Plover	Blue Grosbeak
Black-capped Chickadee	Blue-headed Vireo
Brant	Brown Creeper
Common Bobwhite	Carolina Wren
Dark-eyed Junco	Cedar Waxwing
Gadwall	Chimney Swift
Green-winged Teal	Cooper's Hawk
Horned Grebe	Downy Woodpecker
House Wren	Eastern Bluebird
Marsh Wren	Eastern Phoebe
Northern Gannet	Field Sparrow
Pied-billed Grebe	Golden-crowned Kinglet
Purple Finch	Great-crested Flycatcher
Red-breasted Nuthatch	Greater Yellowlegs
Ruddy Turnstone	Hairy Woodpecker
Sharp-tailed Sparrow	Hooded Merganser
Tree Swallow	Northern Rough-winged Swallow
Tundra Swan	Red-bellied Woodpecker
	Rose-breasted Grosbeak
	Ruby-crowned Kinglet
	Semipalmated Plover
	Semipalmated sandpiper
	Sharp-shinned hawk
	Swamp Sparrow
	White-crowned Sparrow
	Willow Flycatcher
	Winter Wren
	Wood Thrush
	Yellow-bellied Sapsucker

## CONCLUSIONS AND RECOMMENDATIONS

Some species detected in past surveys (the 1996 inventory of flora and fauna of Fort Monroe and Bethel Reservoir) were not detected in 2009-2010, and vice versa. To get a more complete list of species present, refer to Table 3. Although most species were detected in multiple survey periods, several species were only identified during a particular season. It is important to conduct surveys year-round to detect all species. In 2009/2010, a winter survey was not conducted, thus several waterfowl and wintering species were not detected that reportedly use Fort Monroe. For example, American wigeon (*Anas Americana*), ruddy duck (*Oxyura jamaicensis*), mallard (*Anas platyrhynchos*), old squaw now long-tailed duck (*Clangula hyemalis*), lesser scaup (*Aythya affinis*), and American brant (*Branta bernicla*) were observed in January/February 2010 by Fort Monroe personnel (Grady Wesson, pers. comm., July 26, 2010).

The most effective method in detecting the most number of species was Fort-wide surveys and point count surveys. There was not a lot of suitable habitat for mist-netting, so that technique did not yield many additional species aside from what was detected on the other surveys.

Several species detected on the Fort Monroe surveys are identified as species of national or global concern on the Audubon WatchList, or are considered threatened or species of special concern in Virginia. The clapper rail, sanderling, semipalmated sandpiper, black skimmer, willow flycatcher and wood thrush are on the yellow WatchList, which includes species that are either declining or rare and are species of national conservation concern (Audubon WatchList 2007; <http://web1.audubon.org/science/species/watchlist/browseWatchlist.php>). The least tern is included on the red WatchList, which includes species that are declining rapidly and/or have small populations or limited ranges and face major conservation threats (Audubon WatchList 2007; <http://web1.audubon.org/science/species/watchlist/browseWatchlist.php>). The bald eagle is a state threatened species. The brown creeper, brown pelican, golden-crowned kinglet, great egret, least tern and winter wren are all considered species of special concern in Virginia.

Fort Monroe provides habitat for birds during migration and for breeding species. For a relatively small area, it provides a diverse array of habitats—including beaches, wetlands and small patches of forest. Portions of Dog Beach have been colonized by high densities of non-native invasive plants including white mulberry (*Morus alba*) and bush honeysuckle (*Lonicera sp.*). The removal of these and other invasive plant species followed by the planting of native species will provide higher quality habitat for birds that use Dog Beach for foraging. For restoration purposes, planting should focus on fall fruiting species that will provide food for birds during migration, such as eastern red cedar (*Juniperus virginiana*), wax myrtle (*Myrica cerifera*), southern hackberry (*Celtis laevigata*), and yaupon holly (*Ilex vomitoria*). These species all produce fruit that will persist into the fall and winter and provide valuable food for migrating birds.



## REFERENCES

Galvez, J.I., T.W. Black, G.L. Swihart, and C.B. Black. 1998. Biological Diversity Survey of the Flora and Fauna of Fort Monroe and Bethel Reservoir. U.S. Fish and Wildlife Service, Gloucester Office of Fishery Assistance

Appendix 1  
Point Count Survey data

Date	Point	Species	Number within 50-100 m	Number flyover	Comments
6/17/09	8	osprey	1		
6/17/09	8	American robin	4		
6/17/09	8	royal tern		2	
6/17/09	8	northern mockingbird	3		
6/17/09	8	European starling	4		
6/17/09	8	common tern		2	
6/17/09	8	red-winged blackbird	1		
6/17/09	8	laughing gull		1	
6/17/09	8	killdeer	1		
6/17/09	7	European starling		17	
6/17/09	7	laughing gull		1	
6/17/09	7	common tern	1		
6/17/09	7	royal tern	1		
6/17/09	7	northern mockingbird	1		
6/17/09	7	red-winged blackbird		4	
6/17/09	7	common grackle		2	
6/17/09	7	house finch	2		
6/17/09	6	song sparrow	2		
6/17/09	6	northern mockingbird	1		
6/17/09	6	American robin	2		
6/17/09	6	European starling	2	47	
6/17/09	6	red-winged blackbird	1		
6/17/09	6	common grackle		7	
6/17/09	bt 6 and 5	grey catbird	2		
6/17/09	bt 6 and 5	osprey	1		
6/17/09	5	grey catbird	1		
6/17/09	5	American robin	9		juveniles
6/17/09	5	song sparrow	1		
6/17/09	5	European starling		20	
6/17/09	5	osprey		1	
6/17/09	5	northern cardinal	2		
6/17/09	bt 5 and 4	killdeer		1	
6/17/09	4	song sparrow	2		
6/17/09	4	house finch		1	
6/17/09	4	European starling		1	
6/17/09	4	laughing gull		1	

6/17/09	4	grey catbird	1	
6/17/09	4	American robin	1	
6/17/09	4	house finch	4	
6/17/09	bt 4 and 3	brown thrasher	1	
6/17/09	bt 4 and 3	European starling	3	
6/17/09	3	mourning dove	2	
6/17/09	3	brown-headed cowbird	2	
6/17/09	3	American robin	7	
6/17/09	3	laughing gull		4
6/17/09	3	royal tern		2
6/17/09	3	grey catbird	1	
6/17/09	3	Carolina wren	1	
6/17/09	2	grey catbird	3	
6/17/09	2	song sparrow	2	
6/17/09	2	laughing gull		1
6/17/09	2	American robin	5	
6/17/09	2	eastern towhee	1	
6/17/09	1	brown pelican		1
6/17/09	1	American robin	2	
6/17/09	1	song sparrow	1	
6/19/09	8	brown thrasher	3	
6/19/09	8	common grackle	5	20
6/19/09	8	European starling	7	18
6/19/09	8	eastern towhee	1	
6/19/09	8	grey catbird	1	
6/19/09	8	song sparrow	2	
6/19/09	8	Carolina wren	1	
6/19/09	8	common tern		1
6/19/09	8	American robin	1	
6/19/09	7	American robin	1	
6/19/09	7	northern mockingbird	1	
6/19/09	7	laughing gull		1
6/19/09	7	common grackle		10
6/19/09	7	song sparrow	1	
6/19/09	7	royal tern		2
6/19/09	7	red-winged blackbird	1	
6/19/09	6	common yellowthroat	1	
6/19/09	6	grey catbird	2	
6/19/09	6	common grackle	4	
6/19/09	6	red-winged blackbird	2	
6/19/09	6	brown thrasher	1	
6/19/09	6	royal tern		2
6/19/09	6	house finch	1	10
6/19/09	6	barn swallow	1	
6/19/09	bt 6 and 5	mourning dove	3	
6/19/09	bt 6 and 5	chimney swift		1
6/19/09	5	grey catbird	2	
6/19/09	5	chimney swift	1	
6/19/09	5	house finch	4	2

6/19/09	5	northern mockingbird	1	
6/19/09	5	barn swallow	2	
6/19/09	5	American goldfinch		3
6/19/09	5	song sparrow	2	
6/19/09	4	northern mockingbird	2	
6/19/09	4	grey catbird	2	
6/19/09	4	brown thrasher	2	
6/19/09	4	American robin	2	
6/19/09	4	northern cardinal	1	
6/19/09	4	European starling	8	
6/19/09	4	great blue heron		1
6/19/09	3	American robin	1	
6/19/09	3	eastern towhee	1	
6/19/09	3	northern cardinal	1	
6/19/09	3	grey catbird	3	
6/19/09	3	northern mockingbird	1	
6/19/09	3	Carolina wren	1	
6/19/09	3	house finch		3
6/19/09	3	brown-headed cowbird	1	
6/19/09	3	European starling	1	
6/19/09	3	downy woodpecker	1	
6/19/09	3	barn swallow	1	
6/19/09	3	American goldfinch	2	
6/19/09	2	laughing gull		1
6/19/09	2	barn swallow		2
6/19/09	2	American goldfinch	2	
6/19/09	2	mourning dove		1
6/19/09	2	grey catbird	2	
6/19/09	2	song sparrow	2	
6/19/09	2	common grackle	2	
6/19/09	2	fish crow		2
6/19/09	2	hairy woodpecker	1	
6/19/09	1	song sparrow	1	
6/19/09	1	house finch	8	
6/19/09	1	red-winged blackbird	2	
6/19/09	1	common grackle	3	
6/19/09	1	brown-headed cowbird	4	
6/19/09	1	American goldfinch	1	
6/19/09	1	eastern towhee	1	
6/19/09	1	common yellowthroat	1	
6/19/09	1	blue jay	1	
6/19/09	1	northern mockingbird	1	
<b>No point counts in Fall --- only mistnet and fort survey</b>				
4/14/10	1	American robin	1	
4/14/10	1	northern mockingbird	1	
4/14/10	1	red-winged blackbird	4	
4/14/10	1	common yellowthroat	1	
4/14/10	1	double crested cormorant		1



4/14/10	1	American crow	1	
4/14/10	1	northern cardinal	1	
4/14/10	1	Canada goose	1	
4/14/10	1	white-throated sparrow	1	
4/14/10	1	laughing gull	2	
4/14/10	bt 1 and 2	chipping sparrow	1	
4/14/10	bt 1 and 2	mallard	5	
4/14/10	bt 1 and 2	northern cardinal	2	
4/14/10	2	laughing gull	2	
4/14/10	2	red-winged blackbird	1	
4/14/10	2	Carolina wren	1	
4/14/10	2	eastern towhee	1	
4/14/10	3	northern mockingbird	1	
4/14/10	3	northern cardinal	1	
4/14/10	3	red-winged blackbird	2	
4/14/10	3	brown-headed cowbird	2	
4/14/10	3	great egret	1	
4/14/10	3	mourning dove	1	
4/14/10	3	eastern towhee	1	
4/14/10	3	herring gull	1	
4/14/10	3	double crested cormorant	1	in water
4/14/10	4	northern cardinal	3	
4/14/10	4	eastern towhee	2	
4/14/10	4	red-winged blackbird	1	
4/14/10	4	American goldfinch	1	
4/14/10	4	royal tern	2	beach side
4/14/10	bt 4 and 5	common grackle	1	
4/14/10	5	brown-headed cowbird	1	
4/14/10	5	northern cardinal	1	
4/14/10	5	red-winged blackbird	3	
4/14/10	6	song sparrow	2	
4/14/10	6	red-winged blackbird	3	
4/14/10	6	house finch	2	
4/14/10	6	American robin	1	
4/14/10	6	brown-headed cowbird	2	
4/14/10	6	northern cardinal	1	
4/14/10	6	eastern towhee	1	
4/14/10	6	great blue heron	1	in marsh
4/14/10	6	bald eagle	1	across mill creek
4/14/10	6	Cooper's hawk	1	
4/14/10	6	mourning dove	1	
4/14/10	bt 6 and 7	rock pigeon	3	
4/14/10	bt 6 and 7	killdeer	1	
4/14/10	7	house finch	2	
4/14/10	7	brown-headed cowbird	2	

4/14/10	7	northern mockingbird	1	
4/14/10	7	American robin	1	
4/14/10	7	Canada goose	2	
4/14/10	7	brown thrasher	2	
4/14/10	7	song sparrow	1	
4/14/10	bt 7 and 8	killdeer	1	nesting near platform on eggs
4/14/10	8	osprey	2	on nest platform
4/14/10	8	brown thrasher	2	
4/14/10	8	killdeer	1	
4/14/10	8	American goldfinch	1	
4/14/10	8	brown-headed cowbird	1	
4/14/10	8	American robin	2	
4/14/10	8	laughing gull	1	
4/14/10	8	eastern towhee	1	
4/14/10	8	song sparrow	1	

Appendix 2.  
Mist net data from Fort Monroe

Date	Time	Species Code	Species	Age	Sex	No.	Net	
							Lat	Long
6/19/09		AMGO	American goldfinch	AHY?	M		37.03401	-76.2942
6/19/09		GRCA	grey catbird	AHY	M		37.03415	-76.2945
6/19/09		GRCA	grey catbird	AHY	M		37.03415	-76.2945
6/19/09		SOSP	song sparrow	AHY?	M		37.03415	-76.2945
6/19/09		SOSP	song sparrow	UNK	UNK		37.03415	-76.2945
9/17/09		NONE -- Too windy to mistnet 9/17 (nets set up 9/16), second attempt in October						
10/20/09	907	AMRO	American robin	UNK	UNK	1	37.03415	-76.2945
10/20/09	830	NOCA	northern cardinal	AHY	F	1	37.03401	-76.2942
10/20/09	740	RCKI	ruby-crowned kinglet	AHY	M	3	37.03412	-76.2942
10/20/09	10-1045	RCKI	ruby-crowned kinglet	UNK	UNK	1	37.03401	-76.2942
10/20/09	1000	SOSP	song sparrow	UNK	UNK	1	37.03415	-76.2945
10/20/09	10-1045	SOSP	song sparrow	UNK	UNK	1	37.03412	-76.2942
10/20/09	1046	SOSP	song sparrow	UNK	UNK	1	37.03401	-76.2942
10/20/09	740	WIWR	winter wren	UNK	UNK	1	37.03415	-76.2945
10/20/09	850-910	WTSP	white-throated sparrow	UNK	UNK	1	37.03415	-76.2945
10/20/09	850-910	WTSP	white-throated sparrow	UNK	UNK	1	37.03412	-76.2942
10/20/09	740-840	YRWA	yellow-rumped warbler	UNK	UNK	2	37.03401	-76.2942
10/20/09	740-840	YRWA	yellow-rumped warbler	UNK	UNK	9	37.03364	-76.2943
10/20/09	849	YRWA	yellow-rumped warbler	UNK	UNK	3	37.03401	-76.2942
10/20/09	850-910	YRWA	yellow-rumped warbler	UNK	UNK	1	37.03412	-76.2942
10/20/09	850-910	YRWA	yellow-rumped warbler	UNK	UNK	3	37.03415	-76.2945
10/20/09	10-1045	YRWA	yellow-rumped warbler	UNK	UNK	1	37.03412	-76.2942
10/20/09	10-1045	YRWA	yellow-rumped warbler	UNK	UNK	7	37.03364	-76.2943

10/21/09	945	BRTH	brown thrasher	UNK	UNK	1	37.03473	-76.2943
10/21/09	815	HOFI	house finch	UNK	UNK	1	37.03401	-76.2942
10/21/09	850	HOFI	house finch	AHY	M	1	37.03415	-76.2945
10/21/09	945	HOFI	house finch	UNK	UNK	1	37.03401	-76.2942
10/21/09	850	NOCA	northern cardinal	AHY	M + F	2	37.03401	-76.2942
10/21/09	730	NOMO	northern mockingbird	UNK	UNK	1	37.03401	-76.2942
10/21/09	850	NOMO	northern mockingbird	AHY	UNK	1	37.03412	-76.2942
10/21/09	945	NOMO	northern mockingbird	UNK	UNK	1	37.03401	-76.2942
10/21/09	740	RCKI	ruby-crowned kinglet	AHY	M	1	37.03473	-76.2943
10/21/09	850	RCKI	ruby-crowned kinglet	HY?	AHY F?	1	37.03401	-76.2942
10/21/09	730	SOSP	song sparrow	UNK	UNK	1	37.03401	-76.2942
10/21/09	815	YRWA	yellow-rumped warbler	UNK	UNK	1	37.03412	-76.2942
10/21/09	815	YRWA	yellow-rumped warbler	UNK	UNK	1	37.03401	-76.2942
10/21/09	850	YRWA	yellow-rumped warbler	UNK	UNK	3	37.03401	-76.2942
10/21/09	850	YRWA	yellow-rumped warbler	UNK	UNK	2	37.03412	-76.2942
10/21/09	945	YRWA	yellow-rumped warbler	UNK	UNK	3	37.03401	-76.2942
4/15/10	720	AMRO	American robin	AHY	UNK	1	37.03401	-76.2942
4/15/10	800	AMRO	American robin	AHY	F, M	2	37.03415	-76.2945
4/15/10	755	BRTH	brown thrasher	AHY	F		37.03401	-76.2942
4/15/10	700	CHSP	chipping sparrow	AHY	UNK	1	37.03401	-76.2942
4/15/10	750	RWBL	red-winged blackbird	AHY	F	1	37.03473	-76.2943
4/15/10	855	SOSP	song sparrow	AHY	M	1	37.03473	-76.2943
4/16/10	740	CARW	Carolina wren	AHY	F	1	37.03415	-76.2945
5/21/10	810	AMRO	American robin	AHY	M	1	37.01945	-76.2981
5/21/10	1030	GCFL	great-crested flycatcher	AHY	F	1	37.01857	-76.2984
5/21/10	850	GRCA	grey catbird	AHY	M	1	37.01888	-76.2979
5/21/10	850	NOCA	northern cardinal	AHY	F	1	37.01857	-76.2984
5/21/10	850	WOTH	wood thrush	AHY	M	1	37.01945	-76.2981

AHY – after hatch year

HY – hatch year

M – male

F - female

UNK - unknown



Appendix 3.  
Fort-wide Survey Data

Date	Species	Location/Comments	Season	Notes
6/17/09	American crow	near Fort	Summer	
6/17/09	American goldfinch	entrance to base	Summer	
6/17/09	American robin	points	Summer	
6/17/09	barn swallow	wetlands from campground	Summer	
6/17/09	black skimmer	wetlands from airfield	Summer	
6/17/09	boat-tailed grackle	wetlands from campground	Summer	
6/17/09	brown pelican	beach	Summer	
6/17/09	brown thrasher	points	Summer	
6/17/09	brown-headed cowbird	points	Summer	
6/17/09	Canada goose	entrance to base	Summer	
6/17/09	Carolina chickadee	munitions bunker	Summer	
6/17/09	Carolina wren	points	Summer	
6/17/09	common grackle	points	Summer	
6/17/09	common tern	beach, points	Summer	
6/17/09	eastern kingbird	entrance to base	Summer	
6/17/09	eastern towhee	points	Summer	
6/17/09	European starling	points	Summer	
6/17/09	fish crow	entrance to base	Summer	
6/17/09	great black-backed gull	beach	Summer	
6/17/09	great blue heron	wetlands from campground	Summer	
6/17/09	great egret	wetlands from campground	Summer	
6/17/09	great-crested flycatcher	in Fort residential	Summer	
6/17/09	green heron	near Fort	Summer	
6/17/09	grey catbird	points	Summer	
6/17/09	herring gull	beach	Summer	
6/17/09	house finch	airfield area	Summer	
6/17/09	house sparrow	near Fort	Summer	
6/17/09	killdeer	points	Summer	
6/17/09	laughing gull	beach	Summer	

6/17/09	mallard	wetlands from airfield	Summer
6/17/09	mourning dove	points	Summer
6/17/09	northern cardinal	points	Summer
6/17/09	northern mockingbird	points	Summer
6/17/09	northern rough-winged swallow	Fort park	Summer
6/17/09	osprey	beach, points	Summer
6/17/09	purple martin	near Fort	Summer
6/17/09	red-winged blackbird	wetlands from campground	Summer
6/17/09	rock pigeon	near Fort	Summer
6/17/09	royal tern	beach, points	Summer
6/17/09	song sparrow	points	Summer
6/17/09	yellow-crowned night heron	wetland	Summer
6/19/09	American goldfinch	campground area, points	Summer
6/19/09	American robin	munitions bunker, points	Summer
6/19/09	barn swallow	points	Summer
6/19/09	black skimmer	beach near swimming area	Summer
6/19/09	blue jay	munitions bunker, points	Summer
6/19/09	boat-tailed grackle	park near tennis courts	Summer
6/19/09	brown thrasher	points	Summer
6/19/09	brown-headed cowbird	points	Summer
6/19/09	Carolina wren	munitions bunker, points	Summer
6/19/09	chimney swift	Fort park, points	Summer
6/19/09	clapper rail	wetland near campground	Summer
6/19/09	common grackle	park near tennis courts, points	Summer
6/19/09	common tern	beach at end	Summer
6/19/09	common yellowthroat	points	Summer
6/19/09	double-crested cormorant	at entrance, Mill Creek	Summer
6/19/09	downy woodpecker	points	Summer
6/19/09	eastern bluebird	near campground, heard only once (Amanda)	Summer
6/19/09	eastern kingbird	campground area, tennis courts	Summer
6/19/09	eastern towhee	points	Summer
6/19/09	European starling	points	Summer
6/19/09	fish crow	points	Summer

6/19/09	great black-backed gull	beach at end, beach near pool	Summer
6/19/09	great blue heron	wetland, points	Summer
6/19/09	great egret	wetland	Summer
6/19/09	great-crested flycatcher	parking lot near pool	Summer
6/19/09	grey catbird	points	Summer
6/19/09	hairy woodpecker	points	Summer
6/19/09	herring gull	beach at end, beach near pool	Summer
6/19/09	house finch	munitions bunker, points	Summer
6/19/09	house sparrow	Fort park	Summer
6/19/09	killdeer	campground area	Summer
6/19/09	laughing gull	beach at end, points	Summer
6/19/09	mallard	wetland side of park	Summer
6/19/09	mourning dove	munitions bunker, points	Summer
6/19/09	northern cardinal	munitions bunker, points	Summer
6/19/09	northern mockingbird	munitions bunker, points	Summer
6/19/09	northern rough-winged swallow	Fort moat	Summer
6/19/09	osprey	wetland	Summer
6/19/09	purple martin	near pier	Summer
6/19/09	red-winged blackbird	wetland, points	Summer
6/19/09	ring-billed gull	beach near pool	Summer
6/19/09	royal tern	beach at end, points	Summer
6/19/09	song sparrow	points	Summer
6/19/09	willow flycatcher	near point 5, around 8 am	Summer
6/19/09	yellow-crowned night heron	beach at end, wetlands	Summer
9/16/09	American crow	camp ground area, all around	Fall
9/16/09	American goldfinch	park in Fort	Fall
9/16/09	American redstart	park in Fort	Fall
9/16/09	bald eagle	Mill Creek side of cul de sac	Fall
9/16/09	blackburnian warbler	park in Fort	Fall
9/16/09	black-throated green warbler	bunker	Fall
9/16/09	boat-tailed grackle	clubhouse parking lot	Fall 2
9/16/09	brown pelican	beach	Fall
9/16/09	brown thrasher	road near point 3 and 2	Fall

9/16/09	brown-headed cowbird	cul de sac lawn, near Dog Beach	Fall	
9/16/09	Canada goose	lawn near campground	Fall	
9/16/09	double-crested cormorant	beach	Fall	
9/16/09	European starling	all around	Fall	
9/16/09	great black-backed gull	beach	Fall	
9/16/09	great blue heron	wetland	Fall	
9/16/09	great egret	wetland	Fall	
9/16/09	grey catbird	road near point 3 and 2	Fall	
9/16/09	Gull sp	on water behind boats, at beach near clubhouse	Fall	150
9/16/09	herring gull	beach near clubhouse	Fall	
9/16/09	house finch	beach near clubhouse	Fall	
9/16/09	house sparrow	in Fort at park	Fall	
9/16/09	killdeer	beach near clubhouse	Fall	
9/16/09	mourning dove	all around	Fall	
9/16/09	northern cardinal	Cul de sac, beach, all along road, bunker	Fall	
9/16/09	northern mockingbird	Cul de sac, beach, all along road	Fall	
9/16/09	ring-billed gull	beach	Fall	
9/16/09	rose-breasted grosbeak	fence at bunker	Fall	found dead --1 female
9/16/09	sanderling	beach near clubhouse	Fall	6
9/16/09	yellow-crowned night heron	wetland	Fall	
9/17/09	double-crested cormorant	off survey road	Fall	
9/17/09	downy woodpecker	off survey road	Fall	
9/17/09	European starling	off survey road	Fall	
9/17/09	house finch	off survey road	Fall	
9/17/09	osprey	off survey road	Fall	
9/17/09	red-winged blackbird	off survey road	Fall	
10/20/09	American goldfinch	near nets/survey road	Fall	10+
10/20/09	American robin	30+ near survey road/nets, flyovers, feeding	Fall	30+
10/20/09	bald eagle	Mill Creek blind, near gate in tree	Fall	2
10/20/09	blue grosbeak	near nets/survey road	Fall	1
10/20/09	blue jay	near nets/survey road	Fall	3
10/20/09	blue-headed Vireo	bunker	Fall	1
10/20/09	brown creeper	near bunker	Fall	2

10/20/09	Carolina chickadee	near nets/survey road, Fort park	Fall	3+
10/20/09	common yellowthroat	near nets/survey road	Fall	1
10/20/09	Crow sp	around clubhouse	Fall	2
10/20/09	double-crested cormorant	near nets/survey road	Fall	flew over
10/20/09	downy woodpecker	near bunker	Fall	1
10/20/09	eastern phoebe	near nets/survey road, near bunker	Fall	4
10/20/09	European starling	near nets/survey road	Fall	2
10/20/09	field sparrow	near nets/survey road	Fall	2
10/20/09	golden-crowned kinglet	campground live oaks, with RCKIs, Fort park	Fall	15+
10/20/09	great black-backed gull	beach at clubhouse	Fall	15
10/20/09	great blue heron	wetland Mill Creek	Fall	3
10/20/09	herring gull	beach at clubhouse	Fall	15+
10/20/09	house finch	near nets/survey road	Fall	20+
10/20/09	Killdeer	campground flooded area	Fall	
10/20/09	mourning dove	near nets/survey road	Fall	5+
10/20/09	northern flicker	near nets/survey road	Fall	1
10/20/09	northern mockingbird	near nets/survey road	Fall	10+
10/20/09	northern mockingbird	in Fort park, survey road, campground	Fall	3
10/20/09	red-bellied woodpecker	near nets/survey road	Fall	1
10/20/09	Ruby-crowned Kinglet	in Fort park, survey road, campground	Fall	20+
10/20/09	sanderling	beach at clubhouse	Fall	1
10/20/09	savannah sparrow	campground edge of Mill Creek	Fall	1
10/20/09	song sparrow	near nets/survey road	Fall	5+
10/20/09	white-crowned sparrow	bunker	Fall	1
10/20/09	white-throated sparrow	road near nets	Fall	10+
10/20/09	yellow-bellied sapsucker	near nets/survey road	Fall	1
10/20/09	yellow-rumped warbler	near nets/survey road, bunker, all over	Fall	50+
10/21/09	American black duck	Mill Creek wetlands	Fall	2
10/21/09	American robin	near nets/survey road	Fall	50+
10/21/09	bald eagle	telephone pole near wetlands/campground, tree near gate	Fall	2
10/21/09	black skimmer	beach at clubhouse	Fall	15
10/21/09	Carolina wren	near nets/survey road	Fall	1
10/21/09	cedar waxwing	near nets/survey road	Fall	1

10/21/09	clapper rail	near net area - Mill Creek	Fall	1
10/21/09	double-crested cormorant	near nets/survey road flyover and Mill Creek	Fall	100+
10/21/09	eastern towhee	near nets/survey road	Fall	1
10/21/09	great black-backed gull	beach at clubhouse	Fall	6
10/21/09	great blue heron	Mill Creek wetlands	Fall	3
10/21/09	herring gull	beach at clubhouse	Fall	6
10/21/09	house finch	near nets/survey road	Fall	2
10/21/09	Killdeer	near net area - Mill Creek	Fall	2
10/21/09	laughing gull	beach at clubhouse	Fall	20
10/21/09	mallard	mill creek	Fall	
10/21/09	mourning dove	campground	Fall	4
10/21/09	northern cardinal	gate area	Fall	1
10/21/09	northern flicker	near nets/survey road	Fall	1
10/21/09	ring-billed gull	beach at clubhouse	Fall	20
10/21/09	royal tern	Mill Creek, beach near clubhouse	Fall	15
10/21/09	sanderling	beach at clubhouse	Fall	6
10/21/09	semipalmated plover	beach at clubhouse	Fall	1
10/21/09	song sparrow	near nets/survey road	Fall	15
10/21/09	white-crowned sparrow	bunker	Fall	1
10/21/09	yellow-rumped warbler	near nets/survey road	Fall	20
4/14/10	American goldfinch	inside fort	Spring	
4/14/10	American robin	bunker, inside fort	Spring	
4/14/10	blue jay	clubhouse parking lot	Spring	1
4/14/10	boat-tailed grackle	marsh near campground	Spring	10+
4/14/10	Bonaparte's gulls	clubhouse parking lot	Spring	
4/14/10	brown thrasher	bunker	Spring	
4/14/10	bufflehead	Mill Creek towards airstrip, 2 females	Spring	2
4/14/10	Canada goose	marsh near campground	Spring	2
4/14/10	common grackle	campground, inside fort	Spring	10+
4/14/10	common loon	beach near fort	Spring	1
4/14/10	eastern towhee	bunker	Spring	
4/14/10	European starling	bunker, inside fort	Spring	
4/14/10	great blue heron	marsh near campground	Spring	5

4/14/10	great egret	marsh near campground	Spring	2
4/14/10	hooded merganser	Mill Creek, female	Spring	1
4/14/10	house sparrow	inside fort	Spring	
4/14/10	northern cardinal	bunker, inside fort	Spring	
4/14/10	northern mockingbird	bunker, inside fort	Spring	
4/14/10	northern rough-winged swallow	beach near fort, inside fort	Spring	
4/14/10	osprey	marsh near campground	Spring	1
4/14/10	song sparrow	near nets/survey road	Spring	2+
4/14/10	willet	beach near fort	Spring	1
4/14/10	yellow-rumped warbler	inside fort	Spring	1
4/15/10	bald eagle	perched in tree near nets--juvenile	Spring	1
4/15/10	barn swallow	by soccer field, bunkers	Spring	
4/15/10	Carolina chickadee	near nets	Spring	
4/15/10	greater yellowlegs	calling on Mill Creek (and seen)	Spring	1
4/15/10	red-breasted merganser	entrance to base in Mill Creek	Spring	1
4/15/10	sharp-shinned hawk	flying over Mill Creek	Spring	3
4/16/10	cedar waxwing	near net 3	Spring	
4/16/10	clapper rail	near nets in marsh on mill creek	Spring	
4/16/10	swamp sparrow	near nets in marsh on mill creek	Spring	
5/21/10	common yellowthroat	inside bunker	Spring	1
5/21/10	eastern kingbird	inside bunker	Spring	1
5/21/10	great-crested flycatcher	inside bunker	Spring	1
5/21/10	least tern	near entrance to fort	Spring	
5/21/10	sanderling	beach near clubhouse	Spring	5+
5/21/10	semipalmated plover	beach near clubhouse	Spring	4
5/21/10	semipalmated sandpiper	beach near clubhouse	Spring	5+