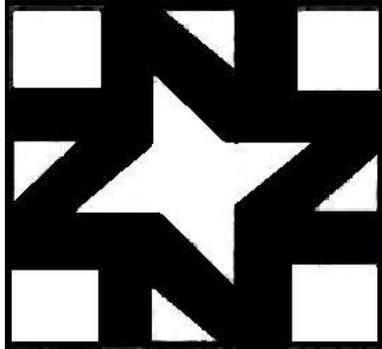


**WILDLIFE HAZARD ASSESSMENT**  
**For**  
**NORFOLK INTERNATIONAL AIRPORT**  
**AUGUST 2010 – JULY 2011**



Protecting People | Protecting Agriculture | Protecting Wildlife

**United States Department of Agriculture**  
**Animal and Plant Health Inspection Service**  
**Wildlife Services**

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**September 7, 2011**

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## **EXECUTIVE SUMMARY**

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services program (WS) conducted a 12-month wildlife hazard assessment (WHA) to identify wildlife hazards to aviation safety at Norfolk International Airport (ORF) from August 2010 through July 2011. Bird surveys were conducted twice per month in the aircraft operations area (AOA). Twelve night-time surveys of the AOA were also conducted to observe mammal use of this area. Data collected included species abundance, behavior, and habitat use. In addition, WS identified and surveyed areas outside of the AOA that may attract hazardous wildlife species to ORF. Small mammal surveys were conducted in spring and fall in varying habitat types on ORF. Species observed were grouped into guilds (species that display similar behavioral characteristics) for analysis. Data collected during surveys were analyzed and compared with records from the Federal Aviation Administration's (FAA) wildlife strike database, control efforts by ORF and WS personnel, and a wildlife hazard ranking list (Dolbeer and Wright 2009) to identify the species that are most hazardous to aviation safety at ORF.

Based on information collected during the WHA, there were 7 guilds identified at ORF from August 2010 through July 2011 that presented the greatest threats to aviation safety. These guilds included waterfowl (ducks and geese), raptors (hawks, vultures, and eagles), gulls, wading birds, crows/jays, blackbirds, and starlings. Though starlings and blackbirds were the most abundant guilds, waterfowl, particularly Canada Geese, and Double-crested Cormorants were the most hazardous due to their large size, flocking behavior, availability of habitat at or near ORF, and general abundance in the area. There were 6 species observed during the WHA that ranked as an extremely high hazard to aviation safety, and 3 species that ranked as very high.

WS recommends a variety of methods to reduce or eliminate the threat of wildlife strikes from the species observed during the WHA. Habitat management can include: eliminating or excluding wildlife from areas of standing water; vegetation management in the AOA; reducing or excluding birds from perching/loafing areas; reducing abundance of prey species (such as small rodents) in the AOA; and ensuring that the perimeter fence is in good repair and prevents mammals from entering the AOA. WS also recommends harassment methods such as pyrotechnics, sirens, paintball guns, and propane cannons to disperse birds from the AOA. Lethal control of hazardous species should be exercised when necessary utilizing firearms or traps. Permits for lethal control of species protected under Federal and State laws should be obtained and kept current from the U.S. Fish and Wildlife Service and the Virginia Department of Game and Inland Fisheries.

Additional recommendations include updating the airport's wildlife hazard management plan, continuation of a wildlife hazards working group, and evaluating potential wildlife hazards when planning new construction or land use changes. It is recommended that ORF continues to monitor wildlife abundance and habitat use in order to provide insight into wildlife use of the AOA and to gauge the effectiveness of control efforts.

## 1.0 INTRODUCTION

### 1.1 Purpose and Need for Action

As bird populations continue to rise and aircraft operations increase, the potential threat of wildlife strikes will also increase. To manage this aviation threat, airport managers will need to consider wildlife management not only within their immediate control (the airfield), but also the vicinity around the airport. It is estimated that wildlife-aircraft strikes cost the United States civil aviation industry \$625 million per year, 98% of these strikes involving birds (Dolbeer and Wright 2008), while worldwide the total cost is over \$1.2 billion per year (Keirn et al. 2010). The time period from 1998 through 2009, 219 people lost their lives, along with 212 aircraft destroyed worldwide as a result of both civil and military wildlife strikes. In January 2009, the wildlife/aircraft strike issue was dramatically illustrated when U.S. Airways Flight 1549 crash landed in New York's Hudson River after ingesting Canada Geese into both engines shortly after takeoff from LaGuardia Airport (Dolbeer 2009). This incident has been referred to in the media as "The Miracle on the Hudson" since all 155 passengers and crew survived despite the aircraft being a total loss. Less than two weeks prior to this incident, eight people were killed and one was seriously injured when a helicopter transporting workers to an offshore site in Louisiana struck a Red-tailed Hawk and crashed into a marsh (Wright 2011).

The Federal Aviation Administration (FAA) is responsible for setting and enforcing the Federal Aviation Regulations (FAR) and policies to enhance public safety. To ensure compliance with Code of Federal Regulations (CFR) 14 Part 139.337, the FAA requires certificated airports to conduct a wildlife hazard assessment (WHA), and if necessary, establish a wildlife hazard management plan (WHMP) when any of the following triggering events occur on or near an airport:

- (1) An air carrier aircraft experiences multiple wildlife strikes;
- (2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;
- (3) An air carrier aircraft experiences an engine ingestion of wildlife; or
- (4) Wildlife of a size, or in numbers, capable of causing an event described above are observed to have access to any airport flight pattern or aircraft movement area.

The WHA must be conducted by a qualified wildlife biologist (see FAA Advisory Circular 150/5200-33B) and should include the following information:

- (1) An analysis of the events or circumstances that prompted the assessment;

- (2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences;
- (3) Identification and location of features on and near the airport that attract wildlife;
- (4) A description of wildlife hazards to air carrier operations; and
- (5) Recommended actions for reducing identified wildlife hazards to air carrier operations.

### **Norfolk International Airport**

In June 2000, Norfolk International Airport entered into a Cooperative Service Agreement (CSA) with the United States Department of Agriculture, Animal Plant Health Inspection Service, Wildlife Services to conduct a WHA at ORF in accordance with FAA Regulations Part 139.337. The purpose of this WHA was to develop long-term actions to manage wildlife on the airport and within its critical airspace. It was also required that ORF implement immediate wildlife control measures to mitigate both short and long-term threats to aviation. The WHA was completed in September, 2001. In March 2003, a WHMP was also completed by WS for ORF at the request of the FAA. Since the completion of both the WHA and WHMP, WS has maintained a part-time presence at ORF and with its immediate neighbors to disperse and remove problem birds and mammals from the airfield environment.

In August 2009, a consultation site visit was conducted by WS in response to FAA's request after a CL-RJ100/200 Air Wisconsin jet struck a Double-crested Cormorant at 200 feet AGL (above ground level) on February 2, 2009. On July 17, 2009, a blackbird was also struck by a US Airways jet, E190 while landing. The cormorant strike caused substantial damage to the jet's wing flap (\$50,000), the blackbird caused no damage. Based on this information the FAA determined that Triggers #2 and 4 (#2) An air carrier aircraft experiences substantial damage from striking wildlife, and Wildlife of a size, or in numbers, capable of causing an event described above are observed to have access to any airport flight pattern or aircraft movement area) of the Code of Federal Regulations (CFR) 14 Part 139.337 had occurred. This determination then prompted a 12 month WHA to identify unsafe wildlife conditions both on ORF's airfield and within its critical zone. On July 1, 2010 ORF entered into 13 month CSA with WS to complete the WHA and to manage wildlife threats identified both on and off the airport. This WHA has analyzed the daily and seasonal changes of bird and mammal abundance, their activities and preferred habitat, food and water attractants, control actions and the wildlife strike history. From this analysis WS has developed recommendations to assist ORF in reducing these wildlife threats.

### **1.2 Legal Authority of Wildlife Services**

WS has a Memorandum of Understanding (MOU) with the FAA (Appendix C) to resolve wildlife hazards to aviation, thus enhancing public safety. The MOU establishes that WS has the expertise and will provide technical and operational assistance (if funded by an airport) to alleviate wildlife hazards at airports. WS may conduct a WHA to serve as a basis for the WHMP, but the

responsibility of development, approval, and implementation of the WHMP remains with the airport manager.

The primary statutory authority by which WS operates is the Animal Damage Control Act of March 2, 1931, as amended (7 U.S.C. 426-426c; 46 Stat. 1468). WS has the authority to manage migratory bird damage as specified in the CFR. In addition, the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 authorizes and directs the Secretary of Agriculture to cooperate with States, individuals, public and private agencies, organizations, and institutions in the control of nuisance mammals and birds deemed injurious to the public.

The MOU and legislation authorizes WS to conduct initial on-site investigations, biological assessments (short-term studies), WHA, wildlife management techniques, and assist airports in completing a WHMP.

### **1.3 Legal Status of Wildlife Species**

Most species of wildlife are protected by one or more Federal, State, and/or local laws and regulations. As such, several agencies may be responsible for implementation of these regulations and specific permits may be required prior to taking action to reduce wildlife threats to aviation safety.

Federal laws passed by Congress to protect wildlife include (but are not limited to) the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), and the Endangered Species Act (ESA). Federal wildlife laws are generally administered by the U.S. Fish and Wildlife Service (USFWS), which is the lead agency responsible for migratory birds protected under the MBTA, BGEPA, and ESA. The USFWS may issue depredation permits to take or harass migratory birds when those species are causing damage to various resources or threaten human health and safety (Appendix D).

The Commonwealth of Virginia defers to the Federal depredation permit for take of non-game migratory bird species, though a separate permit is required to take mammals and game bird species managed by the Virginia Department of Game and Inland Fisheries (VDGIF). As detailed in § 29.1-529 of the Code of Virginia, airport operators may obtain authorization from VDGIF to take wildlife (that are not federally protected) as necessary to protect aviation safety (Appendix E).

The Commonwealth of Virginia hosts a number of threatened and endangered (T&E) species that are granted protection under Federal and State regulations (Appendix F). Prior to conducting operational control work such as harassment, shooting, trapping, or habitat manipulation, the list of species of concern should be reviewed to ensure compliance with Federal and State regulations.

## **2.0 OBJECTIVES**

The objectives of this WHA were to:

1. Identify wildlife species, numbers, locations, behavior, and habitat use in and around the airfield, with particular emphasis on species most hazardous to aircraft safety;
2. Identify and locate features on and in the vicinity of the airport that attract wildlife;
3. Describe wildlife hazards to aviation safety at ORF; and

4. Provide ORF with management recommendations to reduce or eliminate wildlife hazards to aviation safety and serve as a basis for updating the current WHMP.

### 3.0 DESCRIPTION OF STUDY AREA



Norfolk International Airport (ORF) serves the Greater Hampton Roads area and northeastern North Carolina. ORF currently has two runways, a main instrument runway (5-23) which is 9,001' long, and a crosswind runway (14-32) which is 4,875' long. ORF offers on average 353 arrivals and departures daily to major cities throughout the United States. During calendar year 2010, ORF conducted 93,298 air movements and is currently ranked third in Virginia in terms of passengers served annually. ORF is owned and operated by the Norfolk Airport Authority (NAA) (Steven Sterling 2011, personal consultation). Norfolk International Airport (ORF) lies on 1,300 acres and is surrounded on three sides by water from Lake Whitehurst and Denny's Canal. The Norfolk Botanical Gardens is adjacent to ORF on the west-northwest side of the airfield. Due north lies Little Creek Amphibious Base and beyond that, approximately 2 miles is the Chesapeake Bay. The east side of the airfield is bordered by industrial parks and a small residential community. Southeast, lies the Lake Wright Golf Course and due south is Interstate 64.

## **4.0 METHODS**

Data collection for the WHA began on August 1, 2010 and continued through July 31, 2011. Bird survey procedures were based on the North American Breeding Bird Survey methodology. Surveys were conducted twice per month for 12 months at 12 observation points in the AOA and 5 observation points outside of the AOA (17 total observation points). The beginning observation point for each survey was randomly selected, with 2 repetitions of the survey route per day (1/2 hour after sunrise and 2-3 hours prior to dusk). Birds were observed for 3 minutes at each point, with approximately ¼ mile distance between points. At each observation point, the following data were recorded: weather, temperature, time, location, species, number observed, activity (behavior), habitat type, direction of flight, and comments on any other significant information (i.e., freshly mowed grass, approaching weather, etc...). A map overlain with a 750-foot grid system was used to record location. Bird species were located without the aid of binoculars, though binoculars were used to identify species that could not be readily identified with the naked eye or in low light conditions. Alpha species codes from the North American Bird Banding Manual were used to record birds observed during surveys.

In addition to bird surveys, 12 night-time mammal surveys were conducted in the AOA over the course of the study period. Beginning 1 hour after sunset, night surveys were conducted by driving around the perimeter of the AOA and using spotlights and forward looking infra-red (FLIR) equipment to observe wildlife use of the AOA. Information recorded included: weather, temperature, time, location, species, number observed, activity, and habitat type.

Data were analyzed with descriptive statistics and frequency distributions per month using the Wildlife Hazard Management Information System (WHMIS) software developed by WS to determine trends in species abundance, habitat use, and behavior. For analysis purposes, common species were categorized into groups or guilds. Species were placed into their respective guilds based on similar behavioral characteristics, not taxonomic relationships (although guilds often parallel taxonomic lines). This approach was selected because behavioral attributes play a significant role in predisposing some species of wildlife to collisions with aircraft. In addition, wildlife control strategies are often selected based on their ability to exploit an animal's specific behavior(s), therefore species that exhibit similar behaviors and life history attributes generally require similar control methods.

## **5.0 RESULTS**

### **5.1 Wildlife/Aircraft Strikes**

Bird Strike Committee Canada (Transport Canada 1992) developed a wildlife strike definition that has since been adopted by the FAA, International Civil Aviation Organization (ICO), Bird Strike Committee USA, Bird Strike Committee Europe, and the U.S. Air Force. Under this definition, a wildlife strike is considered to have occurred if:

1. A pilot reports a strike.
2. Aircraft maintenance personnel identify damage as having been caused by a bird or mammal strike.

3. Personnel on the ground report seeing an aircraft strike one or more birds or mammals.
4. Birds or mammal remains, in whole or part, are found on any airside pavement area or within 200 feet of a runway. The only exception would be if another reason for the bird's or mammal's death is identified.

Since its inception in 1990, the number of reported strikes submitted to the National Wildlife Strike Database have increased five-fold. However, the number of damaging strikes reported has declined by 20 percent (Dolbeer et al. 2009). This is a significant accomplishment that can be attributed to the wildlife mitigation program that many certificated airports have employed over the years. Wildlife strike data provide valuable information on wildlife hazards at airports, including the species and number struck, seasonality, time of day, location at airport, and damage. Strikes reported at ORF over the period of 1990 - 2009 indicated that gulls (38%), unknown birds (32%), geese (7%), sparrows (4%) and starlings (3%), combined accounted for 81% of all bird strikes (Table 2). Nationwide, these same birds accounted for 70% of all bird strikes for the same period (Dolbeer et al. 2009).

Wildlife strike data obtained for ORF from the wildlife strike database reported 482 wildlife strikes for the 21-year period. Forty-five of these strikes were reported as causing \$669,340 in damage by gulls, unknown birds, geese and raptors (Table 2). Of these damaging strikes, 30 were reported as minor damage and 15 as substantial damage. Minor damage is defined as the aircraft is airworthy with the completion of simple repairs. Substantial damage is defined as damage that adversely affects the aircraft's structural integrity, performance, or flight characteristics. This damage normally requires replacement or repairs of major aircraft components (Wright, 2011).

To put the number of wildlife strikes into perspective in comparison to the number of flights at an airport; strikes are reported by the number of strikes per 10,000 air movements (AM). In 2010, ORF reported 2.89 wildlife strikes per 10,000 AM, this is a 28% increase from the previous five year mean (2005-2009) of 2.26 strikes per 10,000 AM)(Table 1). Damaging strikes reported in 2010 (.43 strikes per 10,000 AM) increased by 115% from the same 5-year mean (.20 strikes per 10,000 AM)(Table 1).

Pilots and airport personnel are strongly encouraged to complete and submit the FAA Strike Report Form (FAA 5200-7) each time a collision with wildlife occurs or the remains of a dead animal is found on or within 200 feet of the runway. The FAA has a system for reporting strikes via the internet at the following address: <http://wildlife-mitigation.tc.faa.gov/wildlife/>. All wildlife remains that are found should be retained until a qualified individual can positively identify them. If the remains are unidentifiable, WS or the Smithsonian Institute (Division of Birds, NHBE-605 MRC 116, Washington, D.C. 20560) can provide positive identification.

Wildlife strikes for ORF are summarized in Tables 1 & 2. Table 1 shows the strikes by year and the reported dollar damage they caused. There were 482 wildlife strike incidents on record with various species during the period of 1990-2010. The largest group, gulls, made up 37% (n=173) followed by unknown birds 32% (n=145). The more information that can be obtained from these strikes, the more we will know about the wildlife present, and the more that can be done to alleviate the attraction that draws them there. Wildlife species exhibit vastly different behaviors and hazards, so knowledge of the species involved is essential for development of an effective strike abatement program. The data collected from known strikes also helps the aviation industry to develop more resistant and robust aircraft components.

**Table 1. Wildlife Strikes per 10,000 air movements (AM) at ORF, 1990-2010.**

<b>Year</b>	<b>Aircraft Movements (AM)</b>	<b># Strikes</b>	<b>Strikes per 10,000 AM</b>	<b>Damaging Strikes</b>	<b>Damaging Strikes per 10,000 AM</b>	<b># of Strikes with NEOF*</b>	<b>Reported Cost</b>
1990	122,962	20	1.63	0	0.00	16	
1991	121,343	40	3.30	2	0.16	36	
1992	125,622	21	1.67	1	0.08	19	
1993	119,309	18	1.51	1	0.08	16	\$80,358
1994	124,690	23	1.84	4	0.32	19	\$4,898
1995	140,865	29	2.06	5	0.35	24	
1996	158,805	28	1.76	0	0.00	27	
1997	139,061	14	1.01	2	0.14	12	\$362
1998	139,980	20	1.43	3	0.21	14	\$162,968
1999	136,979	15	1.10	2	0.15	13	\$281,272
2000	142,406	10	0.70	0	0.00	9	
2001	135,000	22	1.63	4	0.30	16	
2002	136,876	29	2.12	2	0.15	23	\$1,874
2003	139,138	14	1.01	2	0.14	11	
2004	156,550	20	1.28	1	0.06	18	
2005	122,641	20	1.63	5	0.41	14	\$35,141
2006	128,715	22	1.71	0	0.00	20	
2007	135,098	34	2.52	3	0.22	26	
2008	109,992	32	2.91	2	0.18	17	\$325
2009	94,670	24	2.54	2	0.21	14	\$79,554
2010	93,298	27	2.89	4	0.43	18	\$22,588
<b>Total</b>	<b>2,724,000</b>	<b>482</b>	<b>1.77</b>	<b>45</b>	<b>0.17</b>	<b>382</b>	<b>\$669,340</b>

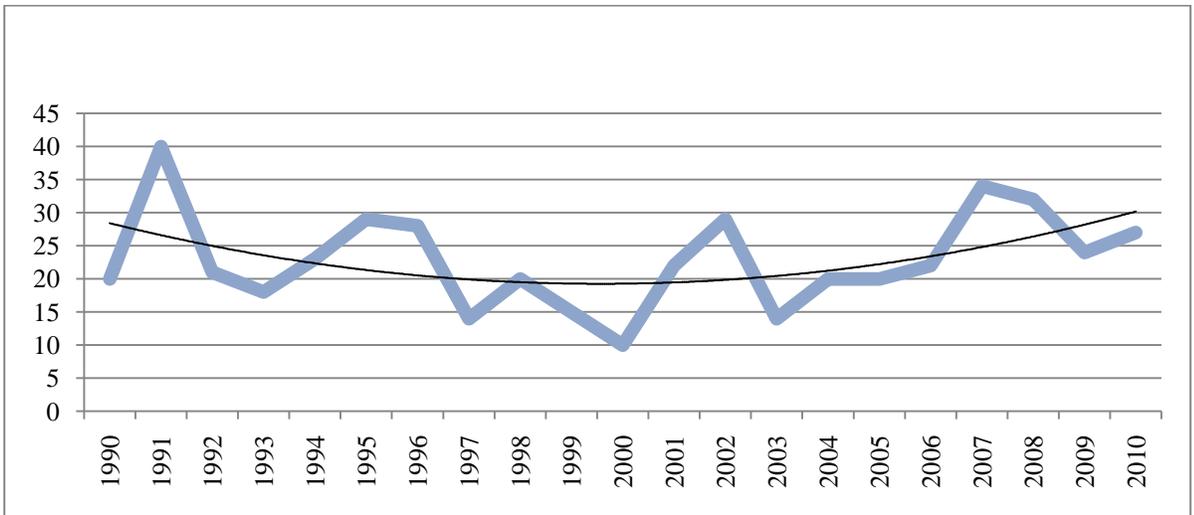
\*NEOF – no effect on flight

**Table 2. Guild composition comparison of wildlife strikes at ORF, 1990 – 2010.**

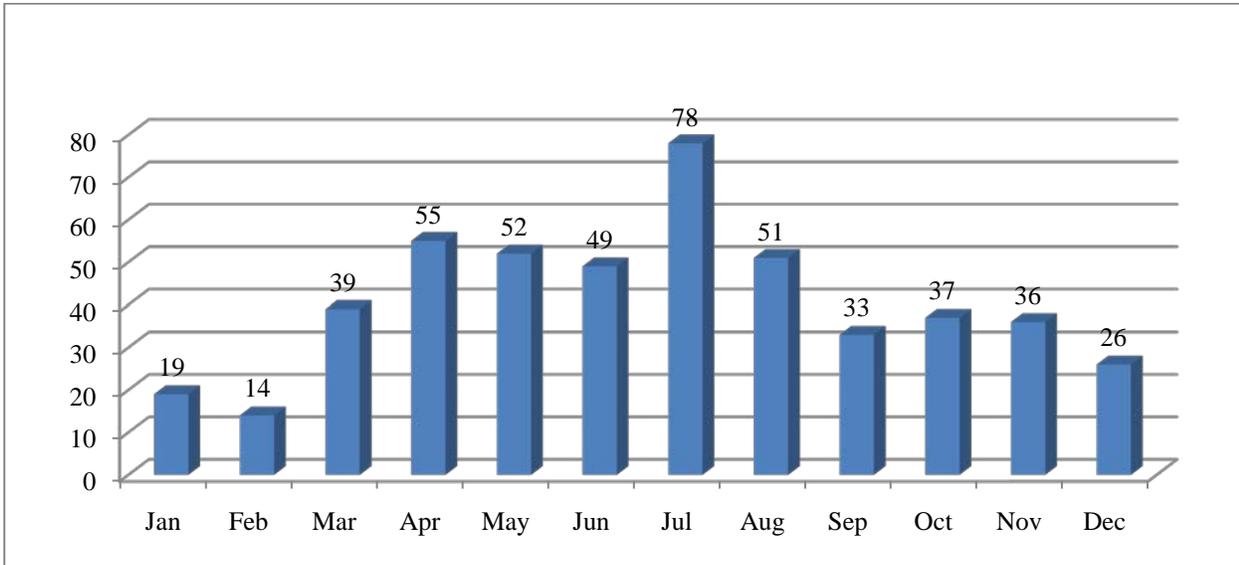
Guild	Number of strikes		Percent of total strikes		Number of damaging strikes		Percentage of damaging strikes	
	20-year total	2010	20-year total	2010	20-year total	2010	20-year total	2010
<b>Birds</b>	<b>450</b>	<b>27</b>	<b>98.9%</b>	<b>100.0%</b>	<b>41</b>	<b>4</b>	<b>100.0%</b>	<b>100.0%</b>
Gulls	155	1	34.1%	3.7%	12	1	29.3%	25.0%
Unknown bird - medium	70	6	15.4%	22.2%	3		7.3%	
Unknown bird - small	64	6	14.1%	22.2%	2		4.9%	
Canada Goose	29	1	6.4%	3.7%	5		12.2%	
Sparrows	16		3.5%					
European Starling	15	1	3.3%	3.7%	1		2.4%	
Hawks	10		2.2%		4		9.8%	
Unknown bird - large	9		2.0%		7		17.1%	
Mourning Dove	8	2	1.8%	7.4%				
Laughing Gull	8		1.8%		1		2.4%	
Rock Pigeon	7		1.5%					
Ring-billed Gull	7	1	1.5%	3.7%	1		2.4%	
Osprey	7	1	1.5%	3.7%		1		25.0%
Blackbirds	7	2	1.5%	7.4%		1		25.0%
American Kestrel	7	2	1.5%	7.4%				
Ducks	6		1.3%					
Great Blue Heron	3		0.7%		2		4.9%	
Barn Swallow	3	3	0.7%	11.1%				
Unknown bird or bat	2		0.4%					
Hérons	2		0.4%					
Crows	2		0.4%					
Bald Eagle	2		0.4%		1		2.4%	
Common Loon	0	1	0.0%	3.7%		1		25.0%
Whimbrel	1		0.2%					
Plovers	1		0.2%					
Mallards	1		0.2%					
Herring Gull	1		0.2%					
Hermit Thrush	1		0.2%					
Geese	1		0.2%		1		2.4%	

**Table 2. Guild composition comparison of wildlife strikes at ORF, 1990 – 2010, cont..**

Guild	Number of strikes		Percent of total strikes		Number of damaging strikes		Percentage of damaging strikes	
	20-year total	2010	20-year total	2010	20-year total	2010	20-year total	2010
Double-crested Cormorant	1		0.2%		1		2.4%	
Common Grackle	1		0.2%					
Brown-headed Cowbird	1		0.2%					
Brown Pelican	1		0.2%					
American Robin	1		0.2%					
<b>Mammals</b>	<b>5</b>		<b>1.1%</b>					
Foxes	2		0.4%					
Raccoon	1		0.2%					
Bats	1		0.2%					
<b>Reptiles</b>	<b>1</b>		<b>0.2%</b>					
Turtles	1		0.2%					
<b>Grand Total</b>	<b>455</b>	<b>27</b>			<b>41</b>	<b>4</b>		

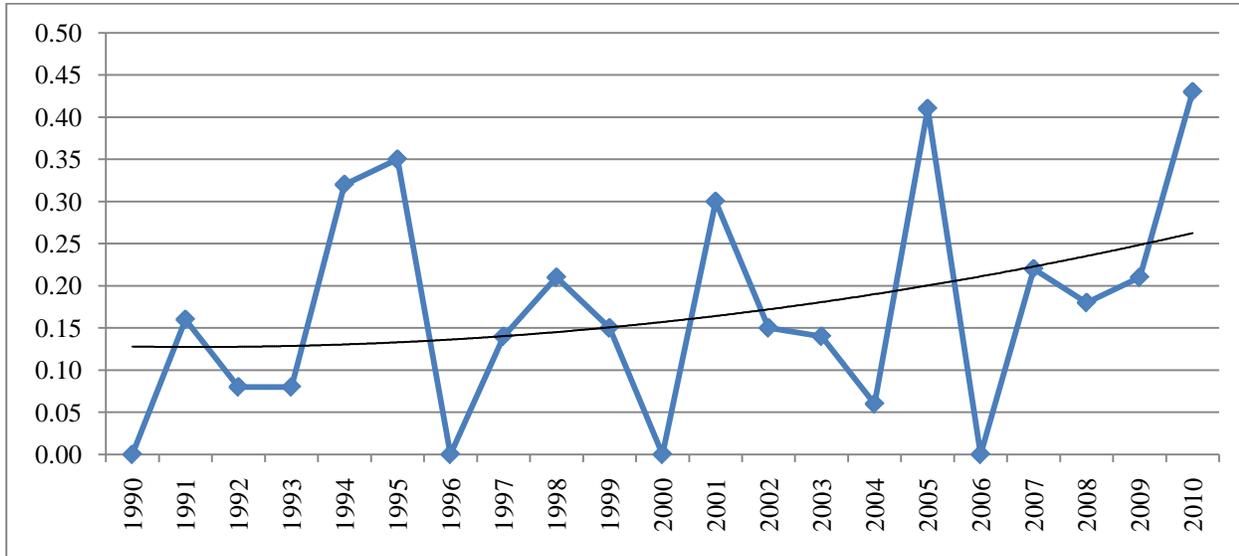


**Figure 1. Reported number of wildlife strikes at ORF by year, 1990-2010**



**Figure 2. Number of strikes reported at ORF by month, 1990-2010**

Figure 2 displays the total wildlife strikes reported by month from 1990 through June 2010. The figure follows the general bird activity for SE Virginia. For the most part, as bird activity fluctuates throughout the year, the strike numbers correspond. In January and February, bird activity is relatively low throughout the 21- year period. The reason is that most migrants are wintering further south. Birds generally observed in Virginia are either nonmigrant's or northern birds that winter in Virginia. As the spring bird migration begins in March, the number of birds moving through the area increases exponentially. This pattern is also shown in the reported strikes. As the migration tapers off in April, the Virginia breeding bird population remains active while they establish nest sites and begin incubation. However, every year during this same time, there are also nonbreeding birds that remain active feeding or competing for territories. May through June, the adult pairs become more active feeding their young. The July spike can be explained by the newly fledged sub-adult birds learning to fly. A majority of these strikes are likely juvenile or first-year birds. From August through early October, bird activity drops off slightly as birds increase feeding to build up fat reserves for the upcoming migration in late September through early November. Late November through December, wintering waterfowl (geese, ducks) and cormorants are a majority of the remaining birds and they are active pursuing winter feeding grounds, open water and avoiding the pressures of hunting.



**Figure 3. Damaging Strikes per 10,000 AM reported at ORF, 1990-2010**

## 5.2 Wildlife Surveys

### Birds

From August 2010 through July 2011, WS recorded 30,070 bird observations at ORF during bird surveys. Forty-nine bird species representing 17 different bird guilds were observed throughout the study year (a complete table listing each guild and species observed throughout the study year can be found in Appendix G). The 5 most abundant guilds were Starlings (11,118), Blackbirds (9,994), Gulls (3,070), Crows/jays (2,616) and Cormorants (1,084). The 10 most abundant species observed are listed below<sup>1</sup>:

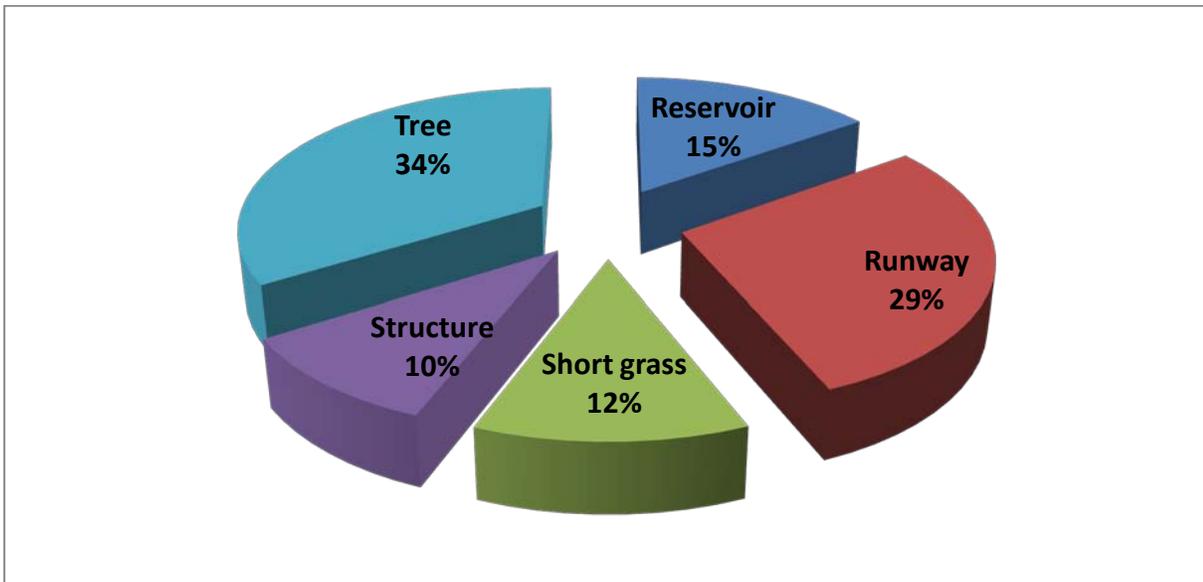
- 1.) European Starling (*Sturnus vulgaris*) = 11,118
- 2.) Common Grackle (*Quiscalus quiscula*)=8,120
- 3.) American Crow (*Corvus brachyrhincos*) = 2,616
- 4.) Ring-billed Gull (*Larus delawarensis*)= 1,884
- 5.) Red-winged Blackbird (*Agelaius phoeniceus*) = 1,371
- 6.) Canada Goose (*Branta canadensis*) = 581
- 7.) Laughing Gull (*Larus atricilla*)= 462
- 8.) Barn Swallow (*Hirundo rustica*)= 263
- 9.) Great Black-backed Gull (*Larus marinus*)= 206
- 10.) Mallards (*Anas platyrhincos*) = 173

Birds were observed in 5 different habitat types during surveys at ORF. Birds were most commonly observed utilizing the areas on or around trees inside the AOA (34%) (Figure 3). Runways were the next most commonly used habitat (29%), followed by ponds and reservoir

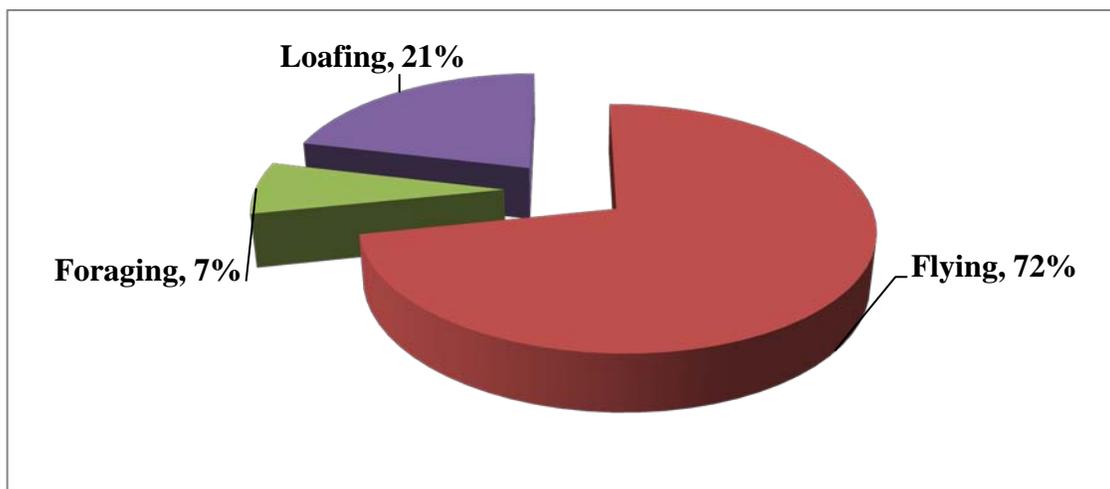
<sup>1</sup> Total abundance is derived by summing all bird observations throughout the study year. Therefore, the total number of bird observations includes individuals that may have been present in the AOA day after day and were recorded on multiple occasions.

(15%), which surrounds the vast majority of ORF, followed by short grass (12%), and structures (10%) such as towers, fences, and buildings where birds were often observed loafing.

Bird activity was classified into 3 categories: Foraging (actively pursuing food on the ground or in the air); flying (locally short, random flights, passing in a continuous path beyond the survey area); loafing (staying in one area for a length of time without engaging in another activity). Flying (72) and loafing (21%) were the most commonly observed activities for all species during the study year (Figure 4).



**Figure 4. Habitat use by birds at ORF, August 2010 through July 2011**



**Figure 5. Bird activity at ORF, August 2010 through July 2011**

### **Mammals**

WS completed 12 night surveys of the AOA. Only 28 mammals were observed during night surveys throughout the study year, with Eastern cottontails (*Sylvilagus floridanus*) being the most

frequently observed species. There were 5 red fox (*Vulpes vulpes*)(observed during night surveys. Most mammal species were observed foraging in the short grass areas of the AOA, or in short grass immediately adjacent to woodland habitat (Table 3).

**Table 3. Mammal species by habitat observed during nighttime surveys at ORF, August 2010 - July 2011.**

Species / Habitat	Short Grass	Woodland	Total
Eastern Cottontail	16	0	16
Red Fox	5	0	5
Opossum	2	0	2
Raccoon	2	0	2
Unknown Mammal	1	1	2
Feral Cat	0	1	1
<b>Total</b>	<b>26</b>	<b>2</b>	<b>28</b>

## 5.0 DISCUSSION

Although almost all wildlife species commonly found at airports can pose some hazard to aircraft safety, not all species are equally hazardous to aviation (Dolbeer and Wright 2009). For example, bird species such as Canada Geese are more likely to cause damage if struck by aircraft than species the size of a sparrow. Utilizing the FAA wildlife strike database, Dolbeer and Wright (2009) developed a ranking of 89 wildlife species that pose the greatest threats to aircraft safety. The ranking was based on the percentage of strikes causing damage to aircraft from 1990 through 2007, and species were classified into 6 hazard severity levels ranging from extremely high (>40% of strikes causing damage) to very low (<1% of strikes causing damage). Combined with wildlife surveys conducted locally at an airport, this hazard ranking list can be used to prioritize management actions to species posing the greatest risk to aircraft safety (Dolbeer and Wright 2009).

Though there were 49 species observed from 19 different guilds (17 bird guilds and 2 mammal guilds) through the study year (Appendix G), for this discussion emphasis will be placed on those guilds that pose the greatest threats to aviation safety at ORF. For this analysis, Dolbeer and Wright’s hazard ranking list was compared with total species abundance from wildlife surveys conducted at ORF, records from the FAA wildlife strike database, and control efforts recorded by both WS and ORF personnel from August 2010 through July 2011. Using this information, guilds were ranked in order of the threat level that they pose to aviation safety at ORF from the most severe to the least severe. This comparison helps to show that the most abundant species at an airport (European Starlings, in this case) are not necessarily the most hazardous to aircraft safety due to abundance alone. The 7 guilds identified as most hazardous to aircraft safety at ORF from August 2010 through July 2011 were Waterfowl, Raptors, Cormorants, Pelicans, Waders, Gulls, and Crows/Jays (Table 4). There were 6 species observed at ORF that rank as an extremely high hazard to aviation safety, 3 as very high, and 8 as a high hazard (Table 4). The following discussion and management recommendations will focus on the 7 most hazardous guilds listed in Table 4. However, most if not all of the management recommendations (habitat modification, dispersal methods, etc.) will be effective for managing the majority of species observed at ORF.

**Table 4. Guild hazard ranking and total observations at ORF, August 2010 through July 2011.**

<b>Guild</b>	<b>Species</b>	<b>Hazard Level and percentage of Strikes causing damage in the U.S.</b>	<b>Total Observed at ORF</b>	<b>Reported strikes at ORF 1990-2010</b>	<b>Strikes at ORF causing damage , 1990-2010</b>
Raptors	Turkey Vulture	Extremely High (51%)	7	0	0
	Bald Eagle	Extremely High (42%)	7	2	1
	Osprey	Very High (22%)	53	8	1
	Red-tailed Hawk	High (16%)	7	0	0
	American Kestrel	Very Low (<1%)	35	9	0
	Northern Harrier	Low (3%)	4	0	0
Waterfowl	Canada Goose	Extremely High (51%)	581	30	5
	Mallards	Very High (26%)	173	1	0
	Gadwall	n/a (27%)	37	0	0
	Hooded Merganser	n/a (40%)	120	0	0
	Pied-billed Grebe	n/a	26	0	0
	Ring-necked Duck	n/a (50%)	16	0	0
Cormorants	Double-crested Cormorant	Extremely High (38%)	1084	1	1
Pelicans	Brown Pelican	Extremely High (46%)	6	1	0
Waders	Great blue heron	Very High (22%)	88	3	2
	Great Egret	High (18%)	97	0	0
	Green Heron	n/a	7	0	0
Gulls	Great Black-back	High (10%)	206	0	0
	Herring Gull	High (11%)	56	1	0
	Ring-billed Gull	High (10%)	1884	8	1
	Laughing Gull	Moderate (7%)	462	8	1
Crows/jays	American Crow	High (8%)	2616	0	0

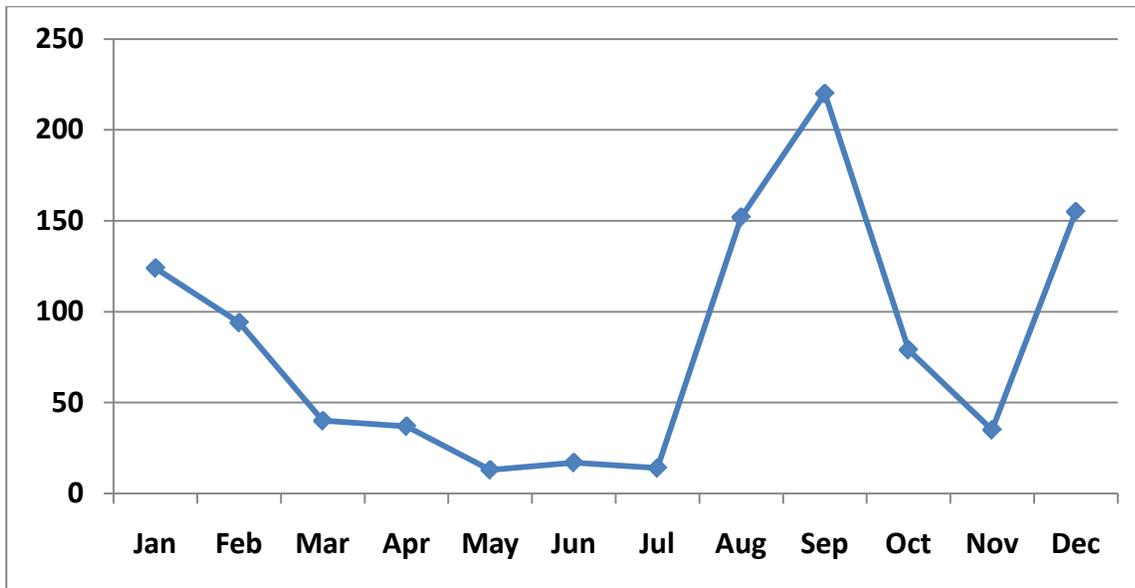
## 6.1 Waterfowl

Waterfowl can be particularly hazardous to aircraft due to their larger body size and flocking behavior. In particular, Canada Geese have been responsible for some of the more serious wildlife strikes. In addition to the more recent “Miracle on the Hudson” event (see Section 1.1), 24 airmen were killed in 1995 when an Air Force AWACS aircraft crashed at Elmendorf Air Force Base in Alaska after striking a flock of Canada Geese (Wright 2011). From 1990 through 2009, waterfowl have been responsible for the greatest number of damaging strikes in the United States (n=1,503), resulting in over \$144 million in losses (Dolbeer et al. 2011).

### General Abundance

Waterfowl were the sixth most abundant guild observed at ORF from August 2010 through July 2011 (Appendix G), though waterfowl shared its rank with raptors as the most hazardous guilds to aircraft safety at ORF (Table 4). Canada Geese were the most commonly observed species in the waterfowl guild, followed by Mallards, both of which are ranked as a very serious threat to aviation safety (Table 4). These two species accounted for 77% of all observations in the

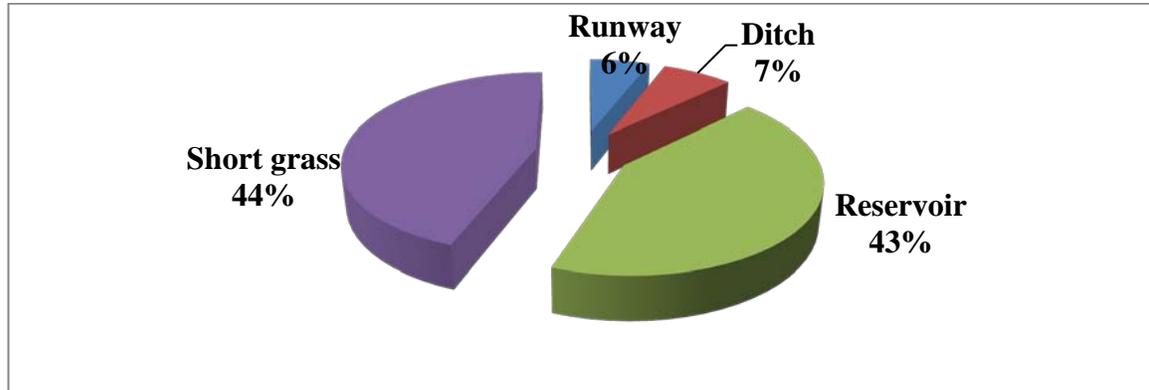
Waterfowl guild. There were two major spikes in numbers of waterfowl observed. The spike that occurred in August through October 2011 (Figure 5), represents an increase of Canada geese that had recovered from their annual molt and brought their recent fledglings with them to the Lake Whitehurst Reservoir. An additional spike occurred December 2010 through February 2011 (Figure 5). This spike represents the use of the reservoir as an overwintering site for Canada geese. The significance of this trend is that these geese were observed flying over the approach end of Runway 23 every evening at sunset.



**Figure 6. Waterfowl observations per month at ORF, August 2010 - July 2011**

### **Attractants**

Waterfowl are attracted to ORF and the surrounding area by several habitat features. ORF is bordered on the west, north, and northwest by a freshwater reservoir. To the southeast there are four small ponds inside the AOA. To the south and to the east, within the two mile critical zone, there are three additional freshwater reservoirs. The vast amounts of differing water bodies surrounding ORF provide prime feeding, nesting, and loafing habitat for waterfowl. Large flocks of Canada Geese were observed frequently flying through ORF's airspace and approach paths at altitudes conducive to strikes (especially during fall/winter months) as well as feeding in the grassy areas around the airfield. The majority of observations were in the reservoir (Lake Whitehurst) and ponds on or near the airfield.



**Figure 7. Waterfowl habitat use at ORF, August 2010 - July 2011**

### **Management Recommendations**

Canada Geese should be considered the greatest wildlife threat to aviation safety at ORF. Nationally, Canada Geese are ranked as an extremely high hazard to aviation safety, as 51% of aircraft strikes with geese resulted in damage from 1990 through 2007 (Dolbeer and Wright 2009). By comparison, Mallards are ranked as a very high hazard to aviation safety, but the damaging strike rate for Mallards is about half that of Canada Geese (Dolbeer and Wright 2009). Since 1990, ORF has reported 30 strikes involving Canada Geese and 7 ducks/Mallards at ORF, with 5 goose strikes resulting in damage (Table 2).

Whenever and wherever possible, areas of standing water in the AOA should be eliminated by improving drainage, grading, or filling in low areas. Inside the AOA at ORF, there are four small ponds to the southeast that have been very attractive to Hooded Mergansers, Gadwall Ducks, and Mallards. Removal of these ponds would eliminate a major attraction for waterfowl. If removal of these ponds is not feasible, removal of all surrounding trees and vegetation would ease dispersal efforts by wildlife personnel. One of these ponds, with trees nearby, has been used by Bald Eagles and Red-tailed Hawks as an area for preying on waterfowl. Removal of this pond and/or trees would make this area less attractive to these raptors hunting waterfowl.

Vegetation management can be an important component of managing for Canada Geese. Generally, it is recommended that airports maintain grass at an intermediate height in the AOA (between 6 and 10 inches). It has long been thought that tall vegetation management in the AOA would deter Canada Geese since they often prefer to forage in areas of short grass, though there is limited scientific data on how Canada Geese react to tall vegetation management and studies have often produced conflicting results (Seamans et al. 2007, Barras and Seamans 2002, Washburn et al. 2007). Though more research is needed, studies suggests that a promising method of reducing Canada Goose use of airfields is to use an endophyte-infected variety of tall fescue when re-seeding areas of an airport disturbed by construction or renovation (Washburn et al. 2007). Research suggests that when consumed by wildlife, tall fescue produces a variety of adverse effects (taste aversion, physical distress) and is generally avoided (Washburn et al. 2007). When re-seeding areas of the airport, ORF (and contractors utilized by the airport) should consider planting tall fescue and avoid grass mixtures containing millet and other palatable grasses so as not to provide a preferred food source for geese.

ORF should adopt and maintain a “zero tolerance” (disperse or lethally remove) policy towards waterfowl in and adjacent to the AOA, especially Canada Geese. Waterfowl species should be aggressively harassed to disperse them from the area. Harassment methods may include the use of pyrotechnics, horns, sirens, paintball guns, and chasing with vehicles. ORF should maintain its current migratory bird depredation permit from the USFWS to allow lethal take of waterfowl species that do not respond to harassment. Canada Geese may also be taken under the Control Order at Airports and Military Airfields (50 CFR §21.49), which allows take of Canada Geese on airport properties and other properties within a 3-mile radius of the airfield (with permission of the landowner) from April 1 to September 15.

In order to further reduce threats from Canada Geese, ORF has expanded control efforts beyond the AOA to properties that provide attractive sources of food and cover, such as Lake Whitehurst and Norfolk Botanical Gardens. ORF should maintain cooperative relationships with these properties and continue to actively seek other areas within 3 miles of the airport where Canada Geese may pose a threat to aviation safety. A study conducted in New York by Seamans et al. (2009) indicated that resident Canada Geese remained within 3 miles (5 km) of their primary feeding and loafing areas around JFK International Airport, and this trend seems to be reflected in the areas around ORF. The WS program in NY reported that goose numbers at Rikers Island decreased annually after removal efforts from 2004 through 2007, and subsequently goose strikes at nearby LaGuardia Airport decreased by 80% (Seamans et al. 2009).

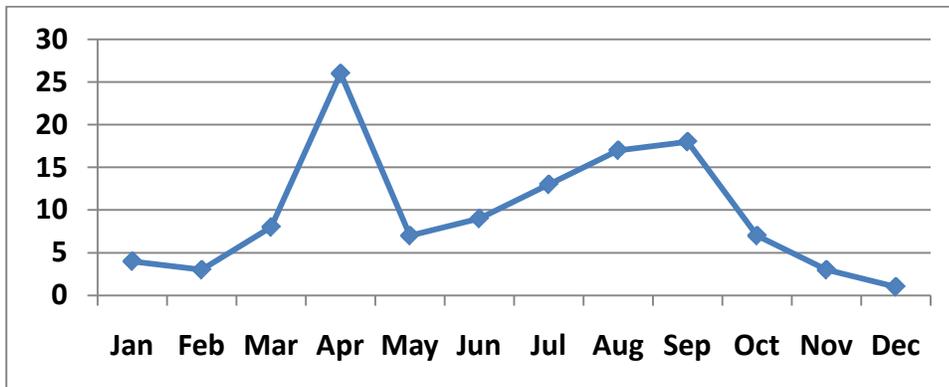
## **6.2 Raptors**

Raptors (birds of prey) pose serious threats to aviation safety due to the larger size of many species and their flight behaviors. Some raptors may soar high over the AOA (eagles, vultures), while others may fly slowly close to the ground while hunting (harriers). From 1990 through 2009, raptors have been involved in 925 damaging wildlife strikes in the United States, resulting in almost \$56 million in damages (Dolbeer et al. 2011). Since 1990, there have been 24 reported strikes involving raptors at ORF, with 5 resulting in damage (Table 2).

### **General Abundance**

While raptors were the eleventh most abundant guild observed at ORF from August 2010 through July 2011 with 116 observations (Appendix G), Two species observed at ORF in the raptor guild pose an extremely high risk to aviation safety (Table 4), making raptors the third most hazardous guild to aircraft safety at ORF (Table 4). As shown in Table 4, Ospreys (*Pandion haliaetus*) were the most commonly observed species in the raptor guild, followed by American Kestrels (*Falco sparverius*), Bald Eagles (*Haliaeetus leucocephalus*), Red-tailed Hawks (*Buteo jamaicensis*), Turkey Vultures (*Cathartes aura*), Northern Harriers (*Circus cyaneus*) and Sharp-shinned Hawks (*Accipiter striatus*). Raptors were observed on or near five different habitat types (Figure 8). Bald Eagles were most often observed on or flying over the runway or in trees (Appendix C. Picture 9 and 10). Ospreys were most often observed over the reservoir or small ponds inside the AOA. Red-tailed Hawks and Sharp-shinned Hawks were frequently observed in trees inside the AOA. A majority of American Kestrel observations were loafing on the perimeter fence, flying over short grass, or the runway. There were two significant peaks in observations of raptors observed from August 2010 through July 2011 (Figure 7). The first peak between March and April 2011 is

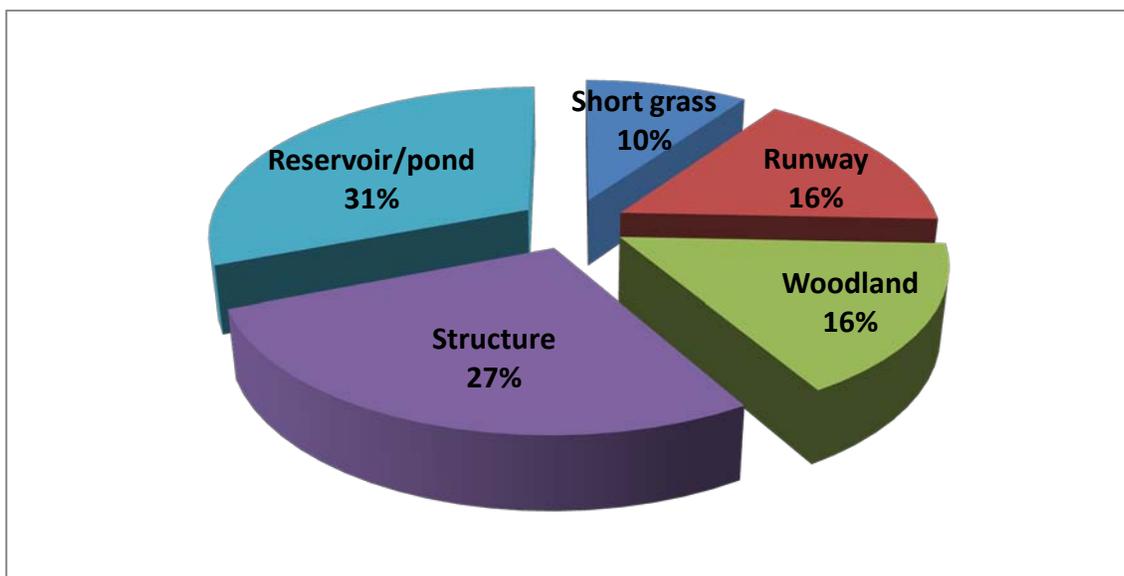
indicative of the migration and breeding activity. The rise in June can be contributed to adult feeding and teaching their young. The second peak in numbers observed in August and September (figure7) is likely the increased presence of recently fledged Raptors using the AOA as a feeding ground.



**Figure 8. Raptor observations per month at ORF, August 2010 - July 2011**

**Attractants**

Raptors are attracted to the AOA at ORF by several features. Raptors find abundant prey (e.g., meadow voles, field mice, Eastern cottontail, fish, etc.) in the open grass, woodlands inside the AOA, and Lake Whitehurst. There are numerous tall trees inside the AOA that are used as perching sites. In particular, there is a woodland area in the southeastern section, adjacent to a pond, which was commonly used as a perching site by Red-tailed Hawks and Bald Eagles.



**Figure 9. Raptor habitat use at ORF, August 2010 - July 2011**

**Management Recommendations**

To reduce the likelihood of aircraft strikes involving raptors, Blackwell and Wright (2006) suggested that management efforts in the AOA should be directed towards the availability of food

and alteration of habitats used by raptors. The reduction of food sources such as rodents and carrion in the AOA is critical to controlling foraging by Red-tailed Hawks and vultures (Blackwell and Wright 2006). Reducing the number of small mammals in the AOA may be accomplished by a variety of methods, including trapping, shooting, or the use of rodenticides. Any animal carcasses found in or around the AOA should be removed and disposed of promptly to avoid attracting vultures.

Research has shown that small mammals use unmanaged areas of tall vegetation far more than disturbed areas (Barras and Seamans 2002, Blackwell and Wright 2006, Washburn and Seamans 2007), so frequent mowing can help to reduce small mammal abundance at airports (Barras and Seamans 2002), thereby reducing the availability of food for raptors. When possible, reducing the availability of locations where raptors may perch, roost, loaf, or nest is recommended. As such, ORF should consider the removal of trees and other perch sites in the AOA (such as old utility poles).

Raptor species should be harassed from the AOA whenever present using methods such as vehicles, horns, and pyrotechnics. Vultures commonly soar high above the AOA, making them difficult to disperse using 15mm pyrotechnics, given their limited range. Devices with much greater range (such as CAPA rounds or 12-gauge cracker shells) may be more useful for dispersing vultures. Lethal removal of some raptors may be necessary for persistent individuals, and as such the airport's depredation permit must be kept current to allow take of raptors. Lethal removal may include methods such as shooting or trapping. All vultures entering or departing roost sites may exhibit towering behavior that can be hazardous to aircraft. Vulture roost in close proximity to the airport, especially in the approach area, should be identified and dispersed.

Though recently removed from the federal endangered species list, Bald Eagles are protected under the Bald and Golden Eagle Protection Act and are considered a state threatened species. A permit is required to simply harass eagles from the AOA. Eagles are becoming more abundant in the area around ORF and observations by airport and WS personnel have increased in recent years. Since 1997, Bald Eagle strikes have been increasing; in Virginia alone, 14 eagle strikes have been reported, four of these at ORF and two during this assessment period. This past year ORF applied for and currently holds an Eagle Harassment Permit. This permit allows for harassment only, not the lethal take of these birds.

### **6.3 Cormorants**

The hazard rating (Dolbeer and Wright 2009) for the Double-crested Cormorant is considered extremely high. On February 2, 2009, Wisconsin Air Flight #3597 struck a Double-crested Cormorant (*Phalacrocorax auritus*) at ORF causing \$52,707.00 in damages to the aircraft prompting the FAA to require that a wildlife hazard evaluation is performed (Appendix B). This site visit resulted in the FAA requiring a yearlong Wildlife Hazard Assessment (Appendix C). Since 1990, there has been 1 reported strike involving Double-crested Cormorants at ORF which resulted in damage (Table 2).

### General Abundance

Cormorants were the fifth most abundant guild (Appendix G), and one of the greatest aircraft hazards at ORF. They were present throughout most of the year, with the largest numbers observed in December (Figure 9). Throughout the year, Cormorants were frequently observed flying over runways and foraging in the Lake Whitehurst Reservoir, small ponds inside of the AOA and Denny’s Canal.

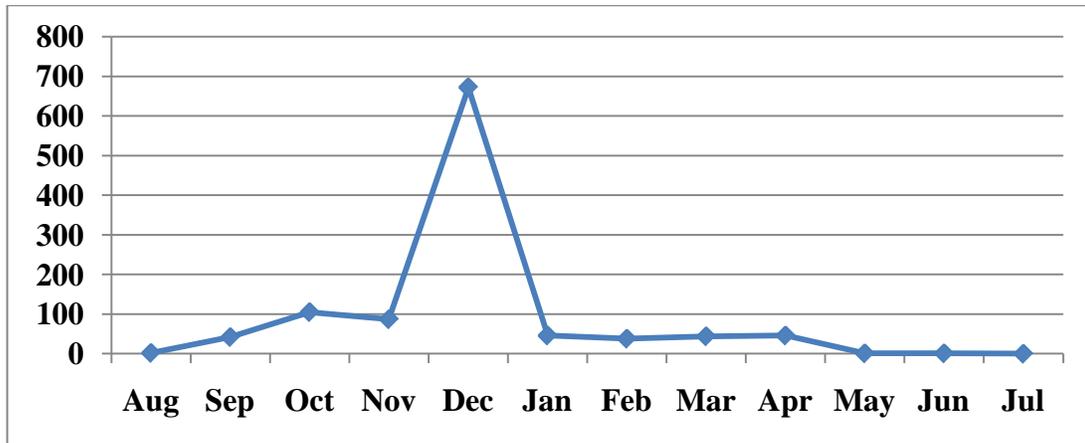


Figure 10. Cormorant observations per month at ORF, August 2010 - July 2011

### Attractants

By far the most significant attractant for cormorants at ORF from August 2010 through July 2011 was the vast amount of water (Figure 10) surrounding ORF, as well as the close proximity to the Chesapeake Bay. The remaining birds were observed flying over woodlands and runways (Figure 11).

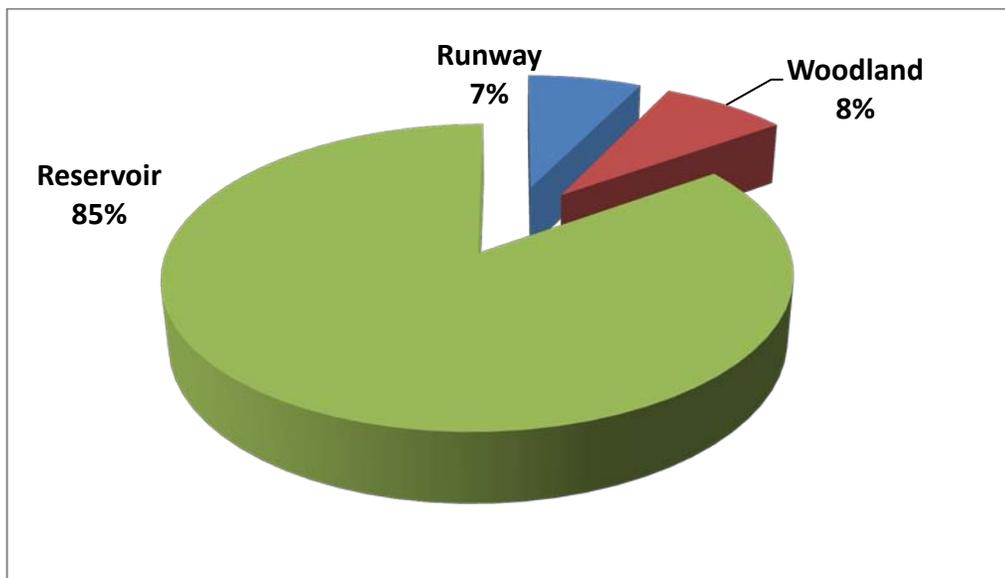


Figure 11. Cormorant habitat use at ORF, August 2010 - July 2011

### Management Recommendations

The effective harassment of Double-crested Cormorants in the reservoir during the winter months will be the most efficient way to reduce the extremely high abundance of activity during that time of year. Constant harassment on a daily basis around small ponds inside the AOA and Denny’s Canal by wildlife personnel would be needed to reduce the threat to aviation caused by Double-crested Cormorants in all of these locations.

### 6.4 Gulls

From 1990 through 2009, gulls were the most frequently struck bird group in the United States (for strikes where the species was identified), with 24% of the 7,894 reported strikes resulting in damage (Dolbeer et al. 2011). Gulls are hazardous because of their tendency to form large flocks, large body size, flight characteristics, and their foraging and loafing behaviors. Since 1990, there have been 173 reported strikes involving gulls at ORF, 15 resulted in damage. Gulls are struck at ORF over twice that of any other guild (Table 2).

#### General Abundance

Gulls were the third most abundant guild (Appendix G), and one of the greatest aircraft hazards at ORF. They were present throughout most of the year, with the largest concentrations observed in December (Figure 11). Their abundance on the reservoir also coincides with the spike in Double-crested Cormorants. Throughout the year, Gulls were frequently observed on runways, taxiways and ramps during and after periods of inclement weather, especially when rain, wind and/ or fog were present.

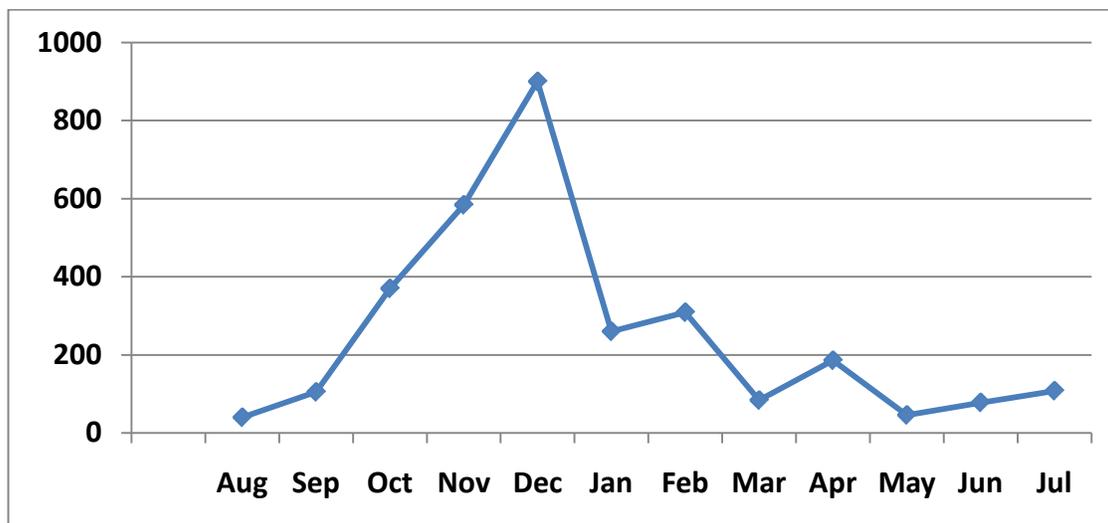
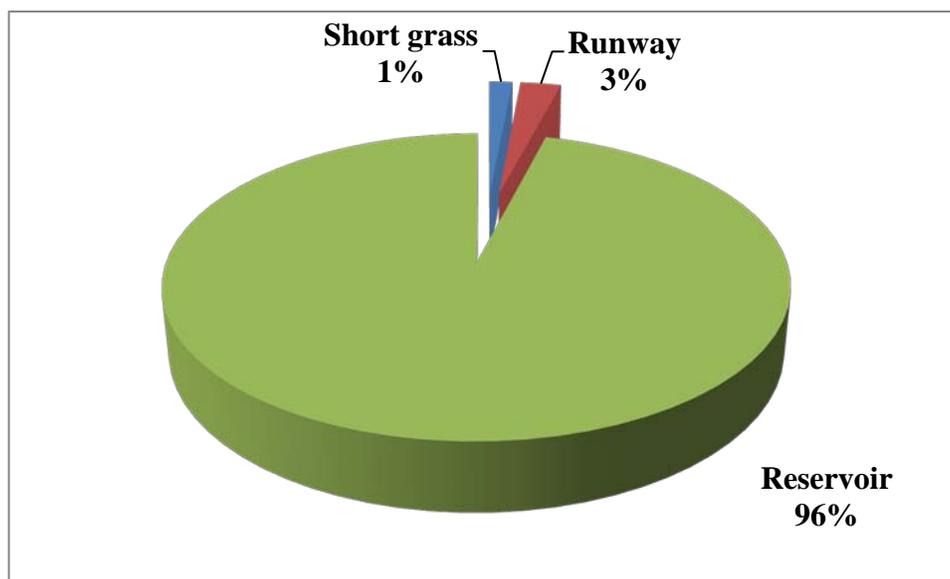


Figure 12. Gull observations per month at ORF, August 2010 - July 2011

## Attractants

The major attractant for gulls at ORF from August 2010 through July 2011 was the Lake Whitehurst Reservoir, accounting for 96% of observations (figure 13.). Another significant attractant, especially for Laughing Gulls, was beetle hatches in the short grass area at the approach end of runway 23 in June and July.



**Figure 13. Gull habitat use at ORF, August 2010 - July 2011**

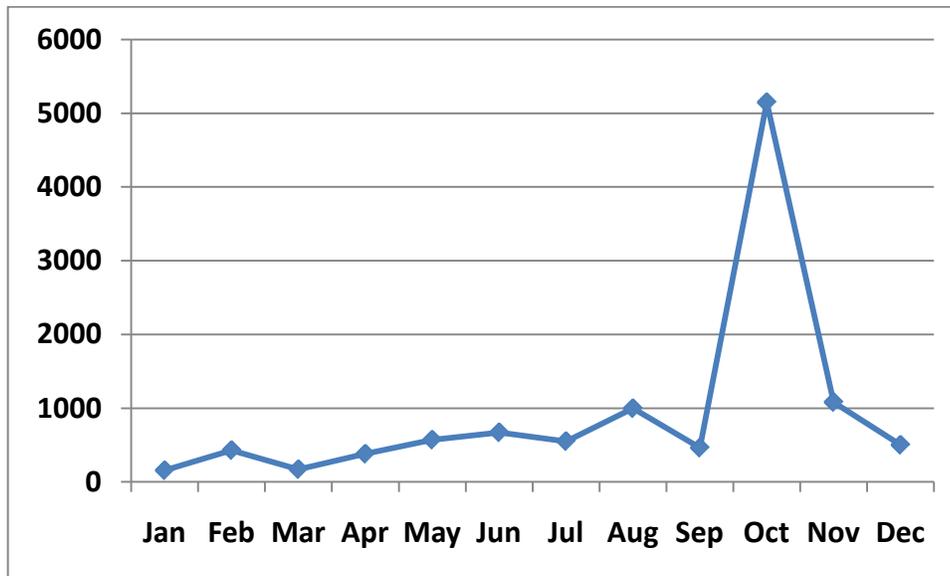
## Management Recommendations

Winter gull harassment over the reservoir will be the most effective and efficient way to reduce the extremely high abundance of gulls. Frequent sweeps by wildlife personnel, especially during and after inclement weather, is necessary to keep the AOA free of Ring-billed Gulls. Laughing Gulls foraging for beetles in June and July requires short periods of constant harassment supplemented by lethal control. If aggressive dispersal of Laughing Gulls during beetle hatches is not possible, the application of a beetle pesticides, such as Merit, to the beetle larvae in the infected area during spring or fall can be effective in preventing these hatches.

### 6.5 Starlings

From August 2010 through July 2011, starlings were the most abundant guild observed at ORF (Appendix G). Starlings were mostly observed flying locally over short grass areas, though during October, a significant peak in numbers was observed (Figure 14) flying over the approach end of Runway 23 at sunset. The greatest hazard to aviation posed by starlings is their tendency to form large, dense flocks that stay in almost continuous motion over short grass habitat. Since 1990, there have been 16 reported strikes involving starlings at ORF, 1 strike resulted in damage.

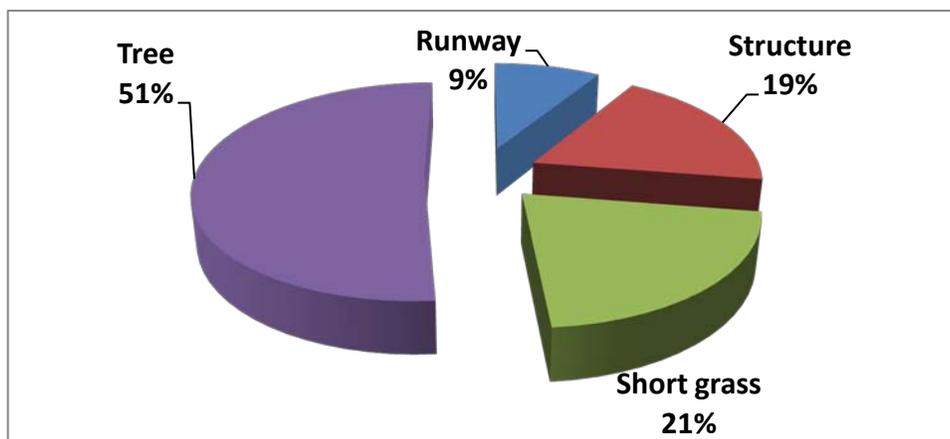
## General Abundance



**Figure 14. Starling observations per month at ORF, August 2010 - July 2011**

## Attractants

Starlings are attracted to the AOA for feeding in the large areas of open short grass where they find abundant forage such as seeds, earthworms, and insects. Another major attractant are the cavities or small openings in hangars, other buildings, and jetways which are utilized as nesting sites. The large stand of phragmites and small trees located on airport property, just outside and southeast of the approach end of Runway 23 of the AOA, was a heavily used roosting site for migrating starlings in October 2010.



**Figure 15. Starling habitat use at ORF, August 2010 - July 2011**

## Management Recommendations

The large stand of phragmites and small trees located on airport property, outside of the AOA to the southeast of the approach end of Runway 23 could be mowed or bush hogged once, each year, in June to prevent the roosting of thousands of starlings in this area for the duration of the migration season. Flocks of starlings foraging in grass inside the AOA may be dispersed by using pyrotechnics, sirens, horns, or recorded distress calls. Persistent starlings that are not easily dispersed should be removed lethally by shooting or trapping. Grass management can be important for controlling these species. Grass that is tall enough to produce a seed head provides a food source and effective cover for species such as starlings. Therefore the grass in the AOA should be maintained at the recommended height of 6 to 10 inches. Cavities in structures such as jetways, hangars, and buildings, commonly used by starlings for nesting, should be excluded by repairing any holes that allow birds to access these structures. Nest traps may also be used to reduce the population of starlings utilizing these structures.

### 6.6 Blackbirds

#### General Abundance

From August 2010 through July 2011, blackbirds were the second most abundant guild observed at ORF (Appendix G). The greatest hazard to aviation posed by blackbirds is their tendency to form large, dense flocks. During times of migrations, these large flocks can stretch for miles across the runway approach creating an almost continuous line. Sixty percent of blackbirds (Figure 16.) were observed flying over Runway 23 at sunset. Since 1990, there have been 11 reported strikes involving blackbirds at ORF, 1 strike resulted in damage.

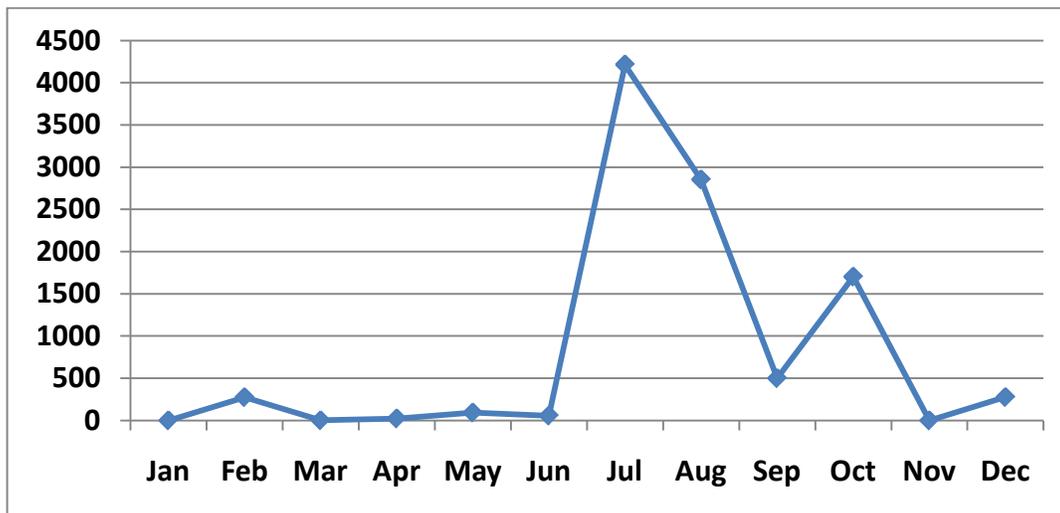
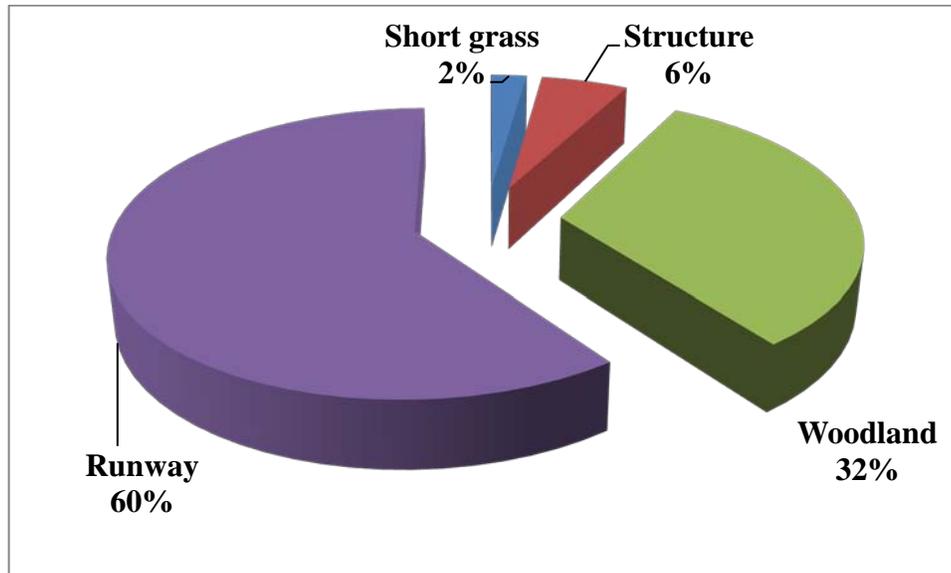


Figure 16. Blackbird observations per month at ORF, August 2010 - July 2011

#### Attractants

Blackbirds, including Red-winged Blackbirds, Common Grackles, and Brown-headed Cowbirds, were most abundant at ORF from July 2010 through October 2010 (Figure 16). The large stand of

phragmites and small trees located on airport property, outside of the AOA, was a heavily used roosting site for migrating blackbirds (Appendix C. pictures 5-9). Red-winged Blackbirds were observed in early spring nesting in small trees and shrubs along Denny’s Canal and the shoreline of Lake Whitehurst adjacent to the AOA fence.



**Figure 17. Blackbird habitat use at ORF, August 2010 - July 2011**

### **Management Recommendations**

The large stand of phragmites and small trees located on airport property, outside of the AOA to the southeast could be mowed or bush hogged once annually, in June to prevent the roosting of thousands of blackbirds in this area for the duration of the migration season. Red-winged Blackbirds can be prevented from nesting along Denny’s Canal and the shoreline of Lake Whitehurst adjacent to the AOA fence by diligent efforts to prevent trees and shrubs from reaching the size suitable for nesting from February through June.

### **6.7 Other Guilds**

Appendix G lists all guilds and species observed at ORF during wildlife surveys from August 2010 through July 2011. For all other guilds observed during wildlife surveys, many, if not all, of the management recommendations listed for waterfowl, raptors, gulls, cormorants, starlings, and blackbirds are applicable for reducing threats to aviation safety. Many species utilize the same habitats, so management for one species will likely affect another. As discussed earlier in this section, habitat management, exclusion and harassment/lethal removal are the three most important components for reducing the threat of wildlife strikes at ORF. Vegetation and water management will likely have the greatest impact for most bird species, while maintaining the perimeter fence will be most effective in reducing the presence of mammals and turtles from entering the AOA.

## 6.8 Small Mammal Surveys

**Table 5. Results of the small mammal trapping surveys.**

Habitat type	Species captured	# of animals captured / 100 ATN
Grassland (mowed)	N/A	0.0
<b>Total by Location:</b>		<b>0.0</b>
Wetland	Deer Mouse	1.0
	Norway Rat	0.2
<b>Total by Location:</b>		<b>1.2</b>
Woodland	Deer Mouse	1.4
<b>Total by Location:</b>		<b>1.4</b>

Table 5 shows that regularly mowed or disturbed habitat, like short grass prevents the buildup of the dead vegetative (duff) layer that small mammals need for concealment and survival. Rodents are less likely to use or maintain a viable population in habitats without this duff layer due to the high rate of predation. Undisturbed habitats like wetlands and woodlands provide this duff layer that supply rodents their basic needs to maintain these viable populations. These high rodent populations can then create an indirect hazard by attracting predators such as red and grey fox and raptors. These predators then key in on this prey and create a direct threat to aviation. Rodents can also create direct hazards on an airfield due to their gnawing of wire cables which can lead to blackouts of critical airfield lighting. Larger rodents, like groundhogs, can cause cave-ins and soil erosion from their burrowing.

The number of rodents captured per 100 adjusted trap nights equaled 1.2 (n=1.0 Deer Mouse and n=0.2 Norway rat) in wetland habitats and 1.4 in woodland habitats (n=1.4 deer mice). It is important to note, that during these surveys, no rodents were captured in short grass habitat. This indicates that the mowing height and frequency currently used at ORF has been conducive to deterring small mammals from using short grass areas as habitat. Captures were made only in the woodland and wetland areas. The presence of small mammals in these woodland and wetland areas will be greatly reduced by removal of the trees, shrubs and wetlands.

## 6.9 Threatened and Endangered Species

Appendix F lists species that are considered endangered, threatened, or of concern in the Commonwealth of Virginia. Of the species observed at ORF during the survey period, Bald Eagles are the only species appearing on the list, classified as State Threatened and a Federal Species of Concern. WS has observed Peregrine Falcons and Upland Sandpipers at ORF in the past, which are listed as State Threatened.

## 7.0 CONTROL ACTIVITIES

In addition to conducting a wildlife hazard assessment, WS also provided direct control services to ORF from August 2010 through July 2011. Table 6 lists species that were removed or dispersed to protect aviation safety at ORF by WS.

**Table 6: Species removed or dispersed by WS at ORF, August 2010 – July 2011.**

Species	# Removed	# Dispersed
European Starlings	531	9203
American Crow	17	2815
Double-crested Cormorants	27	1907
Ring-billed Gull	19	843
Canada Goose	152	557
Common Grackles	40	574
Mourning Dove	220	226
Laughing Gull	19	185
Mallards	28	182
Hooded Merganser	19	120
Red-winged Blackbirds	60	74
Rock Pigeon	48	71
Eastern Meadowlark	7	62
Great Blue Heron	20	60
Great Egret	10	23
Common Merganser	1	16
American Kestrel	13	10
Osprey	8	9
Barn Swallow	15	9
Turkey Vulture	0	9
Black Vulture	0	1
Mute Swan	0	1
American Robin	0	3
Northern Mockingbird	11	3
Red-tailed Hawk	8	3
Northern Harrier	0	3
Pied-billed Grebe	5	2
Bald Eagle	0	3
Sharp-shinned Hawk	4	2
Wood Duck	0	2
American Coot	0	1
Red Fox	13	0
Raccoon	8	0
Eastern Cottontail	4	0
Grey Fox	3	0
Virginia Opossum	2	0
<b>TOTALS</b>	<b>1,312</b>	<b>16,979</b>

## **8.0 RECOMMENDATIONS**

In addition to placing an emphasis on the management of the species discussed in Section 6, WS recommends that the following actions are implemented at ORF to improve wildlife hazard management and further reduce the threat of wildlife/aircraft strikes:

### **Update the Airport Wildlife Hazard Management Plan (WHMP) Based on the WHA**

ORF's current wildlife hazard management plan was developed after the initial WHA in 2001 and is incorporated into its Airport Certification Manual (ACM). The plan provides the framework for the airport to address wildlife hazards and was updated recently after review by FAA, airport personnel and WS. It is recommended that the plan be updated to reflect the information contained in this WHA and submitted to the FAA for approval.

### **Continue Training of Airport Personnel in Wildlife Hazard Management**

FAA regulations require that airport personnel who are responsible for implementing wildlife control measures are properly trained in wildlife hazard management by a qualified wildlife biologist [14 CFR Part 139.303 (c) and (e)]. In August 2010, WS biologists provided 3 required annual training workshops to employees at ORF. Training topics included: FAA regulations, policies, and procedures; wildlife strike reporting; wildlife attractants; habitat management; species identification; safety; and hands-on demonstrations of wildlife management tools and techniques. It is recommended that ORF continue to train employees in wildlife hazard management techniques, especially in the safe use of pyrotechnics and in wildlife identification.

### **Continue Wildlife Hazards Working Group**

ORF has worked with its Wildlife Hazard Working Group to coordinate, facilitate communicate and establish cooperation with its surrounding community. This interaction has created an open line of communication between the airport and community to allow for the interchange of input relating to new projects both on and off the airport that may create hazardous wildlife conditions. When these conditions have been identified, the group has worked together to address and alleviate these concerns. The WHWG should also keep in contact with the City of Norfolk's regional planning and zoning boards to keep abreast of proposed land-use changes within the separation distances of the airport and review those that may create hazardous wildlife conditions.

In August 2007, WS and ORF's Operations Department first met to discuss expansion of, and establishment of future protocols for its WHWG. In this first meeting it was established that WS would supply ORF with enhanced technical assistance and annual reporting. To obtain this information for ORF it was determined that WS would conduct twice weekly wildlife control measures and twice monthly bird surveys. The information collected from these visits would then be compiled into an annual report and presented at the WHWG meetings along with recommendations.

The WHWG meeting has since successfully involved representatives from Norfolk Airport Authority (Field Maintenance, Fire and Police), City of Norfolk (Botanical Garden, Dept. of Utilities and Animal Protection), VA Dept. of Game and Inland Fisheries, WS and the FAA to

address the following concerns: review of the USDA WS annual report to include (bird survey, population trend data, habitat use, seasonal activity, control measures and reported strikes data), also discussed were Canada Goose management both on and off the airport, closure of a waterfowl feeding area located between ORF and the Botanical Garden (Appendix C. picture 3), offer of wildlife assistance to Landmark Aviation, initiation of a Double-crested Cormorant dispersal project, expanding the take on ORF's Migratory Bird Depredation Permit, address potential relocation of nuisance wildlife (raccoon and fox) to the Botanical Gardens, habitat management for blackbirds, geese, and Bald Eagles, removal of fruit bearing trees within the AOA (Appendix C. picture 11 and 12), closure of Lake Whitehurst fishing pier, perimeter fence repairs, expansion of WHWG to include an airline representative, and provide input to the WHA.

Future challenges for ORF's WHWG will be to develop a management plan for the increasing Bald Eagle population in and around ORF's critical zone. To reduce the potential conflict with birds and planes, a proactive plan will need to be established and implemented. During the assessment period an eagle that nested in the Botanical Garden was struck and killed. The eagle nest at the Botanical Garden presents a documented strike risk and should be removed. ORF should work with adjoining landowners to prevent eagles from nesting in the vicinity of the airport.

### **Continue to Seek Cooperation from Adjacent Property Owners**

As discussed in Section 6, wildlife on properties near the airport pose serious threats to aviation safety at ORF. WS recommends that ORF continues to identify areas within 3 miles of the airport that may provide roosting and/or foraging habitat for birds that utilize the airspace at ORF, especially Canada Geese and work with these stakeholders to manage these aviation threats through education and identify potential funding sources.

### **Continue to Utilize the Wildlife Activity Log and Report Bird Strikes**

Airport Operations and Airport Fire and Rescue personnel currently use an airfield wildlife activity database to record all instances of bird dispersals, carcass removal, and other wildlife activity in the AOA. It is recommended that personnel continue to keep accurate records of wildlife activity. WS recommends that the wildlife activity log should include information such as the number of birds involved, cover type, and location on the airfield. This information can be useful in determining trends and prioritizing management objectives.

Bird strikes should be reported online and submitted to the FAA through the provided link in the database, or they may be reported by completing FAA Form 5200-7. Airport personnel should be familiar with FAA Advisory Circular 150/5200-32A, which outlines criteria listed below for determining when a wildlife strike has occurred (see Section 1). Wildlife involved in strikes should be properly identified as accurately as possible to species before the report is submitted to the FAA (i.e., "Ring-billed Gull" instead of "seagull" or "Red-tailed Hawk" instead of "hawk"). A bird field identification guide, available at any bookstore, can be helpful in identifying birds recovered from the airfield. The WS biologist may also assist with species identification and may follow up with the FAA when necessary to ensure that species are recorded correctly.

## **Maintain Necessary Permits to Control Wildlife**

As stated previously, federal and state permits are necessary for lethal take of migratory bird species and state-managed species such as deer and turkeys. In addition, a federal permit is needed before Bald Eagles may be harassed from the AOA. ORF currently holds a migratory bird depredation permit, and an eagle harassment permit. WS recommends that these permits be maintained and updated to include new species or increased take of existing species as the need arises.

## **Maintain Sufficient Control Supplies in all response vehicles**

WS recommends that airport employees who are responsible for wildlife hazard management are provided with adequate equipment needed to disperse wildlife. ORF currently supplies employees with pyrotechnics and launchers, propane cannons, and vehicles equipped with sirens and lights. WS also recommends that employees are properly trained in the safe storage of pyrotechnics in ATF-approved magazines.

## **Evaluate Potential Wildlife Hazards When Planning New Construction or Land Use Changes**

Airports are constantly undergoing expansion and improvement projects. It is critical to consider wildlife attractants during these planning phases. Several aspects to consider will be the planting of new vegetation, which may provide food to wildlife in the form of seeds and fruits and the creation of water bodies or drainage basins that provide fresh water. ORF should contact a certified wildlife damage biologist for review of airport plans that may include these features. In addition, adjacent off-site projects need to be considered as potential wildlife attractant hazards and dealt with accordingly.

## **Continue to Monitor Wildlife Populations and Habitat Use Patterns in the AOA**

The intent of this WHA has been to document general occurrence, land-use patterns, and population characteristics of wildlife at ORF. It must be realized that wildlife abundance and use patterns on airfields are affected by a host of variables that are rarely the same from year-to-year. Hence, conclusions based on wildlife populations and patterns during this study are only meant to be a guide and may or may not be consistent in subsequent years. Survey routes and methods were established in a manner that facilitates continued monitoring. Data from this study will provide a baseline for comparison in subsequent years and ORF should continue to monitor wildlife populations by conducting monthly surveys using the same stations established in this assessment. While surveys conducted in subsequent years may not be conducted with the same frequency or intensity as this initial hazard assessment, they will still provide general insights into wildlife use patterns over time and enable ORF to gauge the effectiveness of its wildlife control program.

## **Habitat Modification and Exclusion**

As discussed in Section 6, habitat modification and exclusion are two of the most important components of a wildlife hazard management plan. ORF maintenance personnel have been diligent in maintaining grass in the AOA at the recommended height (6 to 10 inches), and WS recommends that regular mowing is continued. Grass management is seasonal, and frequency of

mowing may need to be increased during growing seasons as resources permit. Woody vegetation growing in drainage ditches should be removed and these areas should be maintained to prevent creating thick, shrub-like habitat that can provide cover for small mammals and perching sites for raptors and blackbirds. Two areas of concern are located at Denney's Canal and the shoreline of Lake Whitehurst surrounding the approach end of Runway 23. Since all species are attracted to water, areas of standing water should also be eliminated where possible. Low lying areas should be filled or graded to improve drainage. The entire perimeter fence should be inspected frequently for any areas that may allow mammals and turtles to enter the AOA. Any gaps discovered in or under the fence should be repaired immediately using bars, wire, or sections of fence to patch the area. Lowering the current fence until it contacts the concrete apron will solve many of the fox and turtle issues which have been a persistent issue inside the AOA at ORF.

## **9.0 SUMMARY**

Based on data collected during the WHA, records from the FAA wildlife strike database, and control efforts by WS and ORF personnel, several species were identified that threaten aircraft safety at ORF. The guilds that are of most concern to aircraft safety include waterfowl, raptors, cormorants, gulls, starlings and blackbirds. Several management strategies may be implemented to reduce wildlife hazards at ORF, including habitat modification, exclusion, harassment, and lethal removal of hazardous wildlife species. WS recommends that ORF continues to take a hands-on approach to wildlife hazard management through continued monitoring and aggressive management, utilizing the information contained in this WHA to further reduce wildlife hazards and provide a safe environment for the flying public and aircraft operations.

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**APPENDIX A**

**WILDLIFE HAZARD MANAGEMENT PLAN  
NORFOLK INTERNATIONAL AIRPORT**

NORFOLK INTERNATIONAL AIRPORT  
WILDLIFE HAZARD MANAGEMENT PLAN

*Developed by:*

Norfolk Airport Authority  
2200 Norview Ave., Norfolk, VA 23518

*In Cooperation with:*

U.S. Department of Agriculture Animal and  
Plant Health Inspection Service Wildlife  
Services  
P.O. Box 130  
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## **EXECUTIVE SUMMARY**

Pursuant to CFR Title 14 FAR part 139.337(d), the Norfolk International Airport (ORF) developed this Wildlife Hazard Management Plan (WHMP) in cooperation with the U.S. Department of Agriculture's Wildlife Services (USDA-WS) program. This plan will be reviewed periodically by the Wildlife Hazard Working Group and will be updated if changing circumstances merit. All changes made to the WHMP will be sent to the FAA for approval.

The plan places emphasis on identification and abatement of wildlife hazards within the airfield environment. Additional wildlife attractants (e.g., lakes, ponds, etc.) within 5 miles of the airfield are also addressed, since they could potentially attract wildlife in a manner that could jeopardize safety of air traffic operating into and out of ORF.

ORF will take immediate measures to identify and mitigate wildlife hazards whenever they are detected or whenever airport management has been advised that hazardous conditions exist. The plan outlines steps for monitoring, documenting, and reporting potential wildlife hazards and strikes at Norfolk International Airport. Protocols for responding to hazardous wildlife situations are presented, including roles and responsibilities of airport personnel. Wildlife control procedures for birds and mammals are also discussed.

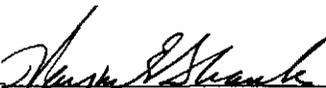
Habitat on and around the airfield will be managed in a manner that is non-conducive to hazardous wildlife, and the plan outlines priorities for habitat management, including target dates for completion.

Most wildlife is afforded some type of protection under state or federal regulations; therefore, special permits may be required for their control. The plan outlines laws and regulations governing the harassment or take of various types of wildlife in the Appendices. Norfolk International Airport's permit status for each type of wildlife is presented and a copy of the federal migratory bird depredation permit is included as an appendix to the plan. A copy of the Virginia Department of Game and Inland Fisheries (VDGIF) Kill Permit for mammals (deer, beaver, raccoon, opossum, etc.) is included as an appendix.

ORF maintains an adequate supply of resources for dispersing and controlling wildlife, including frightening devices (e.g., pyrotechnics), wildlife restraint equipment (e.g., traps, catch poles), and firearms. ORF personnel will be trained to properly identify wildlife and apply wildlife deterrent equipment in a safe and efficient manner, as outlined in this plan.

## SIGNATORIES

The following Wildlife Hazard Management Plan for Norfolk International Airport *has* been reviewed and accepted by the FAA. **It** will be become effective with the following signatures:

  
\_\_\_\_\_  
Wayne E. S, Executive Director  
Norfolk Airport Authority

10/29/10  
Date

\_\_\_\_\_  
FAA Airport Certification Inspector

\_\_\_\_\_  
Date

## PREFACE

This Wildlife Hazard Management Plan was written to fulfill the requirements of CFR Title 14 FAR part 139.337(d) for Norfolk International Airport. This plan is intended specifically for the Airport's use to monitor and reduce wildlife hazards.

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 Tower)  
 FAA Maintenance Sector (Norfolk)

DATE	PAGE	REVISION
	v	Obtained Signatures
	vi	Updated Distribution List
	1.1	Changed 139.337 (e) to (f)
	1.2	Changed 139.337 (e) to (f); deleted Appendix B reference
	2.1	Changed 139.337 (e) to (f); updated WHWG list
	2.2	Updated Field Maintenance responsibilities (2"d bullet)
	2.4	Deleted reference to form FAA 5200-7
	3.1	Changed 139.337 (e) to (f)
	3.2	Added reference to WHA and WHMP re-write w/ dates
	4.1	Changed 139.337 (e) to (f)
	5.1	Changed 139.337 (e) to (f)
	5.2	Added reference to annual training conducted by biologist
	6.1	Changed 139.337 (e) to (f); deleted reference to continuous NOTAM
	6.2	Updated electronic wildlife strike database address
	6.3	Changed 139.337 (e) to (f)
	8.1	Added Training references to sections 8.1 & 8.2
	9.1	Updated agency directory
	10.1	Updated reference



## LIST OF ACRONYMS

ADO AGL AOA ATCT ATIS CFR FAA  
FAR  
NOTAM  
SIDA USDA USFWS VDGIF WHMP WHWG  
WS

Airports District Office

Above Ground Level

Air Operations Area

Air Traffic Control Tower

Automated Terminal Information Service

Code of Federal Regulations Federal Aviation

Administration Federal Aviation Regulations Notice to  
Airmen

Security Identification Display **Area** United States Department  
of Agriculture United States Fish and Wildlife Service

Virginia Department of Game and Inland Fisheries

Wildlife Hazard Management Plan Wildlife **Hazard**

Working Group Wildlife Services

# 1.0 - INTRODUCTION

## 1.1 OVERVIEW

Wildlife hazard management plans (WHMP) address the responsibilities, policies, and procedures necessary to reduce wildlife hazards at airports. Recognizing the potential hazards wildlife pose to aircraft and human lives, the Federal Aviation Administration (FAA) requires airports that incur bird-aircraft strikes to implement a WHMP according to Code of Federal Regulations (CFR) Title 14 FAR part 139.337(f) (refer to CFR Title 14 Part 139.337). The WHMP must include 7 required components according to CFR Title 14 FAR part 139.337(f). Each of these components is sequentially represented as a separate chapter in this document. These required categories are as follows:

1. The persons who have the authority and responsibility for implementing the plan
2. Priorities for needed habitat modification and changes in land use identified in the ecological study, with target dates for completion.
3. Requirements for and, where applicable, copies of local, state, and Federal wildlife control permits.
4. Identification of resources to be provided by the certificate holder for implementation of the plan.
5. Procedures to be followed during air carrier operations, including at least- (i) Assignment of personnel responsibilities for implementing the procedures; (ii) Conduct of physical inspections of the movement area and other areas Critical to wildlife hazard management sufficiently in advance of air carrier operations to allow time for wildlife controls to be effective; (iii) Wildlife control measures (iv) Communication between the wildlife control personnel and any air traffic control tower in operation at the airport.
6. Periodic evaluation and review of the wildlife hazard management plan for- (i) Effectiveness in dealing with the wildlife hazard; and (ii) Indications that the existence of the wildlife hazard, as previously described in the ecological study, should be reevaluated.
7. A training program to provide airport personnel with the knowledge and skills needed to carry out the wildlife hazard management plan required by (d) of this section.

In addition to the requirements stated above, CFR Title 14 FAR part 139.337(f) outlines procedures and personnel responsibilities for notification regarding new or immediate hazards, and describes the rapid response procedures for addressing new or immediate wildlife hazards. Section (f) is extremely important because it allows the WHMP to be promptly modified and updated to address new situations or changing circumstances.

## 1.2 PROBLEM SPECIES

The species generally considered to present the greatest threats to aviation at ORF are birds, some mammals, and some reptiles. The birds with flocking tendencies or of relatively large size, such as waterfowl, gulls, pigeons, starlings, and raptors represent an extreme hazard. Mammals such as fox, skunks, and raccoons also represent a hazard. Reptiles, particularly turtles represent a significant hazard at ORF during spring and summer, when they are known to cross runways and taxiways.

## 1.3 PURPOSE AND SCOPE

Enhancing safe air carrier operations is a primary objective of the Director of Operations at ORF. Accomplishing this objective entails careful monitoring of all aspects of arriving and departing aircraft in the vicinity of ORF, including potential wildlife hazards on and around the airport. As part of its safety efforts, ORF management intends to implement and maintain a WHMP according to CFR Title 14 FAR part 139.337(f) to address potential wildlife hazards at ORF and surrounding areas, with a particular emphasis on hazards within approximately 2 miles of the airfield. In addition to addressing general wildlife hazards, this plan will present specific protocols for monitoring and responding to unforeseen wildlife hazards that may arise.

It is important to note that Part 139.337(t) underscores the need for a flexible plan that can be quickly adapted to changing circumstances. In some rare cases, however, immediate actions may be necessary that are not addressed in this plan to ensure the safety of airport patrons. This plan provides Norfolk International Airport with the discretion and capability to respond to these situations, while providing guidance for compliance with applicable Federal, state, and municipal laws or regulations. The latitude afforded ORF management when administering this plan is discussed in CFR 14- Part 139.113, which states that:

*"In emergency conditions requiring immediate action for the protection of life or property, involving the transportation of persons by air carriers, the certificate holder may deviate from any requirement of Subpart D of this part to the extent required to meet that emergency. Each certificate holder who deviates from a requirement under this paragraph shall, as soon as practicable, but no later than 14 days after the emergency, report in writing to the Regional Airports Division Manager stating the nature, extent, and duration of the deviation."*

This plan will be valid until Norfolk International Airport management or FAA determines then the plan should be updated due to changed conditions or new needs for action. The plan will be reviewed at least annually to ensure it still pertains to conditions at the time of review, but also be revisited more often if situations arise or hazards exist that merit evaluation.

## 2.0 AUTHORITY

*FAR 139.337(j)(1)The persons who have authority and responsibility for implementing the plan.*

Norfolk International Airport's Director of Operations has the authority and responsibility of designating a Wildlife Coordinator to implement the WHMP. Each department and associated agencies have responsibilities outlined in the WHMP and must incorporate them into their programs. Clear communication among airport personnel is essential for the WHMP to succeed. Personnel working at the airport will communicate resource needs, recommendations, and progress to the designated Wildlife Coordinator. The Director of Operations will ensure that the FAA approves the WHMP and that the WHMP and amendments comply with the Federal, state and local laws and regulations.

### 2.1 WILDLIFE HAZARD WORKING GROUP (WHWG)

The Wildlife Hazard Working Group is responsible for reviewing the WHMP, as it relates to each members's respective departmental duties on at least an annual basis. In addition, the group will monitor activities, status, and make recommendations to the Wildlife Coordinator, who will in-turn review and grant approval if satisfied with the progress of the WHMP. The working group will meet once a year, with intermediate meetings when necessary.

The Wildlife Hazard Working Group will be represented by:

- Director of Operations or Designated Representative
- ORF Fire Department
- Wildlife Coordinator
- Director of Facilities
- Field Maintenance Department
- FAA Airport Certification Safety Inspector or Designated Representative
- ATCT Supervisor or designated representative
- Norfolk Botanical Gardens
- City of Norfolk Animal Protection Unit
- Virginia Department of Game and Inland Fisheries
  - City of Norfolk Utilities
  - Tenant Airline Representative

## 2.2 PERSONS RESPONSIBLE FOR IMPLEMENTING THE PLAN DIRECTOR OF

### OPERATIONS

Establish Wildlife Hazard Working Group for ORF.

Supervise, coordinate, and monitor wildlife control activities as outlined in the WHMP. Update the WHMP as necessary.

Disseminate information and assignments through the Wildlife Hazard Working Group. Provide public relations support for wildlife control activities as necessary.

Alleviate all attractants deemed an imminent hazard and, if necessary, coordinate a runway closure to remedy wildlife hazards.

Coordinate the issuance of Notices to Airmen (NOTAM). In addition, request the Air Traffic Control Tower (ATCT) advise pilots on ATIS.

Insure only properly trained and badged wildlife control personnel operate on the AOA in accordance with FAA regulations (e.g., SIDA). Such training includes radio communications, driving on the AOA, and safe use of firearms and pyrotechnics.

### FIELD MAINTENANCE

Insure wildlife-attracting refuse does not accumulate in fields and ditches on the airport. Warn the air traffic control tower and pilots of known wildlife hazards. Notify

Airport

Fire Dept. of the presence of wildlife that requires harassment activities.

Maintain ditches and fields to ensure that water flows, thereby avoiding pooling and accumulation of refuse on the airport.

Assist with, or contract out habitat modifications addressed in the Wildlife Hazard Assessment (WHA), such as vegetation maintenance along ditches and brush and tree removal.

Cover, exclude, or drain ponds, ditches, and other water areas as determined necessary by the Wildlife Coordinator.

Improve and maintain a perimeter fence line to exclude most mammals such as deer, fox, opossum, and raccoon.

Pick up all trash and debris on the airfield.

Minimize pooling formed by rain on tarmac and mfteld areas, grade or dram if necessary.

Assist with wildlife control activities involving field rodents, and other programs.

Inform Wildlife Coordinator of rodents and other wildlife found in and around buildings.

Rodent-proof buildings, dumpsters, and other refuse containers to the extent feasible.

#### DIRECTOR OF FACILITIES

Review designs of new structures/facilities with the Wildlife Coordinator and/or USDA Wildlife Services Biologist during the planning stages for input on designs that are unattractive to wildlife.

Pre-approve and coordinate landscape changes beforehand with the Wildlife Coordinator and/or USDA Wildlife Services Biologist to ensure wildlife attractants are prevented.

Involve the Wildlife Coordinator and/or the USDA Wildlife Services Biologist with land use planning and mitigation efforts.

#### FEDERAL AVIATION ADMINISTRATION (FAA)

Assist ORF in reviewing proposed land use changes, construction plans, and mitigation projects for potential wildlife hazards to aircraft.

Notify Airport Police Dispatch of the presence of wildlife that requires harassment activities.

Review changes or edits to the WHMP.

#### WILDLIFE COORDINATOR (Some of these duties are accomplished through USDA)

Assist ORF personnel in monitoring the airport environment for wildlife hazards, taking corrective action if necessary and record and submit all findings to the Director of Operations.

Make wildlife strike report forms readily available to airfield operations and pilots, and encourage submission of the forms to the appropriate governmental agencies and wildlife control personnel. Submits wildlife strike reports electronically.

Inform and advise the Director of Operations of wildlife management activities, habitat modification needs, and imminent wildlife hazards that require the issuance of a NOTAM or runway closure.

Assists with training airport personnel in the safe handling and proper use of wildlife dispersal methods and equipment (or contact USDA/WS for guidance).

Provide support to Director of Operations with wildlife control activities and in obtaining depredation permits to control migratory birds, and if necessary, mammals with state and federal wildlife agencies and municipal law enforcement.

Provide public relations support for wildlife control activities as

necessary

Assist in reviewing proposed land use changes, construction plans, and mitigation projects for potential wildlife hazards to aircraft.

Provide operational assistance to control fox, rodents, starlings, pigeons, gulls, and geese, or other wildlife deemed hazardous.

Log all known wildlife strikes electronically.

Warn the air traffic control tower and pilots of known wildlife hazards when necessary. Inspect critical areas for wildlife activity and strikes and maintain a record of the action, even if no wildlife was present.

Harass wildlife from critical areas when appropriate as outlined in Chapter 6.

Record all wildlife activity or animals dispersed or shot on the "Airport Operation Daily Wildlife Activity Report

### 3.0- HABITAT MANAGEMENT

*FAR 139.337(/)(2) Priorities for needed habitat modification and changes in land use identified in the ecological study (Wildlife Hazard Assessment) with target dates for completion.*

#### 3.1 OVERVIEW

Habitat management provides the most effective long-term remedial measure for reducing wildlife hazards on, or near, airports. Habitat management includes the physical removal, exclusion, or manipulation of areas that are attractive to wildlife. The ultimate goal is to make the environment fairly uniform and unattractive to the species that are considered the greatest hazard to aviation. Habitat modifications will be monitored carefully to ensure that they reduce wildlife hazards and do not create new attractions for different wildlife. Table 1 lists a series of both habitat and non-habitat based action items/priorities, with target dates for completion.

Table 1. Management priorities for projects to reduce wildlife hazards at Norfolk International Airport are listed, along with the target dates for completion and date that each project was completed. Note that some of the projects may have already been implemented or completed, but because they require a continued effort (e.g., brush removal from drainage ditches, they are ~~ongoing~~ **Ongoing**).

ORF's WILDLIFE MANAGEMENT PROJECTS	TARGET DATE	DATE COMPLETED
Continue the grass management policy on the airfield	Spring through fall	Ongoing
Maintain ditches throughout airfield to enhance drainage	Continuous	Ongoing
Repelling gulls, osprey and waterfowl on the airfield	Continuous	Ongoing
Grade, or fill tire ruts on infield caused by vehicles/maintenance equipment	Every Fall	Ongoing
<b>Maintain wildlife-proof fencing around airfield to exclude large and small mammals</b>	<b>Continuous</b>	Ongoing
Plant ground covers that are unattractive to wildlife	<b>Continuous</b>	Ongoing
Maintain updated migratory bird depredation permits	<b>Continuous</b>	Ongoing
Stock and maintain wildlife control supplies	<b>Continuous</b>	Ongoing
Continue use of a record keeping system for wildlife strikes and hazing efforts	<b>Continuous</b>	Ongoing

## 3.2 ATTRACTANTS

### 3.2.1 General Zone and Critical Zone

The *General Zone* for Norfolk International Airport is defined as the area within a five-mile radius of the runway centerline. Wildlife attractants in this area could potentially impact air traffic safety operating out of ORF, particularly those attractants that lie within the approach and departure patterns. The objective of this plan is to actively reduce attractive wildlife habitat on property under the control of the Airport, while working cooperatively with adjacent property owners to discourage land-use practices that might increase wildlife hazards. Some of the most prominent attractants on the property include those areas near water and trees and shrubs within the AOA. Off-site attractants include the Botanical Garden, Lake Whitehurst, and Lake Wright Golf Course.

The area within a 10,000-foot radius of the runway centerline is delineated as the *Critical Zone*. Control efforts will be primarily concentrated within this area because within 10,000 feet of the runway centerline is the area where arriving and departing aircraft are typically operating at or below 500 feet AGL (above ground level), an altitude that also corresponds with the most bird activity. Approximately 75% of all

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civil bird-aircraft strikes occur within 10,000 feet of the airport which they depart or arrive from.

### 3.2.2 Edge Removal

Edges are the places where different habitats meet and are often most attractive to wildlife because the animal's biological needs can be met in a relatively small area. A portion of the "edge" at the airport consists of the shoreline with Lake Whitehurst. This transition zone is as close as 200ft from runway 5/23. To reduce wildlife use of these edge areas keep the transition zone between edges as abrupt as possible.

### 3.2.3 Airport Building Projects

The Director of Facilities and/or Wildlife Coordinator (or USDAIWS) should participate in the initial and early phases of all airport building projects to avoid any inadvertent increase in wildlife hazards resulting from architectural or landscape changes. The participation will be especially important during construction of the parallel runway, when the ORF airfield environment will be highly dynamic. Thus, additional effort will be required to ensure that new projects and construction activities are designed in a manner that minimizes wildlife attractants. The FAA's Airports District Office (ADO) reviews proposed construction activities for potential wildlife attractions when the FAA Form 7460-1 application is submitted, and may also solicit input from USDA Wildlife Services.

### 3.2.4 Non-airport Land-use Projects

Whenever possible, the Director of Facilities and the Wildlife Coordinator will actively participate in land-use decisions and landscape changes to avoid inadvertent creation of wildlife hazards to aircraft. The FAA's Airports District Office and Safety and Standards Branch of the FAA Region (refer to directory in Chapter 9) will provide technical guidance to Norfolk International Airport in addressing land-use compatibility issues. Proposed projects that will likely increase bird numbers within flight zones will adamantly be discouraged, or mitigated to a safe level. Incompatible land uses may include developments such as water reservoirs, artificial ponds, wetlands, and waste handling facilities. These types' of land-use changes will be monitored for compatibility by working with the local planning authorities.

## 3.3 WATERMANAGEMENT

### 3.3.1 Overview

Almost two-thirds of the airport's perimeter is surrounded by water. In addition, small drainage ditches and canals can be found on the airfield that attract a moderate number of birds and mammals throughout the year, especially during winter and spring when migratory waterfowl pass through the area. Open water on airport property will be drained, filled, or excluded wherever possible and monitored closely to ensure that hazardous species do not use sites. Temporary open water areas will be monitored by the Wildlife Coordinator and drained, filled, or excluded by airport maintenance if deemed necessary. Water sources outside of airport property, but within the critical area of the airport, will be monitored, and airport management will work with local agencies and landowners to help deter hazardous wildlife.

### 3.3.2 Wetlands

One lake and several wetlands naturally occur in the vicinity of the airport, and are extremely attractive to wildlife. Any future wetland mitigation resulting from airport construction projects will be implemented as far away from the airfield as possible, unless it can be demonstrated with reasonable certainty that the mitigation would not likely increase wildlife hazards and will comply with criteria described in FAA Advisory Circular 150/5200-33 (Appendix E). The Wildlife Coordinator and Director of Facilities will review all other wetland mitigation. Norfolk International Airport management will closely monitor wildlife activity in these wetland areas and if necessary, the Wildlife Coordinator will take the appropriate steps to alleviate any wildlife hazards.

### 3.3.3 Temporary Standing Waters and Ditches

During the wetter winter and spring months, small depressions (tire ruts) created by vehicles operating within the infield areas fill up with water for short periods of time and can attract dabbling ducks. This situation may become particularly problematic during periods of heavy maintenance/construction activity. Airport management will discourage driving on the infield during periods of high precipitation (typically winter and spring months) to avoid ruts in the soil. Where ruts are found, airport maintenance should fill and/or grade the damaged area when conditions are acceptable. In areas where there are larger pools, the land should be filled or graded such that water consistently drains into ditches. Ditches should be appropriately sloped so that water does not pool and leaves the airfield in a reasonably short amount of time.

## 3.4 VEGETATION MANAGEMENT

### 3.4.1 Overview

Norfolk International Airport contains diverse vegetation types, some of which are highly attractive to wildlife. The most effective approach to reducing this attraction in the critical zone is to remove all unnecessary trees, shrubs, weeds and plants, and establish non-seeding or small-seeded grass, especially within 200 feet of the runway. The Wildlife Coordinator, in consultation with USDA/WS, will try to review all plantings on airport property and exclude those species that produce edible fruits, nuts or berries if these plants create an attraction to hazardous wildlife. Norfolk International Airport management will work with USDA Wildlife Services to develop a list of unacceptable plant species (see Appendix F). This list will be given to contractors for reference. Norfolk International Airport should continue to maintain a defined transition zone between the infield grass and the shoreline.

### 3.4.2 Grass Management

Other than paved areas, grass will be the primary cover inside the airport perimeter. FAA Certalert No. 98-05 advises, "Airport operators should ensure that grass species and other varieties of plants attractive to hazardous wildlife are not used on the airport".

In addition, grasses that produce large seeds and are known to be attractive to wildlife will be avoided when planting new areas.

#### 3.4.2.1 Grass Type

The type of grass used within the airport's perimeter and between the runways should produce small or no seeds, but still be able to generate new growth or re-seed itself to provide a thick, monotypic stand and prevent erosion. The selected ground cover should withstand drought, flooding, and other normal climatic conditions, and be somewhat unpalatable to grazers such as geese and ducks. The grasses should also harbor relatively few insects and rodents that may attract hawks, owls, starlings, and other hazardous wildlife species. Several varieties of tall fescue (*Festuca arundinacea*), if allowed to grow to a height of 8-14 inches, have been found to be unattractive to Canada geese because of a fungus harbored by the plant, and the fescue will generally preclude other more attractive grass species from invading the airfield. Whenever possible, grass mixtures indigenous to the local area will be used at ORF when replanting as part of a construction or mitigation project, provided it could be demonstrated the seed mixture poses no significant wildlife attraction.

#### 3.4.2.2 Grass Height

Grass height throughout the airfield will be maintained at a height of not less than four (4) inches and not exceeding heights (approximately 14 inches) where seeds production is allowed to mature, except around runway and taxiway marker lights where it will be cut to 3 inches for purposes of visibility. Grass height will be maintained throughout the year, with the first mowing activities beginning when the infield is firm enough to allow equipment access and the grass is sufficiently long to merit cutting.

#### 3.4.2.3 Mowing

Mowing activities will be coordinated with the Director of Operations and/or Wildlife Coordinator to ensure a dispersal team/person is available should birds attracted to the activity cause a hazard to aircraft operations. FEDERAL AVIATION ADMINISTRATION

#### 3.4.3 Riparian Vegetation

Herbaceous vegetation growing on the edge of the lake or other wetland may provide preferred habitat for species considered most hazardous to aircraft. The vegetation that grows alongside ditches and the lake on Norfolk International Airport property may be removed or maintained so that habitat is not provided for waterfowl, herons, blackbirds, gulls, and other wildlife that could present a direct or indirect hazard to aviation. Rock (e.g., quarry spalls, rip-rap), and in some instances, shrubs or grass, can be used to replace undesirable plants, slow erosion, and conceal a base flow of water from wildlife, but the situation will need to be examined on a case-by-case basis to avoid worsening the hazards. Once existing lakeside conditions are identified to attract wildlife, an appropriate plan to reduce the hazard will be developed.

### 3.4.4 Ornamental Landscaping

Landscaping at the airport can affect tourism, business, and the overall impression of the Norfolk International Airport vicinity to visitors; therefore, landscaping needs to be aesthetically pleasing. It must, however, not compromise the airport's more important responsibility of air safety. Trees and bushes that offer hunting perches, roosting and loafing sites, nesting cover, and food for birds and other wildlife will be removed. Ornamental trees and bushes used to enhance airport aesthetics will be kept to a minimum, and varieties that are unattractive to wildlife will be selected. Species, which produce edible fruits, nuts, or berries, will not be used on airport property if they might attract hazardous wildlife. Norfolk International Airport has worked with USDA Wildlife Services to develop a list of unacceptable plant species that should not be used on the airport. Trees will be monitored to prevent communal roosting by starlings and crows, and the trees will be thinned, topped, or removed if necessary. Refer to Norfolk International Airport landscaping standards in Appendix F for a current listing of plants that are unacceptable for use on airport grounds.

## 3.5 STRUCTURE MANAGEMENT

### 3.5.1 Overview

Structures provide cover and hunting perches for wildlife. If wildlife is considered when a building is being designed, costly control measures can be avoided. Buildings should not provide nesting, perching, or roosting sites for birds and should inhibit access by mammals such as rodents and cats.

### 3.5.2 Airfield Structures

Airfield structures such as runway lights, ramp and taxiway signs, ILS towers, and light poles are used as hunting and loafing perches for birds such as hawks and gulls. Lights attract insects at night, and in turn, bats and nighthawks. Structures found to routinely attract birds in a hazardous manner may be fitted with wire coils or porcupine wire (e.g., Nixalite).

### 3.5.3 Abandoned Structures

Structures not pertinent to air operations in close proximity to the airfield, and no longer in use, will be removed, including abandoned houses, sheds, machinery, and light poles. Such structures are attractive to rodents, small birds, and rabbits and, in turn, attract hawks, owls, and other predators that can become a significant air hazard. Structures used for crash-fire training are considered to be pertinent to air operations and are generally compatible with safe air operations.

### 3.6 FOOD/PREY-BASE MANAGEMENT

#### 3.6.1 Overview

Rodents, rabbits, insects, earthworms, and other invertebrates are highly attractive to many species of birds and mammals and should be controlled where feasible. Handouts, trash, and scattered debris also provide food for wildlife. The modification or management of a wide variety of habitats such as wildlife-attracting vegetation and removal of abandoned structures will reduce populations of potentially hazardous wildlife by limiting shelter, food, and prey availability.

#### 3.6.2 Rodents

Mice and voles at the airport appear to be the primary attractants of fox, but will occasionally attract herons and other predators. The Wildlife Coordinator will monitor populations and conduct a control program if rodent abundance increases to a level where wildlife is attracted in such numbers that pose a significant aviation safety risk.

#### 3.6.3 Insects and Other Invertebrates

Insects and other invertebrates (e.g., earthworms, spiders, Japanese Beetles, etc.) may attract many species of wildlife to the airport, particularly starlings and gulls. Insect populations will be monitored periodically by the Wildlife Coordinator to determine if they are present in sufficient numbers to attract wildlife. If control is deemed necessary, the Virginia Cooperative Extension agent (see Chapter 9) can help select the best pesticide or control method. Habitat management will keep much of the prey population in check, but the airport will continue to monitor these populations for outbreaks.

#### 3.6.4 Trash, Debris, and Handouts

Trash and debris are often responsible for attracting species such as gulls, crows, and pigeons. Norfolk International Airport maintenance will continue to conduct trash and FOD (foreign object debris/damage) collection sweeps on the airfield, especially after high winds. The public or airport employees should not be allowed to feed birds or mammals around the airport. Additionally, contractors, food vendors, catering companies and others who feed wildlife shall be issued warnings and appropriate disciplinary actions taken for persistent violations.

## **4.0- LAWS AND REGULATIONS**

### 4.1

*FAR 139.337(/)(3) Requirements for and, where applicable, copies of local, state, and Federal wildlife control permits.*

### 4.1 OVERVIEW

Federal, state and local governments administer laws and regulations that manage wildlife and their habitat. A number of laws affect wildlife control at airports and ORF, and wildlife control personnel must understand and comply with these regulations. In general, taking most types of wildlife is regulated through a permit process, overseen by Federal or state agencies. Permits are necessary for a successful control program and will be obtained on a regular basis, or as required, by the wildlife coordinator and or the Director of Operations.

### 4.2 VIRGINIA WILDLIFE REGULATIONS

Several Virginia State government agencies have regulations that affect wildlife control at airports. County and municipality regulations can also affect ORF's wildlife management efforts; however, the Norfolk Airport Authority is not required to comply with these regulations due to its governing body status. State wildlife laws involving resident birds, mammals, reptiles, and amphibians, as well as state threatened and endangered species, are generally administered by the Virginia Department of Game and Inland Fisheries.

### 4.3 FEDERAL REGULATIONS

Several Federal regulations, including the Migratory Bird Treaty Act, the Lacey Act, the Endangered Species Act, Eagle Protection Act, the National Environmental Policy Act, and the Federal Insecticide, Fungicide, and Rodenticide Act regulate various aspects of ORF's wildlife management activities. Additional regulations that may affect wildlife control activities at ORF are found in the Code of Federal Regulations (CFR), and several Federal agencies may be responsible for their implementation. Federal wildlife laws are typically administered by the U.S. Fish and Wildlife Service (USFWS) and involve primarily migratory birds and threatened and endangered species.

### 4.4 WILDLIFE CATEGORIES

Federal (CFR Title 50), and state (Code of Virginia, or the Game Department Regulations Manual) laws define the categories of wildlife and regulations related to their management. For the purposes of this document, feral and free ranging dogs, cats and other domestic animals are considered "wildlife" because of the hazards they may pose to aircraft, but they are mostly regulated under other municipal laws. Wildlife categories (Table 2) include migratory and resident, game and non-game, and threatened and endangered species. Wildlife control personnel know the category for the species that they intend to control, so that they can determine the relevant laws and necessary permits.

Table 2. Wildlife Categories in Virginia, and permits necessary for lethal control as required by Federal and state wildlife agencies. The table also shows whether ORF has current Federal or state permits for each category. It should be noted that Virginia Statutes (trapping or killing of wildlife causing damage-emergency situations) provides for the trapping or killing of wildlife (with exception of threatened, endangered, and federally protected species) by property owners without state permits, if the wildlife are damaging property or posing a threat to human life

Category	Species	State Permit Required'	State Permit Obtained	Federal Permit Required	Federal Permit Obtained
Resident Game Birds	Quail, grouse, and turkey	Yes	No	No	N/A
Resident Nongame Birds	Starlings, house sparrows, and pigeons	No	N/A	No	N/A
Migratory Game Billis	<b>Ducks, geese, coots,</b> gallinules, snipe, and mourning doves	No	N/A	Yes	Yes
Migratory Nongame Birds	All species except game birds, resident nongame birds, and domestic and exotic birds (including gulls, vultures, herons,				
Depredation Order Birds <sup>1</sup>	<b>Crows, blackbirds, house</b> sparrows, and cowbirds	No	N/A	No	N/A
Domestic Birds	Rock doves (feral pigeons) and domestic poultry, domestic ducks				
Game Mammals	White-tailed deer, fox, raccoon, squirrel and cotton-tailed rabbits Yes				
Forbearers	<b>Fox, raccoon, beaver,</b> muskrat, and skunk,	Yes	Pending	No	N/A
Nuisance Species	Groundhog, starling, English sparrow, mute				
Feral Domestic Mammals	Dogs, cats, livestock	No-Call animal control	N/A	No	N/A
Reptiles And Amphibians	Except those listed as threatened or endangered in Appendix G	State hunting license	No	No	N/A
Fully Protected Wildlife	Threatened and Endangered species listed in Appendix G	Yes	No	Yes	No

<sup>1</sup>Control actions requiring a state permit should be coordinated through the Regional Biologist with the Virginia Department of Game and Inland Fisheries.

<sup>2</sup>May be taken without permits "when concentrated in such numbers and manner as to constitute a health hazard or other nuisance" (50 CFR §21.43).

## 4.5 GENERAL REGULATIONS FOR WILDLIFE CONTROL

Several regulations and permits apply to wildlife management activities at airports in Virginia. Many of these regulations relate to safety, methods, and special considerations or restrictions, which are usually, specified on the depredation permits.

### 4.6 BIRDS

#### 4.6.1 Resident Game Birds

Resident game birds (grouse, turkey, quail, etc. specific to Virginia) are non-migratory. Although they are not managed by the MBTA (and no Federal permit is required for take) they are protected by state law and a state depredation permit is required prior to take except for wild turkey, which are regulated by state legislature.

#### 4.6.2 Resident Nongame Birds

Starlings, pigeons, and house sparrows are resident non-game birds that are classified as non-migratory, nuisance, and invasive species, and no permit is required to take them.

#### 4.6.3 Migratory Game Birds

Migratory game birds (Ducks, geese, coots, snipe, and mourning doves, etc.) are regulated under Federal law by the USFWS. These regulations allow harassment of migratory birds when the birds are damaging property, but a permit is required for lethal take. Migratory bird permits are not valid for eagles, and threatened and endangered species, which require separate permits for lethal take and harassment. Although states can impose more restrictive regulation than Federal law on migratory birds, Virginia currently does not require additional permits for migratory birds that are already regulated under Federal law.

##### 4.6.3.1 *Migratory Bird Depredation Permit for Norfolk International Airport (CFR 50. Part 13)*

A depredation permit to take federally protected migratory birds was obtained by completing a Federal Fish and Wildlife License/Permit Application and submitting it to the U.S. Fish and Wildlife Service. The USFWS may also require that a Migratory Bird Damage Project Report be completed by USDA Wildlife Services and accompany the permit application. ORF has a current Federal permit (Appendix C) to take all migratory birds except eagles and threatened or endangered species if they are a bona fide threat to aviation safety. VDGIF allows the take of these species under the Federal permit without obtaining an additional state permit.

The Director of Operations will be responsible for the required annual renewal of the depredation permit, and will submit a report to the USFWS within 30 days of the expiration date detailing the species and number of animals taken under the permit. Details for the permit uses are given below. Federally listed threatened and endangered migratory birds including bald eagles are listed in Appendix G. Peregrine falcons were removed from the federal list in 1999, but are still listed as state endangered.

#### 4.6.3.2 *Reporting Control Actions to USFWS*

The Director of Operations should submit a report of the animals taken to the USFWS to fulfill the requirements of this section and the Federal permit. The report could be generated from a computerized database containing all control actions at ORF. CFR 50 Part 21.41

#### CONTROL OF DEPREDATING BIRDS- Depredation permits

(a) *Permit requirement.* Except as provided in 21.42 through 21.46, a depredation permit is required before any person may take, possess, or transport migratory birds for depredation control purposes. No permit is required merely to scare or herd depredating migratory birds other than endangered or threatened species or bald or golden eagles.

(b) *Application procedures.* Applications for depredation permits shall be submitted to the appropriate Special Agent in Charge (see 13.11 (b) of this Subchapter). Each such application must contain the general information and certification by 13.12 (a) of this Subchapter plus the following additional information:

- (1) A description of the area depredations are occurring;
- (2) The nature of the crops or other interests being injured;
- (3) The extent of such injury; and
- (4) The particular species of migratory birds committing the injury.

(e) *Additional permit conditions.* In addition to the general conditions set forth in Part 13 of this Subchapter B, depredation permits shall be subject to the following conditions:

- (I) Permittees may not kill migratory birds unless specifically authorized on the permit.
- (2) Unless otherwise specifically authorized, when permittees are authorized to kill migratory birds they may do so only with a shotgun not larger than No. 10 gauge fired from the shoulder, and only on or over the threatened area or area described on the permit.
- (3) Permittees may not use blinds, pits, or other means of concealment, decoys, duck calls, or other devices to lure or entice birds within gun range.
- (4) All migratory birds killed shall be retrieved by the permittee and disposed of as provided by law.
- (5) Only persons named on the permit are authorized to act as agents of the permittee under authority of the permit.
- (d) *Tenure of permits.* The tenure of depredation permits shall be limited to the dates that appear on its face, but in no case shall be longer than one year.

#### 4.6.4 Migratory Nongame Birds

Migratory nongame birds are all species except game birds, resident nongame birds, and domestic and exotic birds (including gulls, vultures, herons, egrets, etc.) are regulated under Federal law by the USFWS. These regulations allow harassment of migratory birds when the birds are damaging property, but a permit is required for lethal take. Migratory bird permits are not valid for eagles, and threatened and endangered species, which require separate permits for lethal take and harassment. Although states can impose more restrictive regulation than Federal law on migratory birds, Virginia

currently does not require additional permits for migratory birds that are already regulated under Federal law.

#### 4.6.5 Depredation Order Birds

Depredation order birds are (Crows, starlings, blackbirds, and cowbirds) who are protected under the MBTA but may be taken when they are concentrated in such numbers and manner as to constitute a health hazard or other nuisance. Under the Depredation Order (50 CFR § 21.43), no federal permit is required to remove crows. The state of Virginia recognizes the federal regulations and does not require a state permit under these conditions.

CFR 50 Part 21.43

Depredation order for blackbirds, cowbirds, grackles, and crows

A Federal permit shall not be required to control red-winged blackbirds, cowbirds, starlings, and crows, when concentrated in such numbers and manner as to constitute a health hazard or other nuisance: *Provided*

(a) That none of the birds killed pursuant to this section, nor their plumage, shall be sold or offered for sale, but may be possessed, transported, and otherwise disposed of or utilized.

(b) That any person exercising any of the privileges granted by this section shall permit at all reasonable times including during actual operations, any Federal or State game or deputy game agent, warden, protector, or other game law enforcement officer free and unrestricted access over the premises on which such operations have been or are being conducted; and shall furnish promptly to such officer whatever information he may require, concerning said operations.

(c) That nothing in this section shall be construed to authorize the killing of such birds contrary to any State laws or regulations; and that none of the privileges granted under this section shall be exercised unless the person possesses whatever permits as may be required for such activities by the State concerned.

#### 4.6.6 Domestic Birds

Currently State and Federal laws do not regulate these species (Domestic ducks, geese, domestic poultry, etc.) and no permit is required to take them. Domestic waterfowl may become a problem if they are abandoned on airport property. Taking these species should only be done by wildlife personnel trained to distinguish the differences between domestic and wild waterfowl with similar appearances. If other species of feral poultry or exotic birds are observed at ORF, the Wildlife Coordinator should be contacted for assistance with control methods.

### 4.7 MAMMALS

#### 4.7.1 Game Mammals

Game mammals are defined primarily as those species that are hunted for sport, recreation, or meat. Deer have not historically frequented the airfield, but will require control if they enter the Air Operations Area (AOA). A state permit has been obtained to control deer.

threatened or endangered animals are not covered under this provision, and birds protected under the Migratory Bird Treaty Act require a Federal depredation permit (see section 4.6.3 of this plan).

#### 4.7.2 Furbearers

It is likely that furbearers will need to be controlled at ORF and in order to conduct control activities a permit will be required through the VDGIF (see Section 4.2 of this plan).

#### 4.7.3 Non-game Mammals

Few species of non-game mammals are present at ORF, but will need to be controlled when present. Permits are not required to take these species when they damage or could damage property or when observed in the AOA.

### 4.8 REPTILES & AMPIDBIANS

Non-protected reptiles and amphibians can be taken with a permit or appropriate hunting, trapping or fishing license. At their current abundance, only turtles represent a significant hazard at ORF and control measures would involve no lethal control at this time.

### 4.9 PROTECTED WILDLIFE

#### 4.9.1 Federal and State Threatened and Endangered Species

The Federal Endangered Species Act (Sec. 2 [16 U.S.C. 1531]) and Virginia Endangered Species Act both protect animal and plant species potentially threatened with extinction. These acts classify species as endangered or threatened. An "Endangered Species" is defined as "any species or subspecies, which is in danger of extinction throughout all or a significant portion of its range." A "Threatened Species" is defined as "any species or subspecies that is in danger of becoming an endangered species within the foreseeable future throughout or over a significant portion of its range." Once listed, a threatened or endangered species cannot be taken or harassed without a special permit. Eagles are also afforded protection under the U.S. Eagle Protection Act. In Virginia, several additional species are given special protection by being listed as state threatened or endangered species. If a significant hazard exists with a listed species that jeopardizes air safety, either the USFWS or the VDGIF, depending on the protective status of the species involved, should be contacted for assistance. In many cases only personnel from these or other agencies may obtain a permit to take individuals of a specially protected species. Appendix G lists the protected species for

#### 4.9.2 Habitat Conservation

USFWS and VDGIF are responsible for species conservation and recovery plans. These plans require the identification of critical habitat when it is associated with the decline of a species.

Habitat alterations and developments may be prohibited in areas where critical habitat has been designated or where such changes could result in the inadvertent take of an endangered species. Consultation with USFWS or State biologists will help determine on a case-by-case basis whether critical habitat is affected by airport projects, and if so, the necessary mitigation.

#### 4.9.3 Wetlands Mitigation

Wetland modifications may require permits from various agencies, including the USFWS, U.S. Army Corps of Engineers (USCOE), Virginia Department of Environmental Quality and or County. Pre-development mitigation may be required for issuance of a permit. The FAA has outlined a series of procedures (refer to the publication on wetland mitigation banking in the FAA's wildlife section homepage for mitigating wetland impacts resulting from project development. See 40 CFR 1505.3.

#### 4.9.4 Endangered Species List

The USFWS and VDGIF maintain updated lists of endangered and threatened species. Virginia Department of Game and Inland Fisheries current listing of state and federally endangered, threatened, and sensitive species can be accessed on the Internet. Wildlife control personnel at Norfolk International Airport should familiarize themselves with these listed species and their potential occurrence at the airport (Appendix G). Permits are required to harass them and in most cases, a permit will not be granted to lethally remove members of a threatened and endangered species. ORF wildlife control personnel should learn to identify these species and understand the regulatory permitting processes required for their effective management. Habitat critical to listed species is regulated by the USFWS or VDGIF and these regulations should be reviewed to determine their potential effect on ORF's habitat modification plans to reduce wildlife hazards.

The Director of Operations and/or Wildlife Coordinator will work closely with Federal, state, and local agencies to ensure that protected species are not adversely affected and projects do not inadvertently result in increased wildlife hazards to aircraft. The Wildlife Coordinator will carefully review habitat improvement and/or mitigation projects, and if necessary, USDA Wildlife Services and the FAA, to ensure the project do not result in hazardous wildlife attractions. Norfolk International Airport should keep an updated listing of Threatened and Endangered species in the WHMP and should review this list prior to implementing construction projects that may adversely affect listed species (Appendix

#### 4.9.5 Avoiding Impacts to Threatened and Endangered

The WHMP examines resolutions to detect and alleviate wildlife hazards that threaten human health and safety or aircraft operations at ORF. Birds are generally considered the most hazardous form of wildlife at Norfolk International Airport, particularly waterfowl, gulls, raptors, and starlings. Domestic dogs occasionally gain access to the airfield where they pose a strike hazard to aircraft, but this is a relatively infrequent occurrence.

— The proposed actions outlined in the WHMP would involve application of the most appropriate, effective, and biologically sound wildlife control methods available. This approach is known as Integrated Wildlife Damage Management, and includes both habitat management and direct control.

Habitat management provides the best long-term approach for reducing wildlife attractants on or near the airfield. Habitat management measures are discussed in Chapter 3 of the WHMP, and include elimination of standing water, planting alternative ground covers on the airfield, removal of fruit and berry producing vegetation, thinning roost trees, structural exclusion (e.g., netting), and incorporating wildlife considerations in the early planning stages of new construction projects. Direct control efforts generally provide a more immediate response to hazardous situations, but the desired effects are often not as long lasting. Wildlife control and dispersal procedures employed at ORF are discussed in Chapter 6 of the WHMP, and include, pyrotechnic hazing, mylar flash tape, recorded distress calls, vehicular harassment, nest removal, selective trapping, and shooting with air rifles and/or shotguns.

Control methods at ORF would not have an effect on listed endangered or threatened species because capture and removal methods that are used at ORF are selective and would allow for positive identification of target animals.

Hazing and lethal control methods such as shooting and live trapping are selectively directed at target individuals.

#### 4.10 PESTICIDE APPLICATOR LICENSE

Authorization to use restricted-use pesticides for the removal of hazardous wildlife (e.g., blackbirds, starlings) or prey-base (e.g., rodents, insects, earthworms, and weeds) is limited to Certified Pesticide Operators or persons under their direct supervision. To obtain the necessary license to apply restricted-use pesticides, a person must pass an exam administered by Virginia State Department of Agriculture (see directory in Chapter 9). All ORF personnel that use restricted-use chemicals will first obtain a pesticide applicator's license or be under the direct supervision of an applicator. Use of all pesticides will strictly adhere to the pesticide label and should follow U.S. EPA, Ecology, and County guidelines.

## 5.0 - RESOURCES

*FAR 139.337(/)(4) Identification of resources to be provided by the certificate holder for implementation of the plan.*

### 5.1 OVERVIEW

Habitat Management and wildlife control supplies can be purchased from several companies. Trained personnel should keep an adequate supply of equipment on hand at ORF for use.

### 5.2 AIRPORT SUPPLIES

Supplies that may be stocked at the airport include:

- 15 mm pyrotechnic pistol launchers (Bird bombs/bangers, screamers, and whistlers)
- 12 gauge break action shotgun and bird shot ammunition
- Cleaning kits for all firearms
- Field guide for local bird identification
- Mylar tape
- Snare/catch pole
- Cage trap for dogs (e.g., Tomahawk 110B)
- Cage trap for cats/opossums/raccoons (e.g., Tomahawk 108)
- Rat/mouse traps snap traps
- Binoculars
- Pellet rifle and pellets
- Latex gloves
- Garbage bags
- Gallon-size re-sealable sandwich bags
- "Prevention and Control of Wildlife Damage" reference manual
- Freezer to preserve bird carcasses found on runways

### AIRPORT SUPERVISORS AND RAMP CONTROLLER VEHICLES

The Airport vehicles are stocked with the supplies listed below to facilitate an immediate response to wildlife hazards. They will be responsible for responding to emergency calls from the ORF tower or the Wildlife Coordinator to disperse animals from the runways. They maintain radio communications with the tower if there is a situation within the AOA Movement Area, and the patrols shall operate within the air movement areas according to FAA guidelines. At a minimum, supplies to be maintained in their vehicles include at least:

- 15 mm pyrotechnic pistol launchers
- An adequate supply of 15 mm pyrotechnics (hangers, whistlers, etc.)
- Bird identification field guide
- Binoculars
- Latex gloves
- Garbage bags
- Gallon-size re-sealable sandwich bags

### **5.3 USDA-WILDLIFE SERVICES ASSISTANCE**

Some supplies such as traps and other wildlife damage management tools are available through USDA Wildlife Services for conducting specific control operations. ORF can enter into an Agreement with USDA Wildlife Services to perform various wildlife damage management activities. USDA currently provides ORF personnel with training to conduct the work. This training is conducted by a qualified wildlife biologist in accordance with Part 139 standards.

## **6.0- WILDLIFE CONTROL PROCEDURES**

*FAR 139.337(/)(5) Procedures to be followed during air carrier operations including at least .•.*

*139.337(/)(S)(i) Assignment of personnel responsibilities for implementing the procedures;*

Personnel responsibilities are described and delineated in Chapter 2.

*139.337(/)(S)(ii) Conduct of Physical inspections of the movement areas and other areas critical to wildlife hazard management sufficiently in advance of air carrier operations to allow time for wildlife controls to be effective;*

ORF Fire Department frequently conducts physical inspections of movement areas and other areas critical to wildlife hazard management as part of the daily protocol. The Wildlife Coordinator documents observed wildlife and records the data on a daily activity report.

*139.337(/)(S)(iii) Wildlife control measures;*

### 6.1 OVERVIEW

Wildlife that is identified as hazardous during and after the completion of the recommended habitat modifications will be controlled using accepted direct control techniques.

### 6.2 WILDLIFE PATROL

ORF's wildlife patrol crew should consist of the Fire Department, the Wildlife Coordinator, and Field Maintenance personnel. The patrol monitors and responds to wildlife hazards on the airfield. The patrol shall monitor the tower, in accordance with FAA radio protocols. All observations of wildlife activity are recorded in the Daily Activity Report. Routine runway sweeps are conducted at least twice per day, and the presence of any deceased wildlife found from strikes or suspected strikes should be recorded in the daily activity report. Other wildlife- related activities (e.g., notable hazards, animals killed or dispersed, unusual wildlife behavior, etc.) will be logged on the Daily Activity Report. All dead birds or mammals found on or within 200' of runways and taxiways will be considered the result of a strike unless the death was obviously due to some other cause.

Any bird or mammal remains that are found are bagged, labeled (e.g., time and date found, location on runway, person who found remains, etc.), and placed in a freezer for later inspection and identification. Wildlife strikes may be submitted electronically to the FAA at <http://wildlife-mitigation.tc.faa.gov>. A printout of the strike report must also be submitted to the Director of Operations and Wildlife Coordinator so that the situation can be assessed.

## 6.2 GENERAL WILDLIFE CONTROL

Wildlife control personnel to determine a practical solution will analyze each wildlife hazard that develops. The initial response for most species will be to haze them with frightening devices, followed by population control methods when necessary.

## 6.4 BIRD CONTROL

Several species of birds are present at ORF and represent the most significant potential for causing damaging strikes. Although resident Canada Geese are of primary concern, migratory species are also a great concern. Bird harassment will be employed whenever possible, but removal will be performed as necessary.

## 6.5 MAMMAL CONTROL

Potential hazards from the majority of mammal species at ORF should be reduced through habitat modifications and the improvement of fencing and other exclusionary devices. Occasionally raccoons and fox will gain access to the airfield. However, smaller mammals still exist on the airfield at low densities, and can provide an attraction to larger predators and raptors. The Wildlife Coordinator will monitor the rodent population and removal will be performed as necessary.

## 6.6 USDA-WILDLIFE SERVICES ASSISTANCE

USDA Wildlife Services can provide technical assistance and/or direct control assistance, if requested. Many of the control techniques for mammals differ from bird hazard control techniques, and require specialized experience and permits. These permits are in place as noted in Appendix C.

## 6.7 CITY OF NORFOLK ANIMAL CONTROL ASSISTANCE

City of Norfolk Animal Control is also available to help with free-ranging dogs and cats. If the animal poses an immediate threat to aviation, wildlife control personnel will attempt to catch, disperse, or lethally remove it.

*139.337(/)(S)(iv) Communication between wildlife control personnel and any air traffic control tower in operation at the airport;*

All wildlife control personnel are equipped with radios and have proper training to contact the air traffic control tower. If an immediate hazard exists that might compromise the safety of air traffic at ORF, the Director of Operations or the Wildlife Coordinator shall coordinate with the air traffic control tower, and if necessary, detain arriving or departing air traffic until the hazard is eliminated. In extreme cases, the runway may need to be closed temporarily at the discretion of the Director of Operations. Although the air traffic control tower cannot be expected to monitor all wildlife hazards on the airfield and still direct air traffic, tower personnel regularly notify the Fire Department immediately if pilots report hazards or any such hazards are observed from the tower.

## **7.0 - EVALUATION**

### 7.1

*FAR 139.337(/)(6) Periodic evaluation and review of the wildlife hazard management plan for...*

#### 7.1 OVERVIEW

The WHMP will be evaluated at least annually. The Wildlife Hazard Working Group will determine the effectiveness of the WHMP at reducing wildlife strikes at ORF and monitor the status of hazard reduction projects, including their completion dates.

#### 7.2 MEETINGS

The Wildlife Hazard Working Group will meet at least once per year, but the group may convene more regularly if situations warrant, as determined by the Director of Operations.

#### 7.3 WILDLIFE STRIKE DATABASE

The USDA Wildlife Services program can monitor the National Wildlife Strike Database for wildlife strikes on the airfield and surrounding areas. Information from this database will be used to identify trends and to monitor any increases in wildlife hazards on the airfield. If unacceptable increases in wildlife strikes are observed, the cause should be determined and the WHMP modified to address the problem.

#### 7.4 AIRPORT EXPANSION

Airport expansion plans will be reviewed by the Wildlife Hazard Working Group to ensure that new developments will not inadvertently result in increased wildlife hazards to aircraft operations. If appropriate, they will coordinate designs with the FAA and USDA Wildlife Services.

#### 7.5 FAA INVOLVEMENT

FAA Regional Certification Inspectors and personnel from the Local/ Regional Airports District Office (ADO) should be invited to make comments on the WHMP and to attend annual meetings on plan modifications.

## **8.0 - TRAINING**

### 8.1

*FAR 139.337(/)(7) a training program to provide airport personnel with the knowledge and skills needed to carry out the wildlife hazard management plan...*

#### 8.1 OVERVIEW

Training is essential for personnel involved in the WHMP. The Director of Operations should ensure that all personnel that might be working in a wildlife deterrence capacity are trained in the proper selection and application of control methods as well as wildlife species identification.

This training is conducted at least once every 12 months by a qualified wildlife biologist as defined by 14 CFR Part 139.

#### 8.2 STANDARD TRAINING

Wildlife control personnel should receive training in mitigating wildlife hazards at airports, including an overview of laws associated with wildlife control, techniques used for prey-base reductions, effective use of firearms and pyrotechnics (including hands-on training), and wildlife identification and dispersal techniques. Airport communications and driver training should also be provided to all employees involved in wildlife control operations that may require them to operate on the AOA. AOA Driver training is completed at least once every 12 months.

#### 8.3 USDA-WILDLIFE SERVICES TRAINING

USDA Wildlife Services can provide a training course for wildlife patrol personnel. The purpose of the course is to familiarize personnel involved with airport operations in basic wildlife identification and dispersal techniques. The course also involves hands-on training using pyrotechnics, and other deterrent equipment, with an emphasis on safety and effectiveness.

All personnel who have responsibilities in dispersing wildlife at Norfolk International Airport should take this training. The training would be customized to fit the needs of individual recipients and situations.

## 9- AGENCY DIRECTORY

### REGULATORY AND ENFORCEMENT

*U.S. Fish and Wildlife Service (Wildlife Permitting)*

Migratory Bird Permits

PO Box 779

Hadley, MA 01035-9589

Phone (413)253-8643

Fax (413) 253-8424

*Virginia Department of Game and Inland Fisheries*

*(Law enforcement and Permitting)*

3801 John Tyler Memorial Hwy

Charles City, VA 23030

Phone (804) 829-6580

Fax (804) 829-6788

*State Department of Environmental Quality (Air, Water, and Waste Issues)*

Surface Water Investigations:

900 Natural Resources Dr. STE 600

Charlottesville, VA 22903

Phone: (434) 293-1020

Air Monitoring Office:

4949-C Cox Road

Glen Allen, VA 23060

*Federal Aviation Administration (FAA)*

Safety and Standards Branch

**John Green, Certification Inspector** Federal Aviation Administration Eastern Region

1 Aviation Plaza

Jamaica, NY 11434

Phone- (718) 553-3342

Airports District Office (ADO)

Terry Paige, ADO Manager

23723 Air Freight Lane

Suite 210

Dulles, VA 20166

Phone (703) 661-1357

MUNICIPAL AGENCIES

*Animal Protection Unit*  
Norfolk, VA 23502  
Phone (757) 664-7387

*Norfolk International Airport*  
Steve Sterling, Director of Operations  
Norfolk International Airport  
2200 Norview Avenue  
Norfolk, VA 23518  
Phone (757) 857-3351

TECHNICAL ASSISTANCE

*U.S. Department of Agriculture, Wildlife Services* David Allaben, Supervisory Wildlife Biologist  
PO Box 130  
Moseley, VA 23120  
Phone (804) 739-7739

*VA Cooperative Extension Service*  
830 Southampton Avenue  
Suite 2069  
Norfolk, VA 23510-1045

*Virginia Department of Agriculture (Pesticides Management)*  
102 Governor St, 1<sup>st</sup> Floor  
Richmond, VA 23219  
Phone 804.371.6558

## **10.0- LITERATURE CITED**

United States Dept. of Agriculture, Animal Plant Health Inspection Service, Wildlife Services. 1998. Wildlife Hazard Management at Airports 2<sup>nd</sup> Edition, 2005. USDA APHIS Wildlife Services, Washington D.C. 76pp.

**APPENDIX B**  
**FAA WILDLIFE HAZARD ASSESSMENT DETERMINATION**  
**NORFOLK INTERNATIONAL AIRPORT**



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

Eastern Region, Airports Division

1 Aviation Plaza, Room 516  
Jamaica, NY 11434-4809

T: (718) 553-3330  
F: (718) 995-5615

July 20, 2009

Mr. Wayne E. Shank, A.A.E.  
Executive Director  
Norfolk International Airport  
2200 Norview Avenue  
Norfolk, VA 23518-5897

Re: Wildlife Hazard Site Visit

Dear Mr. Shank:

Aircraft collisions with wildlife annually cost the US aviation industry over \$300 million in direct damage and associated costs and over 500,000 hours of aircraft down time. The cost in human lives lost (over 100 since 1960) best illustrates the need for management of the wildlife strike problem. Bird strike related reports are enclosed for your information.

Part 139.337(b) requires that a certificate holder provide for the conduct of a Wildlife Hazard Assessment if an air carrier aircraft experiences multiple wildlife strikes, an engine ingestion of wildlife, or an air carrier experiences substantial damage from striking wildlife. Part 139 also requires that an assessment be conducted if wildlife of a size or in numbers capable of causing one of these events is observed to have access to any airport flight pattern or aircraft movement area.

If the airport notes wildlife hazards on or near the airport in the Airport Facility Directory (AFD), on Notice to Airmen (NOTAMS), or on the Automated Terminal Information Service (ATIS), the airport may be required to conduct a Wildlife Hazard Assessment.

For airports that have previously had a Wildlife Hazard Assessment, a new Wildlife Hazard Assessment may be required when land use on or near the airport changes, when increases in wildlife activity are identified, or when changes in species using the airport or vicinity are identified, because these changes may result in increased attraction of wildlife or increased wildlife hazards. A new Wildlife Hazard Assessment may also be required when an increase in wildlife strikes or change in species involved in wildlife strikes is identified and is not due to increased reporting of strikes which is typical shortly after implementation of a WHMP.

The wildlife hazard management process begins with the conduct of a Wildlife Hazard Site Visit by a Wildlife Biologist from USDA Wildlife Services (WS) or a

qualified private contractor. This preliminary assessment consists of a one or two day site visit, including day and night observations, by a qualified Wildlife Biologist. The purpose of the preliminary assessment is to provide immediate assistance to an airport operator in managing a wildlife hazard and to determine if the airport has a significant wildlife problem which would require a new more extensive year long study of the seasonal fluctuations of wildlife activity.

Based on the recent wildlife activity at your airport, the FAA requires that a Wildlife Hazard Site Visit be scheduled for your airport within 30 days of the date of this letter. Please forward the Wildlife Hazard Site Visit findings to our attention within 15 days of receipt. Our office will then review the findings to determine if a new, year long **Wildlife Hazard Assessment** is necessary.

Airport operators will need to enter into a cooperative service agreement with USDA WS or a qualified private contractor for the study and other services such as training of airport personnel in wildlife hazard reduction programs. Qualified private contractors must meet the criteria identified in AC 150/5200-36, Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculum for airport personnel involved in controlling wildlife hazards on airports.

Please note that the FAA Wildlife Biologist in Washington DC is currently verifying the credentials of various private companies to determine if they meet the qualifications required under AC 150/5200-36. Please contact Mr. John Weller directly with any questions regarding qualification verification at 202-267-3778 or via email to [john.weller@faa.gov](mailto:john.weller@faa.gov). Please forward the Washington Headquarters approval letter upon notification.

A detailed manual titled, "*Wildlife Hazard Management at Airports*", is available on the national FAA Airports web site. Go the link under Manuals and Current Reports at ([http://wildlife-mitigation.tc.faa.gov/public\\_html/index.html](http://wildlife-mitigation.tc.faa.gov/public_html/index.html)). This manual will provided valuable assistance to airport staff in developing, implementing, and evaluating Wildlife Hazard Management Plans.

Should you have any questions please call Ms. Evelyn Martinez, Lead Airport Certification Safety Inspector at 718-553-3348.

Sincerely,



A. Harvey DeGraw  
Manager, Safety and Standards Branch  
Airports Division

References:

[http://wildlife.pr.erau.edu/EnglishManual/2005 FAA Manual complete.pdf](http://wildlife.pr.erau.edu/EnglishManual/2005_FAA_Manual_complete.pdf)

[http://www.faa.gov/airports airtraffic/airports/resources/publications/orders/media/aip 5100 38c.pdf](http://www.faa.gov/airports%20airtraffic/airports/resources/publications/orders/media/aip_5100_38c.pdf)

Enclosures: Airport Wildlife Strike Report

cc: Terry Page, WASADO  
Carl Knauer, USDA APHIS  
Robert Bowen, ORF Operations  
Cert files  
Day files  
Wildlife folder

FAA NATIONAL WILDLIFE STRIKE DATABASE INDIVIDUAL STRIKE REPORT				
Incident Date: 02-02-2009	Operator ID: AWI	Operator: AIR WISCONSIN AIRLINES		ACCESS Ref Nr: 151225
Aircraft Type: CL-RJ100/200	A/C Make: 188	A/C Model: 10	Eng Make: 22	Eng Model: 04
Registration: N421ZW	Time of Day: DAY	Time: 11:00	Runway: 23	Damage Code*: S
Flight Nr: 3597	Height: 200	Speed: 141	Location Enroute:	
Airport Code: KORF	Airport: NORFOLK INTL		State: VA	FAA Region: AEA
	<b>Struck</b>		<b>Damaged</b>	
	Radome	<input type="checkbox"/>	Radome	<input type="checkbox"/>
	Windshield	<input type="checkbox"/>	Windshield	<input type="checkbox"/>
	Nose	<input type="checkbox"/>	Nose	<input type="checkbox"/>
	Engine #1	<input type="checkbox"/>	Engine #1	<input type="checkbox"/>
	Engine #2	<input type="checkbox"/>	Engine #2	<input type="checkbox"/>
	Engine #3	<input type="checkbox"/>	Engine #3	<input type="checkbox"/>
	Engine #4	<input type="checkbox"/>	Engine #4	<input type="checkbox"/>
	Birds Ingested	<input type="checkbox"/>	Other (Specify):	
	Propellor	<input type="checkbox"/>	Propellor	<input type="checkbox"/>
Wing/Rotor	<input checked="" type="checkbox"/>	Wing/Rotor	<input type="checkbox"/>	
Fuselage	<input type="checkbox"/>	Fuselage	<input type="checkbox"/>	
Ldg Gear	<input type="checkbox"/>	Ldg Gear	<input type="checkbox"/>	
Tail	<input type="checkbox"/>	Tail	<input type="checkbox"/>	
Lights	<input type="checkbox"/>	Lights	<input type="checkbox"/>	
Other	<input type="checkbox"/>	Other	<input type="checkbox"/>	
Phase of Flt: APPROACH	Effect on Flight: NONE		Sky: NO CLOUD	Precipitation: NONE
	Other Effect:		Nr Injuries:	Nr Fatalities:
Wildlife/Bird Remains: <input type="checkbox"/> Collected <input type="checkbox"/> Sent To Smithsonian				
Species ID: H4105	Species**: DOUBLE-CRESTED CORMORANT	Nr Seen: 2-10	Nr Struck: 1	Size: MEDIUM
Pilot Warned: Y	Remarks: BIRD REPTD AS CORMORANT, ASSUME DOUBLE-CRESTED. PILOT REPTD STRIKE A BIRD ON APCH. NO REMAINS FOUND. HE SAW SEVERAL BIRDS. DMG TO RT WING FLAP. NO EFFECT ON FLT. PHOTOS.			
Aircraft Out of Service (Hrs):	Original Cost of Repairs (US\$): 50,000	Original Other Costs (US\$):		
Comments: XXXX-X-X-XXXXXX				
Reported By: C LAVENE		Title: FIRE CHIEF		Date:
Source:		Person Reporting:		Last Updated:

FAA FORM 5200-7-E

AIRPORT OPERATIONS

06-02-2009

\* Damage Codes (Civilian) - N (None), M (Minor), M? (Damage, but extent unknown), S (Substantial) and D (Destroyed).

Damage Codes (Military) - Class A (Over \$1,000,000), Class B (\$200,000 - 1,000,000), Class C (\$20,000 - \$200,000), Class N/Class Class E (No Damage or Damage Less Than \$20,000).

See Memorandum of Agreement (Glossary) for exact definitions of damage codes.

\*\* Species - For additional information on various species, please see [The North American Breeding Bird Survey Results and Analysis](#).

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Back To  
[Wildlife Strike Database Query Results](#)

Prepared for the FAA by  
Embry-Riddle Aeronautical University  
Prescott, AZ  
Revised: ARN, April 29, 2009

## Daily Reports

NORFOLK AIRPORT, VA: US AIRWAYS FLIGHT 1818, AN E190, LANDED ON RUNWAY 23 AFTER REPORTING A BIRD STRIKE WHILE INBOUND. THE ARFF RESPONDED AND THE AIRCRAFT TAXIED TO THE GATE. DAMAGE: NONE, 7/17/09 1420Z

*Blackbird*

\*NORFOLK AIRPORT, VA: COMMONWEALTH JET SERVICES FLIGHT 7371, A CRJ7, STRUCK A BIRD DURING DEPARTURE FROM RUNWAY 5. THE FLIGHT CONTINUED THE FLIGHT. 7/9/09 1010Z *DCCO*

**APPENDIX C**  
**WS WILDLIFE HAZARD EVALUATION LETTER**  
**NORFOLK INTERNATIONAL AIRPORT**



United States  
Department of  
Agriculture

Animal and  
Plant Health  
Inspection  
Service

Wildlife Services

PO Box 20085  
Washington, DC  
20041

(703) 572-6836

October 19, 2009

Robert Bowen  
Director of Operations  
Norfolk International Airport  
Norfolk Airport Authority

Mr. Bowen,

Wildlife Services (WS) conducted a consultation site visit to evaluate potential wildlife hazards to aviation at Norfolk International Airport (ORF) on August 17<sup>th</sup> and August 18<sup>th</sup>, 2009. The site visit was conducted at the request of ORF and the Federal Aviation Administration (FAA) to determine if a subsequent Wildlife Hazard Assessment would benefit aviation safety at the airport.

During the site visit, WS conducted surveys of the aircraft operations area (AOA) and surrounding airport property to assess wildlife usage of the area. Potential wildlife attractants and habitat types were noted and evaluated during these surveys. Information was obtained from airport personnel regarding the history and current status of wildlife hazard management at ORF. The following information will provide a summary of information collected during the consultation and will provide recommendations to reduce wildlife hazards to aviation at ORF.

### **General Information**

Norfolk International Airport is owned and managed by the Norfolk Airport Authority. Commercial air carriers, general aviation, and air cargo utilize ORF. Nearly 110,000 aircraft movements occurred on the airport's two runways, 5/23 and 14/32, in 2008. ORF has averaged 123,882 annual aircraft movements during the past five years (2004-2008).

Norfolk International Airport covers 1,300 acres and is bordered on the North by the Norfolk Botanical Gardens and East by an industrial park and small neighborhood. Little Creek Amphibious Base and Lake Wright Golf Course are also in close proximity of the AOA.

### **Wildlife Habitat**

There are numerous habitat features on the AOA and surrounding areas that are highly attractive to hazardous wildlife. The vast number of fresh and salt water bodies in close proximity to the airport is a contributing factor to the abundance of wildlife in the area and of major concern to aviation safety. Lake Whitehurst and Denny's Canal offer food and shelter for numerous wildlife species directly adjacent to or within the AOA. These two bodies of water border the airport on 3 sides and create a significant attractant for wading birds, waterfowl, gulls, and fish-eating birds such as osprey and cormorants. The Chesapeake Bay, Little Creek, Little



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Creek Reservoir, and Lake Wright also fall within the 10,000 foot separation distance (distance recommended by the FAA between the airport and wildlife attractants; FAA AC 150/5200-33b) and are considered areas of concern for concentrations of hazardous wildlife.

The wetland area east of runway 5/23, between Lake Whitehurst and the radar site, provides roosting habitat for at least two species of blackbirds; red-winged blackbirds and common grackles. This wetland area was not surveyed during the site visit, but wetland vegetation such as cattails and phragmites could be observed from the AOA. These wetland plants grow in thick stands which provide excellent shelter for roosting or nesting blackbirds.

There are several small to medium sized wooded areas within the AOA that serve as loafing, perching, and roosting locations for several bird species as well as cover for small mammals such as rabbits, raccoons, and fox. These areas also provide a food source for a variety of bird and mammal species through the availability of seeds, fruit, and vegetation at certain times of the year. Several persimmon trees were noted within the AOA area near the radar, which provides a food source for red and gray fox, raccoons, and some seed eating birds. Blackberry bushes, which provide a preferred wildlife food source, were also noted.

Grass management practices at ORF were optimal at the time of the site visit. Grass heights were measured at 10-12 inches throughout the airfield, which is short enough to avoid concealing hazardous mammals, but long enough to deter many bird species. By mowing the grass frequently at a height of 7-14 inches, grass height is maintained higher than it would be with less frequent mowing at shorter heights. Some grass areas had grown to the point of having seed heads, but these areas were being mowed at the time of the site visit.

### **Wildlife Strikes**

From 1990-2008, 431 wildlife strikes were reported to the FAA Wildlife Strike Database for ORF. Thirty-six were reported as damaging strikes, with more than \$400,000 in associated costs. Strike rates per 10,000 aircraft movements (AM) have increased each year since 2003. Damaging strike rates have been sporadic with no identifiable trends. The 2005, 2007, and 2008 damaging strike rates were higher than the average of 1993-2008 (0.17 damaging strikes/10,000 AM). It should be noted that data derived from the FAA Wildlife Strike Database may be variable dependent upon airport and air carrier reporting standards. (Source: [http://wildlife-mitigation.tc.faa.gov/public\\_html/index.html](http://wildlife-mitigation.tc.faa.gov/public_html/index.html))

**Table 1. Wildlife strikes and damaging wildlife strikes rates per 10,000 aircraft movements at ORF, 1993-2008.**

Year	Aircraft Movements (AM)	Strikes	Strikes per 10,000 AM	Damaging Strikes	Damaging Strikes per 10,000 AM	Reported Cost
1993	135,000	18	1.33	1	0.07	\$ 50,000
1994	142,406	23	1.62	4	0.28	\$ 3,129
1995	136,979	29	2.12	5	0.37	-
1996	139,980	28	2.00	0	0.00	-
1997	139,061	14	1.01	2	0.14	\$ 250
1998	158,805	20	1.26	3	0.19	\$ 115,686
1999	140,865	15	1.06	2	0.14	\$ 205,000
2000	124,690	10	0.80	0	0.00	-
2001	119,309	22	1.84	4	0.34	-
2002	125,622	29	2.31	2	0.16	\$1,478
2003	121,373	14	1.15	2	0.16	-
2004	122,962	20	1.63	1	0.08	-
2005	122,641	20	1.63	5	0.41	\$ 30,000
2006	128,715	22	1.71	0	0.00	-
2007	135,098	34	2.52	3	0.22	-
2008	109,992	32	2.91	2	0.18	\$ 300
<b>1993-2008</b>	<b>2,103,498</b>	<b>350</b>	<b>1.66</b>	<b>36</b>	<b>0.17</b>	<b>\$405,843</b>

Of the strikes reported to the FAA Wildlife Strike Database from 1990-2008, gulls were the most frequently struck species group at 39%, (all gull strikes listed in Table 2). Gulls are the 11<sup>th</sup> most hazardous bird species to aviation safety, according to a ranking in the FAA AC 150/1500-33B "Hazardous Wildlife Attractants On Or Near Airports." Geese were the second most frequently struck species at 7% (all geese strikes listed in Table 2), of all species struck and are ranked as the 2<sup>nd</sup> most hazardous bird species to aviation safety. Raptors, such as hawks, osprey, American kestrel, and bald eagles accounted for 25% of wildlife strikes at ORF between 1990 and 2008, while blackbirds (European starlings, red-winged blackbirds, common grackles, and brown-headed cowbirds) accounted for 24% of wildlife strikes during the same timeframe.

Only 4 mammal strikes have been reported to the FAA Wildlife Strike Database for ORF since 1990; 1 bat strike, 1 raccoon strike, and 2 fox strikes.

**Table 2. Total number of reported wildlife strikes by species, 1990-2008.**

<b>Species</b>	<b>Strike Incidents</b>	<b>% of Total</b>
GULLS	154	36%
UNKNOWN BIRD – SMALL	57	13%
UNKNOWN BIRD	34	8%
UNKNOWN BIRD – MEDIUM	31	7%
CANADA GOOSE	28	6%
SPARROWS	16	4%
EUROPEAN STARLING	15	3%
HAWKS	10	2%
UNKNOWN BIRD – LARGE	8	2%
BLACKBIRDS	7	2%
LAUGHING GULL	7	2%
MOURNING DOVE	7	2%
OSPREY	7	2%
ROCK PIGEON	7	2%
AMERICAN KESTREL	6	1%
DUCKS	6	1%
RING-BILLED GULL	5	1%
BARN SWALLOW	3	1%
GREAT BLUE HERON	3	1%
BALD EAGLE	2	<1%
CROWS	2	<1%
FOXES	2	<1%
HERONS	2	<1%
UNKNOWN BIRD OR BAT	2	<1%
AMERICAN ROBIN	1	<1%
BATS	1	<1%
BROWN-HEADED COWBIRD	1	<1%
COMMON GRACKLE	1	<1%
GEESE	1	<1%
HERMIT THRUSH	1	<1%
HERRING GULL	1	<1%
MALLARD	1	<1%
PLOVERS	1	<1%
RACCOON	1	<1%
<b>Grand Total</b>	<b>431</b>	<b>100%</b>

### **Wildlife Surveys**

Bird Surveys were conducted over three periods throughout the day at sunrise, mid-day, and evening to assess wildlife usage of the AOA and surrounding areas. Common grackles were the most abundant species, followed by red-winged blackbirds. A large blackbird roost consisting of common grackles and red-winged blackbirds was observed during the evening survey. Several

thousand grackles and red-winged blackbirds crossed runway 5/23 as they moved from staging areas east and west of ORF to the wetland area between Lake Whitehurst and the radar. European starlings were the third most abundant species observed. Mourning doves, American crows, and killdeer were the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> most abundant species and were observed throughout the day on each survey period. Flying locally was the predominant behavior observed and shrub, runway, and short grass were the primary cover types utilized. Several Canada geese were observed within the AOA and on Lake Whitehurst during the bird survey. Incidental observations of Canada geese occurred throughout the day near Lake Wright Golf Course on the south eastern border of the airport property and on residential properties bordering Lake Whitehurst.

A night-time survey was conducted using a Forward Looking Infrared (FLIR) device and a spotlight to identify mammals observed. During the night-time survey, 1 rabbit, 1 feral cat, 2 gray fox, and 1 raccoon were observed. All of these wildlife species were observed between the hours of 10:00 pm and 12:00 am. These species were observed in the wooded areas near the radar site.

It is important to note that the surveys conducted at ORF during the site visit represent a snapshot of wildlife abundance at a particular time. The results of the surveys are not necessarily reflective of species abundance, diversity, and activity throughout the year since these factors may vary widely from month to month.

**Table 3. Wildlife observations from 3 wildlife surveys conducted at ORF, 8/17/09-8/18/09.**

Species	Number Observed	Percent of Surveys Species Observed In	Max Number Observed in a Single Survey	Avg. Number Seen per Survey
Common Grackle	34000	33.33%	34000	11333
Red-winged Blackbird	9501	66.67%	9500	3167
European Starling	377	66.67%	227	126
Mourning Dove	80	100.00%	43	27
American Crow	57	100.00%	46	19
Killdeer	34	100.00%	17	11
Canada Goose	29	66.67%	28	10
Barn Swallow	14	100.00%	5	5
Northern Mockingbird	7	66.67%	6	2
Laughing Gull	6	33.33%	6	2
Great Blue Heron	5	66.67%	4	2
Ring-billed Gull	5	66.67%	4	2
Rock Dove	5	33.33%	5	2
Eastern Bluebird	4	33.33%	4	1
Osprey	4	66.67%	3	1
Eastern Meadowlark	3	66.67%	2	1

throughout the fall, winter, and spring months when wildlife abundances are inflated due to migration.

3. Canada Goose Management – Continue aggressive resident Canada goose management, especially in areas that have historically been problem areas such as Lake Whitehurst, Lake Wright, and Little Creek. Goose roundups should be considered throughout the 10,000 foot separation distances and egg oiling programs could be implemented wherever nesting Canada geese are observed within the 10,000 foot separation distance.
4. Woodland Management – Replacing wooded areas with short grass habitat would reduce the edge effect that is currently in place, which in turn would reduce the number of species utilizing these areas. Because the wooded areas are used by various bird species for loafing, feeding, roosting, and nesting, replacing these areas with short grass would increase the distance of the nearest preferable habitat from the runway and thus push many species from the airfield. Woodland and shrub areas are also known to harbor more small mammals than short grass habitat, which increases the available food for raptors and carnivores.

WS recommends that any tree removal conducted in these areas be conducted so as to leave the area maintainable in the future. A small group of trees on the south side of the airfield were “topped”, leaving shrub habitat interspersed with tree trunks that cannot be easily maintained. These areas can create more favorable habitat for bird and mammal species by increasing “edge” which increases species diversity.

### **Conclusion**

Based on observations during the site visit, WS recommends that an updated Wildlife Hazard Assessment be conducted. A more complete evaluation is warranted due to the great diversity and quantity of hazardous wildlife species that utilize ORF and the surrounding area. An updated WHA will identify any changes in species usage of the AOA and provide a comprehensive evaluation of the current wildlife hazard conditions at ORF. A WHA update will also be useful in updating the ORF Wildlife Hazard Management Plan to prioritize wildlife hazard management objectives.

Existing and potential wildlife attractants should be considered during the planning and implementation phases of planned construction and expansion projects at ORF. An updated WHA would provide better information to assist with construction planning to reduce wildlife attractants and protect aviation safety. Wildlife monitoring associated with the WHA process would allow

ORF to assess impacts of construction projects continuously and implement immediate mitigation measures to reduce hazards.

If you have questions concerning the information contained in this letter or need further assistance in reducing wildlife threats to aviation safety, please contact me at the address and phone number at the top of this letter.

Sincerely,

A handwritten signature in cursive script that reads "Ryan M. Stewart". The signature is written in black ink and is positioned above the printed name.

Ryan Stewart  
Wildlife Biologist

cc: Scott C. Barras, State Director, USDA, APHIS, Wildlife Services  
Jennifer Cromwell, Assistant State Director, USDA, APHIS, Wildlife Services  
David Allaben, SE District Supervisor, USDA, APHIS, Wildlife Services  
Evelyn Martinez, Lead Airport Certification Safety Inspector, FAA  
John Weller, Wildlife Biologist, FAA

**Picture 1. Shrub area near Runway 5/23.**



**Picture 2. Open dumpster in need of replacement or repair near General Aviation hangars.**



**Picture 3. Waterfowl loafing area at Norfolk Botanical Gardens.**



**Picture 4. Canada goose feeding in AOA near maintenance shops; approach end of runway 5.**



**Picture 5. Common grackle and red-winged blackbird mixed flock moving to roost site, east of runway 23.**



**Picture 6. Common grackles moving to roost site, east of runway 23.**



**Picture 7. Common grackles flying over runway 23.**



**Picture 8. Common grackles and red-winged blackbirds flying over runway 23.**



**Picture 9. Section of Denny's Canal within the AOA, approach end of runway 5.**



**Picture 10. Wooded area located near radar.**



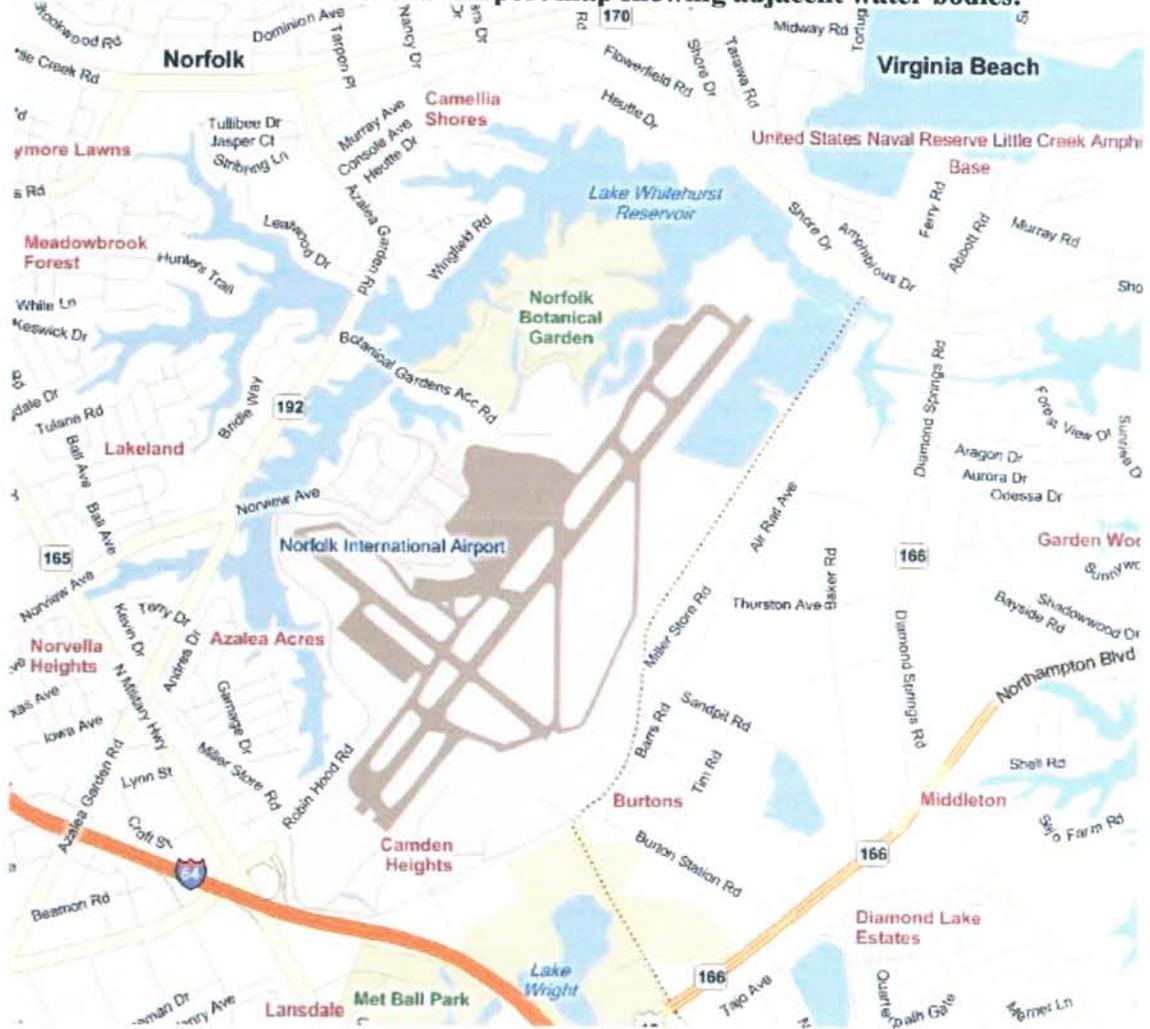
**Picture 11. Persimmon fruit from several persimmon trees in wooded area near radar.**



**Picture 12. Persimmon trees located near the radar.**



Picture 13. Norfolk International Airport map showing adjacent water bodies.



**APPENDIX D**  
**FAA CERTALERT 04-09**  
**RELATIONSHIP BETWEEN FAA AND WS**

# CERTALERT

**ADVISORY \* CAUTIONARY \* NON-DIRECTIVE**

FOR INFORMATION, CONTACT ED CLEARY, AAS-317 (202) 267-3389

<b>DATE:</b>	<b>August 30, 2004</b>	<b>No. 04-09</b>
<b>TO:</b>	<b>Airport Certification Program Inspectors</b>	
<b>TOPIC:</b>	<b>Relationship Between FAA and WS</b>	

## CANCELLATION

Certalert 97-02, Relationship Between FAA And WS, Dated April 25, 1997, is cancelled.

## PURPOSE

This Certalert clarifies the roles of, and relationship between the Federal Aviation Administration (FAA) and the United States Department of Agriculture/Animal and Plant Health Inspection Service/Wildlife Services (WS) with regards to wildlife hazards on or near airports.

## FEDERAL AVIATION ADMINISTRATION

The FAA issues airport operating certificates for airports serving certain air carrier aircraft under Title 14, Code of Federal Regulations, Part 139. Section 139.337 requires certificated airports having a wildlife hazard problem to develop and implement a Wildlife Hazard Management Plan to manage and control wildlife, which present a risk to public safety, caused by aircraft collisions with wildlife. The FAA relies heavily on the assistance of WS to review and contribute to such plans.

## ANIMAL DAMAGE CONTROL

The Animal Damage Control Act of March 2, 1931, (7 USC 426-426c, as amended), charges the Secretary of Agriculture with management of wildlife injurious to agricultural interests, other wildlife, or human health and safety. Further, the Secretary is authorized to cooperate with States, individuals, public and private agencies, organizations, and institutions in the control of nuisance mammals and birds, including wildlife hazards to aviation. Because of the experience, training, and background of its personnel, WS is recognized throughout the world as an expert in dealing with wildlife damage management issues. WS has an active presence in all U.S. states and territories.

## **MEMORANDUM OF UNDERSTANDING**

A Memorandum of Understanding (MOU) between the FAA and WS (No. 12-4-71-0003-MOU) establishes a cooperative relationship between these agencies for resolving wildlife hazards to aviation.

### **AGENCY FUNDING**

Both agencies are funded by congressional appropriations. The majority of funding for the FAA comes from the Aviation Trust Fund with the remainder coming from the general funds of the U.S. Treasury. Any revenues generated by the FAA are returned to the U.S. Treasury. WS receives a limited amount of funds from the general fund of the U.S. Treasury that allows it to perform some services for the public good. However, WS's funding is also based upon its ability to enter into contracts to provide services and receive reimbursement for the cost of the services. Legislation allows WS to collect this money and return it to the program rather than the general funds of the U.S. Treasury. Consequently, WS may enter into a cooperative service agreement with an airport operator for reimbursement of services to perform a wildlife hazard assessment on an airport.

### **WILDLIFE HAZARD MANAGEMENT**

14 CFR 139.337(b) requires the certificate holder conduct a wildlife hazard assessment, acceptable to the FAA Administrator, when any of the following events occur on or near the airport:

- (b) (1) An air carrier aircraft experiences multiple wildlife strikes:
- (b) (2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;
- (b) (3) An air carrier aircraft experiences an engine ingestion of wildlife; or
- (b) (4) Wildlife of a size, or in numbers, capable of causing an event described in paragraph (b)(1), (2), or (3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

The wildlife hazard assessment shall contain at least the following (14CFR 139.337(c)):

- (c) (1) An analysis of the events or circumstances that prompted the assessment.
- (c) (2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.

- (c) (3) Identification and location of features on and near the airport that attract wildlife.
- (c) (4) A description of wildlife hazards to air carrier operations.
- (c) (5) Recommended actions for reducing identified wildlife hazards to air carrier operations.

The certificate holder may look to WS or to private consultants to conduct the required wildlife hazard assessment. The FAA uses the wildlife hazard assessment in determining if a wildlife hazard management plan is needed for the airport. Therefore, persons having the education, training, and experience necessary to adequately assess any wildlife hazards should conduct the assessment.

Depending on the availability of resources, WS may conduct a preliminary hazard assessments at no charge to the certificate holder. The certificate holder should determine in advance if WS will charge to conduct the preliminary hazard assessment. More detailed assessments may require the certificate holder to enter into a cooperative service agreement with WS.

\_\_\_\_\_  
OSB

Benedict D. Castellano

Manager, Airport Safety and Operations

**1.0 August 30, 2004**

Date

**APPENDIX E**

**MIGRATORY BIRD DEPREDATION PERMIT AND BALD EAGLE HARASSMENT  
PERMIT, NORFOLK INTERNATIONAL AIRPORT**



DEPARTMENT OF THE INTERIOR  
U.S. FISH AND WILDLIFE SERVICE

3-201  
(1/97)

### FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES  
16 USD 703-712

REGULATIONS  
50 CFR Part 13  
50 CFR 21.41

1. PERMITTEE

NORFOLK AIRPORT AUTHORITY  
2200 NORVIEW AVENUE  
NORFOLK, VA 23518

3. NUMBER  
**MB706187-0**

4. RENEWABLE  
 YES  
 NO

5. MAY COPY  
 YES  
 NO

6. EFFECTIVE  
05/01/2011

7. EXPIRES  
04/30/2012

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business)  
ROBERT S. BOWEN  
DIRECTOR OF OPERATIONS

9. TYPE OF PERMIT  
DEPREDAATION AT AIRPORTS

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

**WITHIN THE PROPERTY BOUNDARIES OF NORFOLK INTERNATIONAL AIRPORT, NORFOLK, VA  
TEL: 757-857-3351**

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. You are authorized to take, temporarily possess, and transport the migratory birds specified below to relieve or prevent injurious situations impacting public safety. All take must be done as part of an integrated wildlife damage management program that emphasizes nonlethal management techniques. You may not use this authority for situations in which migratory birds are merely causing a nuisance.

(1) The following may be lethally taken:

- (a) 200 Ring-billed Gull
- (b) 500 Mourning dove
- (c) 100 Herring gull
- (d) 150 Double-crested cormorant
- (e) 25 each: Great black-backed gull, Laughing Gulls, Barn Swallows, Killdeer, Gadwall, Rubg-necked Duck, Great egret
- (f) 50 each: Pied-billed grebe, Great blue heron, Hooded merganser, Northern mockingbirds, Eastern meadowlark
- (g) 15 each: Common merganser, Turkey Vultures, Black Vultures
- (h) 300 Canada geese
- (i) 250 Mallard

(2) The following may be live-trapped and relocated:

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

**ANNUAL REPORT DUE WITH NEXT RENEWAL FORM**

USFWS Forms can be found at: <http://www.fws.gov/migratorybirds/mbpermits.html>

ISSUED BY

TITLE

CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 5

DATE

05/18/2011

- a. 20 Osprey
- b. 10 each: Sharp-shinned hawk, Northern harrier
- c. 25 each: American kestrel, Red-tailed hawk

Birds must be transported and relocated to a site approved by the Virginia Department of Game and Inland Fisheries, if required. Any raptors injured under this Condition must be transported to a licensed wildlife rehabilitator for treatment. All raptors trapped under this Condition must be leg-banded in accordance with USGS bird banding permits. Any birds recaptured under this Condition may be euthanized. Alternatively, when trapping efforts fail, or an emergency occurs, these raptors may be shot using shotgun, rifle or air rifle.

(3) The following active nests (including eggs) may be destroyed:

- a. 150 nests of Mallards within the airport boundaries. You may treat the eggs by freezing, shaking, puncturing or oiling (using corn oil), and you must immediately replace the eggs for subsequent incubation. **Alternatively, you may remove and destroy these eggs and nests.**
- b. 25 Osprey nests. Nests must be relocated to platforms, OR destroyed when relocation is not possible.

**State restrictions:** Peregrine Falcons and other bird species are listed as Endangered or Threatened by Virginia State law and therefore may not be taken, unless otherwise authorized by the Virginia Department of Game and Inland Fisheries.

E. You are authorized in emergency situations only to take, trap, or relocate any migratory birds, nests and eggs, including species that are not listed in Condition D (except bald eagles, golden eagles, or endangered or threatened species) when the migratory birds, nests, or eggs are posing a direct threat to human safety. A direct threat to human safety is one which involves a threat of serious bodily injury or a risk to human life.

You must report any emergency take activity to your migratory bird permit issuing office, Hadley, MA, by faxing to 413-253-8424, within 72 hours after the emergency take action. Your report must include the species and number of birds taken, method, and a complete description of the circumstances warranting the emergency action.

F. You are authorized to salvage and temporarily possess migratory birds found dead or taken under this permit for (1) disposal, (2) transfer to the U.S. Department of Agriculture, (3) diagnostic purposes, (4) purposes of training airport personnel, (5) donation to a public charity (those suitable for human consumption), or (6) donation to a public scientific or educational institution as defined in 50 CFR 10.12. Any dead bald eagles or golden eagles salvaged must be reported within 48 hours to the National Eagle Repository at (303) 287-2110 and to the migratory bird permit issuing office by fax 413-253-8424. The Repository will provide directions for shipment of these specimens.

G. You may not salvage and must immediately report to U.S. Fish and Wildlife Service Law Enforcement any migratory birds that appear to have been poisoned, shot, electrocuted, have collided with industrial power generation equipment, or were otherwise injured as the result of potential criminal activity.

H. You may use the following methods of take: (1) firearms; (1a) other types of firearms by USDA only; (2) nets; (3) registered animal drugs (excluding nicarbazin), pesticides and repellents; (4) falconry abatement; and (5) legal lethal and live traps (excluding pole traps). Birds caught live may be euthanized or transported and relocated to another site approved by the appropriate State wildlife agency, if required. When using firearms, you may use rifles or air rifles to shoot any bird when you determine that the use of a shotgun is inadequate to resolve the injurious situation. The use of any of the above techniques is at your discretion for each situation.

I. You may temporarily possess and stabilize sick and injured migratory birds and immediately transport them to a federally licensed rehabilitator for care.

J. The following subpermittees are authorized: Airport employees and employees of USDA/APHIS/Wildlife Services. **USDA/APHIS/WS employees ONLY may use rifles or air rifles to shoot any bird that may be killed with firearms under the above Conditions**, when they determine that the use of shotguns as a reinforcement to harassment techniques is inadequate to resolve the threat to aircraft safety. Authorities under **Conditions H (3)** may be performed **ONLY by USDA/APHIS/WS employees**.

In addition, any other person who is (1) employed by or under contract to you for the activities specified in this permit, or (2) otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

F. You and any subpermittees must comply with the attached Standard Conditions for Migratory Bird Depredation Permits. **These standard conditions are a continuation of your permit conditions and must remain with your permit.**

G. A "No Feeding Policy" must be in place.

**For Canada Geese Egg Addling or Nest Destruction you MUST register each year between January 1 and June 30 at: <https://epermits.fws.gov/eRCGR>. You must return to website and report your take before October 31 each year.**

**For suspected illegal activity, immediately contact USFWS Law Enforcement at: Richmond, VA: 804-771-2883**



## Standard Conditions Migratory Bird Depredation Permits 50 CFR 21.41

All of the provisions and conditions of the governing regulations at 50 CFR part 13 and 50 CFR part 21.41 are conditions of your permit. The standard conditions below are a continuation of your permit conditions and must remain with your permit. If you have questions regarding these conditions, refer to the regulations or, if necessary, contact your migratory bird permit issuing office. For copies of the regulations and forms, or to obtain contact information for your issuing office, visit: <http://www.fws.gov/migratorybirds/mbpermits.html>.

1. To minimize the lethal take of migratory birds, you are required to continually apply non-lethal methods of harassment in conjunction with lethal control.  
*[Note: Explosive Pest Control Devices (EPCDs) are regulated by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). If you plan to use EPCDs, you require a Federal explosives permit, unless you are exempt under 27 CFR 555.141. Information and contacts may be found at <http://www.atf.gov/explosives/how-to/become-an-fel.htm>.]*

2. Shotguns used to take migratory birds can be no larger than 10-gauge and must be fired from the shoulder. You must use nontoxic shot listed in 50 CFR 20.21(j).
3. You may not use blinds, pits, or other means of concealment, decoys, duck calls, or other devices to lure or entice migratory birds into gun range.
4. You are not authorized to take, capture, harass, or disturb bald eagles or golden eagles, or species listed as threatened or endangered under the Endangered Species Act found in 50 CFR 17, without additional authorization.

For a list of threatened and endangered species in your state, visit the U.S. Fish and Wildlife Service's Threatened and Endangered Species System (TESS) at: <http://www.fws.gov/endangered>.

5. If you encounter a migratory bird with a Federal band issued by the U.S. Geological Survey Bird Banding Laboratory, Laurel, MD, report the band number to 1-800-327-BAND or <http://www.reportband.gov>.
6. This permit does not authorize take or release of any migratory birds, nests, or eggs on Federal lands without additional prior written authorization from the applicable Federal agency.
7. This permit does not authorize take or release of any migratory birds, nests, or eggs on State lands or other public or private property without prior written permission or permits from the landowner or custodian.
8. Unless otherwise specified on the face of the permit, migratory birds, nests, or eggs taken under this permit must be:
  - (a) turned over to the U.S. Department of Agriculture for official purposes, or
  - (b) donated to a public educational or scientific institution as defined by 50 CFR 10, or
  - (c) completely destroyed by burial or incineration, or
  - (d) with prior approval from the permit issuing office, donated to persons authorized by permit or regulation to possess them.

9. Subpermittees must be at least 18 years of age. As the permittee, you are legally responsible for ensuring that your subpermittees are adequately trained and adhere to the terms of your permit. You are responsible for maintaining current records of who you have designated as a subpermittee, including copies of letters you have provided.
10. You and any subpermittees must carry a legible copy of this permit, *including these Standard Conditions*, and display it upon request whenever you are exercising its authority.
11. You must maintain records as required in 50 CFR 13.46 and 50 CFR 21.41. All records relating to the permitted activities must be kept at the location indicated in writing by you to the migratory bird permit issuing office.
12. Acceptance of this permit authorizes the U.S. Fish and Wildlife Service to inspect any wildlife held, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.
13. You may not conduct the activities authorized by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable law.

(DPRD - 2/24/2011)



DEPARTMENT OF THE INTERIOR  
U.S. FISH AND WILDLIFE SERVICE

3-201  
(1/97)

**FEDERAL FISH AND WILDLIFE PERMIT**

1. PERMITTEE

NORFOLK AIRPORT AUTHORITY  
2200 NORVIEW AVE.  
NORFOLK, VA 23518  
U.S.A.

2. AUTHORITY-STATUTES  
16 USC 668a

REGULATIONS  
50 CFR Part 13  
50 CFR 22.23

3. NUMBER  
**MB31175A-0**

4. RENEWABLE  
 YES  
 NO

5. MAY COPY  
 YES  
 NO

6. EFFECTIVE  
01/06/2011

7. EXPIRES  
12/31/2016

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business)  
STEVEN C. STERLING  
DIRECTOR OF OPERATIONS

9. TYPE OF PERMIT  
EAGLE DEPREDDATION

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

**Norfolk International Airport property, Norfolk, VA**

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. You are authorized to use non-lethal scare devices, scare tactics or frightening devices to move or disperse bald eagles endangering human safety due to a high risk of a serious bird strike to landing and departing aircraft. You are authorized to use airhorns, pyrotechnics, and drive vehicles with horns as necessary to scare eagles. Pyrotechnics must not be shot directly at the eagles.

E. You must make a continuous effort to eliminate attractants and other physical properties that may draw eagles to airport property.

F. This permit does not authorize the killing, injury or capture of any eagle or the destruction of any young or nests.

G. This permit does not authorize the disturbance of eagles at active nest sites that contain eggs or young or nests.

H. You must notify the permit issuing office by fax (413) 253-8424 within 48 hours of any injury or death of any eagle during project activities.

I. The following subpermittees are authorized: designated employees of USDA/APHIS/Wildlife Services, ORF Fire Dept and Airport Operations personnel. In addition, any other person who is (1) employed by or under contract to you for the activities specified in this permit, or (2) otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

J. You must submit a report of activities conducted under this permit to the USFWS, Migratory Bird Permit Office, P.O. Box 779, Hadley, MA 01035, by December 31 each year. The report form, 3-202-11, is available at: <http://www.fws.gov/forms/3-202-11.pdf>.

K. You must comply with the attached Standard Conditions for Migratory Bird Depredation Permits. These standard conditions are a continuation of your permit conditions and must remain with your permit. For suspected illegal activity, immediately contact USFWS Law Enforcement at: Richmond, VA 804-771-2883

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

**ANNUAL REPORT DUE 12/31**

The report form, 3-202-11, is available at: <http://www.fws.gov/forms/3-202-11.pdf>.

ISSUED BY

*Valerie Jacobs*

TITLE

CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 5

DATE

01/06/2011



## Standard Conditions Eagle Depredation Permits 50 CFR 22.23

All of the provisions and conditions of the governing regulations at 50 CFR part 13 and 50 CFR part 22.23 are conditions of your permit. Failure to comply with the conditions of your permit could be cause for suspension of the permit. The standard conditions below are a continuation of your permit conditions and must remain with your permit. If you have questions regarding these conditions, refer to the regulations or, if necessary, contact your migratory bird permit issuing office. For copies of the regulations and forms, or to obtain contact information for your issuing office, visit: <http://www.fws.gov/migratorybirds/mbpermits.html>.

1. Unless otherwise specified on the face of this permit, you may not lethally take any bald eagle or golden eagle under this permit. Eagles may be taken only by the method(s) specified on the face of your permit.
2. If you encounter an eagle with a Federal band issued by the U.S. Geological Survey Bird Banding Laboratory, Laurel, MD, report the band number to 1-800-327-BAND or <http://www.reportband.gov>.
3. This permit does not authorize take or release of any bald eagle or golden eagle on Federal lands without additional prior written authorization from the applicable Federal agency.
4. This permit does not authorize take or release of any bald eagle or golden eagle on State lands or other public or private property without prior written permission or permits from the landowner or custodian.
5. Unless otherwise specified on the face of the permit, any bald eagle or golden eagle taken under this permit must be promptly turned over to a U.S. Fish and Wildlife Service (Service) agent or other wildlife law enforcement officer designated on the face of the permit.
6. Any person exercising the authorities of this permit must carry a legible copy of this permit, *including these Standard Conditions*, and display it upon request to any State or Federal officer when exercising its authority.
7. You must maintain records as required in 50 CFR 13.46. All records relating to the permitted activities must be kept at the location indicated in writing by you to the migratory bird permit issuing office.
8. Acceptance of this permit authorizes the Service to inspect any wildlife held, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.
9. You may not conduct the activities authorized by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable law.

(EADP 1/1/2011)

**APPENDIX F**

**LIST OF THREATENED AND ENDANGERED SPECIES IN THE  
COMMONWEALTH OF VIRGINIA**

## Threatened and Endangered Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federal	State
<b>FRESHWATER FISHES</b>			
Blackbanded sunfish	<i>Enneacanthus chaetodon</i>		SE
Blackside dace	<i>Phoxinus cumberlandensis</i>	FT	ST
Carolina darter	<i>Etheostoma collis</i>		ST
Duskytail darter	<i>Etheostoma percnurum</i>	FE	SE
Emerald shiner	<i>Notropis atherinoides</i>		ST
Golden darter	<i>Etheostoma denoncourti</i>	SOC	ST
Greenfin darter	<i>Etheostoma chlorobranchium</i>		ST
Longhead darter	<i>Percina macrocephala</i>		ST
Orangefin madtom	<i>Noturus gilberti</i>	SOC	ST
Paddlefish	<i>Polyodon spathula</i>		ST
Roanoke logperch	<i>Percina rex</i>	FE	SE
Sharphead darter	<i>Etheostoma acuticeps</i>		SE
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	FE	SE
Slender chub	<i>Erimystax cahni</i>	FT	ST
Spotfin chub	<i>Erimonax monachus</i>	FT	ST
Steelcolor shiner	<i>Cyprinella whipplei</i>		ST
Tennessee dace	<i>Phoxinus tennesseensis</i>		SE
Variagate darter	<i>Etheostoma variatum</i>		SE
Western sand darter	<i>Ammocrypta clara</i>		ST
Whitemouth shiner	<i>Notropis alborus</i>		ST
Yellowfin madtom	<i>Noturus flavipinnis</i>	FT	ST
<b>AMPHIBIANS</b>			
	<i>Frogs</i>		
Barking treefrog	<i>Hyla gratiosa</i>		ST
	<i>Salamanders</i>		
Eastern tiger salamander	<i>Ambystoma tigrinum tigrinum</i>		SE
Mabee's salamander	<i>Ambystoma mabeei</i>		ST
Shenandoah salamander	<i>Plethodon shenandoah</i>	FE	SE
<b>REPTILES</b>			
	<i>Lizards</i>		
Eastern glass lizard	<i>Ophisaurus ventralis</i>		ST
	<i>Snakes</i>		
Canebroke rattlesnake (Coastal Plain population of timber rattlesnake)	<i>Crotalus horridus</i>		SE
	<i>Turtles</i>		
Bog (= Muhlenberg) turtle	<i>Glyptemys (=Clemmys) muhlenbergii</i>	FT(S/A)	SE
Eastern chicken turtle	<i>Deirochelys reticularia reticularia</i>		SE
Green sea turtle	<i>Chelonia mydas</i>	FT	ST
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	FE	SE
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	FE	SE
Leatherback sea turtle	<i>Dermodochelys coriacea</i>	FE	SE
Loggerhead sea turtle	<i>Caretta caretta</i>	FT	ST
Wood turtle	<i>Glyptemys insculpta</i>		ST

## Threatened and Endangered Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federal	State
<b>BIRDS</b>			
Bachman's sparrow	<i>Aimophila aestivalis</i>		ST
Bachman's warbler (=wood)	<i>Vermivora bachmanii</i>	FE	SE
Bald eagle	<i>Haliaeetus leucocephalus</i>	SOC	ST
Bewick's wren	<i>Thryomanes bewickii</i>		SE
Gull-billed tern	<i>Sterna nilotica</i>		ST
Henslow's sparrow	<i>Ammodramus henslowii</i>		ST
Kirtland's warbler (=wood)	<i>Dendroica kirtlandii</i>	FE	SE
Loggerhead shrike	<i>Lanius ludovicianus</i>		ST
Peregrine falcon	<i>Falco peregrinus</i>		ST
Piping plover	<i>Charadrius melodus</i>	FT	ST
Red-cockaded woodpecker	<i>Picoides borealis</i>	FE	SE
Roseate tern	<i>Sterna dougallii dougallii</i>	FE	SE
Upland sandpiper	<i>Bartramia longicauda</i>		ST
Wilson's plover	<i>Charadrius wilsonia</i>		SE
<b>MAMMALS</b>			
American water shrew	<i>Sorex palustris</i>		SE
Carolina northern flying squirrel	<i>Glaucomys sabrinus coloratus</i>	FE	SE
Delmarva Peninsula fox squirrel	<i>Sciurus niger cinereus</i>	FE	SE
Dismal Swamp southeastern shrew	<i>Sorex longirostris fisheri</i>		ST
Eastern puma (=cougar)	<i>Puma (=Felis) concolor cougar</i>	FE	SE
Gray bat	<i>Myotis grisescens</i>	FE	SE
Gray wolf	<i>Canis lupus</i>	FE	SE
Indiana bat	<i>Myotis sodalis</i>	FE	SE
Rafinesque's eastern big-eared bat	<i>Corynorhinus rafinesquii macrotis</i>		SE
Rock vole	<i>Microtus chrotorrhinus</i>		SE
Snowshoe hare	<i>Lepus americanus</i>		SE
Virginia big-eared bat	<i>Corynorhinus (= Plecotus) townsendii virginianus</i>	FE	SE
Virginia northern flying squirrel	<i>Glaucomys sabrinus fuscus</i>		SE
<b>MOLLUSKS</b>			
<i>Freshwater Mollusks</i>			
Appalachian monkeyface (pearlymussel)	<i>Quadrula sparsa</i>	FE	SE
Atlantic pigtoe	<i>Fusconaia masoni</i>	SOC	ST
Birdwing pearlymussel	<i>Conradilla caelata (= Lemiox rimosus)</i>	FE	SE
Black sandshell	<i>Ligumia recta</i>		ST
Brook floater	<i>Alasmidonta varicosa</i>		SE
Cracking pearlymussel	<i>Hemistena lata</i>	FE	SE
Cumberland bean (pearlymussel)	<i>Villosa trabalis</i>	FE	SE
Cumberland monkeyface (pearlymussel)	<i>Quadrula intermedia</i>	FE	SE
Cumberlandian combshell	<i>Epioblasma brevidens</i>	FE	SE
Deertoe	<i>Truncilla truncata</i>		SE
Dromedary pearlymussel	<i>Dromus dromas</i>	FE	SE
Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	FE	SE
Elephantear	<i>Elliptio crassidens</i>		SE
Fanshell	<i>Cyprogenia stegaria</i>	FE	SE
Fine-rayed pigtoe	<i>Fusconaia cuneolus</i>	FE	SE
Fluted kidneyshell	<i>Ptychobranchus subtentum</i>	FC	
Fragile papershell	<i>Leptodea fragilis</i>		ST
Green blossom (pearlymussel)	<i>Epioblasma torulosa gubernaculum</i>	FE	SE
Green floater	<i>Lasmigona subviridis</i>		ST
James spiny mussel	<i>Pleurobema collina</i>	FE	SE

## Threatened and Endangered Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federal	State
Little-wing pearlymussel	<i>Pegias fabula</i>	FE	SE
Ohio pigtoe	<i>Pleurobema cordatum</i>		SE
Oyster mussel	<i>Epioblasma capsaeformis</i>	FE	SE
Pimpleback	<i>Quadrula pustulosa pustulosa</i>		ST
Pink mucket (pearlymussel)	<i>Lampsilis abrupta</i>	FE	SE
Pistolgrip	<i>Tritogonia verrucosa</i>		ST
Purple bean	<i>Villosa perpurpurea</i>	FE	SE
Purple lilliput	<i>Toxolasma lividus</i>	SOC	SE
Pyramid pigtoe	<i>Pleurobema rubrum</i>	SOC	SE
Rayed bean	<i>Villosa fabalis</i>	SOC/FC	
Rough pigtoe	<i>Pleurobema plenum</i>	FE	SE
Rough rabbitsfoot	<i>Quadrula cylindrica strigillata</i>	FE	SE
Sheepnose	<i>Plethobasus cyphus</i>		ST
Shiny pigtoe	<i>Fusconaia cor</i>	FE	SE
Slabside pearlymussel	<i>Lexingtonia dolabelloides</i>	FC	ST
Slippershell mussel	<i>Alasmidonta viridis</i>		SE
Snuffbox	<i>Epioblasma triquetra</i>		SE
Spectaclecase	<i>Cumberlandia monodonta</i>	SOC/FC	SE
Tan riffleshell	<i>Epioblasma florentina walkeri</i> (= <i>E. walkeri</i> )	FE	SE
Tennessee heelsplitter	<i>Lasmigona holstonia</i>		SE
<i>Freshwater &amp; Land Snails</i>			
Appalachian springsnail	<i>Fontigens bottimeri</i>	SOC	SE
Brown supercoil	<i>Paravitrea septadens</i>	SOC	ST
Rubble coil	<i>Helicodiscus lirellus</i>	SOC	SE
Shaggy coil	<i>Helicodiscus diadema</i>	SOC	SE
Spider elimia	<i>Elimia arachnoidea</i>		SE
Spiny riversnail	<i>Io fluviialis</i>	SOC	ST
Spirit supercoil	<i>Paravitrea hera</i>	SOC	SE
Springsnail (no common name)	<i>Fontigens morrisoni</i>	SOC	SE
Thankless ghostsnail	<i>Holsingeria unthinksensis</i>	SOC	SE
Virginia fringed mountain snail	<i>Polygriscus virginianus</i>	FE	SE
<b>FRESHWATER CRUSTACEANS</b>			
Big Sandy crayfish	<i>Cambarus veteranus</i>	SOC	SE
Lee County Cave isopod	<i>Lirceus usdagalun</i>	FE	SE
Madison Cave amphipod	<i>Stygobromus stegerorum</i>	SOC	ST
Madison Cave isopod	<i>Antrolana lira</i>	FT	ST
<b>MILLIPEDES</b>			
Ellett Valley pseudotremia	<i>Pseudotremia cavernarum</i>	SOC	ST
Laurel Creek xystodesmid	<i>Sigmoria whiteheadi</i>	SOC	ST
<b><u>INSECTS<sup>2</sup></u></b>			
American burying beetle	<i>Nicrophorus americanus</i>	FE	
Appalachian grizzled skipper	<i>Pyrgus wyandot</i> (= <i>Pyrgus centaureae wyandot</i> )		ST
Buffalo Mountain mealybug	<i>Puto kosztarabi</i>		SE
Holsinger's cave beetle	<i>Pseudanophthalmus holsingeri</i>	FC	
Mitchell's satyr butterfly	<i>Neonympha mitchellii</i>		SE
Northeastern beach tiger beetle	<i>Cicindela dorsalis dorsalis</i>	FT	ST
Virginia Piedmont water boatman	<i>Sigara depressa</i>		SE

<sup>2</sup> all insects listed as federal or state endangered or threatened are protected by regulations that fall under the

## Threatened and Endangered Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federal	State
Virginia Department of Agriculture and Consumer Services' jurisdiction			
MARINE MAMMALS			
Blue whale	<i>Balaenoptera musculus</i>	FE	SE
Finback whale	<i>Balaenoptera physalus</i>	FE	SE
Humpback whale	<i>Megaptera novaeangliae</i>	FE	SE
Right whale	<i>Balaena glacialis</i> (incl. <i>australis</i> )	FE	SE
Sei whale	<i>Balaenoptera borealis</i>	FE	SE
Sperm whale	<i>Physeter catodon</i> (= <i>macrocephalus</i> )	FE	SE
West Indian manatee	<i>Trichechus manatus</i>	FE	SE

## Special Concern Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federa	State
FRESHWATER FISHES			
Appalachia darter	<i>Percina gymnocephala</i>	SOC	
Ashy darter	<i>Etheostoma cinereum</i>	SOC	
Atlantic sturgeon	<i>Acipenser oxyrhynchus</i>	SOC	SSC
Bigeye jumprock	<i>Moxostoma ariommum</i>	SOC	
Blotchside logperch	<i>Percina burtoni</i>	SOC	SSC
Bluebreast darter	<i>Etheostoma camurum</i>		SSC
Bluestone sculpin	<i>Cottus sp. 1</i>	SOC	
Bridle shiner	<i>Notropis bifrenatus</i>		SSC
Brook silverside	<i>Labidesthes sicculus</i>		SSC
Candy darter	<i>Etheostoma osburni</i>	SOC	SSC
Channel darter	<i>Percina copelandi</i>		SSC
Clinch sculpin	<i>Cottus sp. 4</i>	SOC	
Fatlips minnow	<i>Phenacobius crassilabrum</i>	SOC	SSC
Holston sculpin	<i>Cottus sp. 5</i>	SOC	
Kanawha darter	<i>Etheostoma kanawhae</i>	SOC	
Kanawha minnow	<i>Phenacobius teretulus</i>	SOC	
Mirror shiner	<i>Notropis spectrunculus</i>		SSC
Mountain brook lamprey	<i>Ichthyomyzon greeleyi</i>	SOC	
Popeye shiner	<i>Notropis ariommus</i>	SOC	SSC
River redhorse	<i>Moxostoma carinatum</i>		SSC
Riverweed darter	<i>Etheostoma podostemone</i>	SOC	
Roanoke bass	<i>Ambloplites cavifrons</i>	SOC	SSC
Roanoke hog sucker	<i>Hypentelium roanokense</i>	SOC	
Roughhead shiner	<i>Notropis semperasper</i>	SOC	SSC
Rustyside sucker	<i>Thoburnia hamiltoni</i>	SOC	SSC
Sauger	<i>Sander canadensis</i>		SSC
Speckled killifish	<i>Fundulus rathbuni</i>		SSC
Spotted-margin madtom	<i>Noturus insignis ssp. 1</i>	SOC	
Stonecat	<i>Noturus flavus</i>		SSC
Thicklip chub	<i>Cyprinella labrosa</i>	SOC	
Wounded darter	<i>Etheostoma vulneratum</i>	SOC	
AMPHIBIANS			
Frogs			
Carpenter frog	<i>Rana virgatipes</i>		SSC
Oak toad	<i>Bufo quercicus</i>		SSC
Salamanders			
Cow Knob salamander	<i>Plethodon punctatus</i>	SOC	SSC
Eastern hellbender	<i>Cryptobranchus alleganiensis alleganiensis</i>	SOC	SSC
Mole salamander	<i>Ambystoma talpoideum</i>		SSC
Peaks of Otter salamander	<i>Plethodon hubrichti</i>	SOC	SSC
Pigmy salamander	<i>Desmognathus wrighti</i>		SSC
Shovel-nosed salamander	<i>Desmognathus marmoratus</i>		SSC
Weller's salamander	<i>Plethodon welleri</i>	SOC	SSC

## Special Concern Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federa	State
REPTILES			

Snakes

Mountain earthsnake	<i>Virginia valeriae pulchra</i>		SSC
Northern pinesnake	<i>Pituophis melanoleucus melanoleucus</i>	SOC	

Turtles

Northern diamond-backed terrapin	<i>Malaclemys terrapin terrapin</i>	SOC	
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BIRDS

Alder flycatcher	<i>Empidonax alnorum</i>		SSC
Barn owl	<i>Tyto alba pratincola</i>		SSC
Black rail	<i>Laterallus jamaicensis</i>	SOC	
Brown creeper	<i>Certhia americana</i>		SSC
Brown pelican	<i>Pelecanus occidentalis carolinensis</i>		SSC
Caspian tern	<i>Sterna caspia</i>		SSC
Cerulean warbler	<i>Dendroica cerulea</i>	SOC	
Common moorhen	<i>Gallinula chloropus cachinnans</i>		SSC
Dickcissel	<i>Spiza americana</i>		SSC
Forster's tern	<i>Sterna forsteri</i>		SSC
Glossy ibis	<i>Plegadis falcinellus</i>		SSC
Golden-crowned kinglet	<i>Regulus satrapa</i>		SSC
Golden-winged warbler	<i>Vermivora chrysoptera</i>		SSC
Great egret	<i>Ardea alba egretta</i>		SSC
Hermit thrush	<i>Catharus guttatus</i>		SSC
Least tern	<i>Sterna antillarum</i>		SSC
Little blue heron	<i>Egretta caerulea caerulea</i>		SSC
Long-eared owl	<i>Asio otus</i>		SSC
Magnolia warbler	<i>Dendroica magnolia</i>		SSC
Migrant loggerhead shrike	<i>Lanius ludovicianus migrans</i>	SOC	
Mourning warbler	<i>Oporornis philadelphia</i>		SSC
Northern goshawk	<i>Accipiter gentilis</i>	SOC	
Northern harrier	<i>Circus cyaneus</i>		SSC
Northern saw-whet owl	<i>Aegolius acadicus</i>		SSC
Purple finch	<i>Carpodacus purpureus</i>		SSC
Red crossbill	<i>Loxia curvirostra</i>		SSC
Red-breasted nuthatch	<i>Sitta canadensis</i>		SSC
Saltmarsh sharp-tailed sparrow	<i>Ammodramus caudacutus</i>		SSC
Sandwich tern	<i>Sterna sandvicensis acufavidus</i>		SSC
Sedge wren	<i>Cistothorus platensis</i>		SSC
Swainson's warbler	<i>Limnithlypis swainsonii</i>		SSC
Tricolored heron	<i>Egretta tricolor</i>		SSC
Winter wren	<i>Troglodytes troglodytes</i>		SSC
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>		SSC
Yellow-crowned night-heron	<i>Nyctanassa violacea violacea</i>		SSC

Special Concern Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federa	State

MAMMALS

Appalachian cottontail	<i>Sylvilagus obscurus</i>	SOC	
Allegheny woodrat	<i>Neotoma magister</i>	SOC	
Eastern small-footed myotis	<i>Myotis leibii</i>	SOC	
Marsh rabbit	<i>Sylvilagus palustris palustris</i>		SSC
Northern river otter	<i>Lontra canadensis lataxina</i>		SSC
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	SOC	



A cave amphipod (Nelson County)	<i>Stygobromus sp. 11</i>	SOC	
A cave amphipod (Rockbridge County)	<i>Stygobromus sp. 12</i>	SOC	
Alleghany County cave amphipod	<i>Stygobromus hoffmani</i>	SOC	
Appalachian Valley cave amphipod	<i>Crangonyx antennatus</i>		SSC
Bath County cave amphipod	<i>Stygobromus mundus</i>	SOC	SSC
Bigger's cave amphipod	<i>Stygobromus biggersi</i>	SOC	
Bland County amphipod	<i>Crangonyx sp. 3</i>	SOC	
Blue Ridge Mountain amphipod	<i>Stygobromus spinosus</i>	SOC	
Burnsville Cove cave amphipod	<i>Stygobromus conradi</i>	SOC	
Chowanoke crayfish	<i>Orconectes virginienis</i>	SOC	
Clinch River crayfish	<i>Cambarus angularis</i>	SOC	
Craig County cave amphipod	<i>Stygobromus estesi</i>	SOC	
Cumberland cave amphipod	<i>Stygobromus cumberlandus</i>	SOC	
Cumberland Gap cave amphipod	<i>Bactrurus sp. 2</i>	SOC	
Cumberland isopod	<i>Caecidotea sp. 7</i>	SOC	
Dismal Swamp isopod	<i>Caecidotea attenuatus</i>	SOC	
Ephemeral cave amphipod	<i>Stygobromus ephemerus</i>	SOC	SSC
Finley's cave amphipod	<i>Stygobromus finleyi</i>	SOC	
Grayson crayfish ostracod	<i>Ascetocythere cosmata</i>	SOC	
Helseley's cave amphipod	<i>Stygobromus sp. 16</i>	SOC	
Henrot's cave isopod	<i>Caecidotea henroti</i>	SOC	
Holsinger's cave isopod	<i>Caecidotea holsingeri</i>	SOC	
Incurved cave isopod	<i>Caecidotea incurva</i>	SOC	
James Cave amphipod	<i>Stygobromus abditus</i>	SOC	
Lee County cave amphipod	<i>Stygobromus leensis</i>	SOC	
Luray Caverns amphipod	<i>Stygobromus pseudospinosus</i>	SOC	
Montgomery County cave amphipod	<i>Stygobromus fergusonii</i>	SOC	
Morrison's cave amphipod	<i>Stygobromus morrisoni</i>	SOC	SSC
Mount Rogers groundwater amphipod	<i>Stygobromus sp. 8</i>	SOC	
Natural Bridge cave isopod	<i>Caecidotea bowmani</i>	SOC	
New Castle Murder Hole amphipod	<i>Stygobromus interitus</i>	SOC	
Northern Virginia well amphipod	<i>Stygobromus phreaticus</i>	SOC	
Phreatic isopod	<i>Caecidotea phreatica</i>	SOC	
Pittsylvania well amphipod	<i>Stygobromus obrutus</i>	SOC	
Pizzini's amphipod	<i>Stygobromus pizzinii</i>	SOC	SSC
Powell Valley terrestrial cave isopod	<i>Amerigoniscus henroti</i>	SOC	

Common Name	Scientific Name	Status <sup>1</sup>	
		Federa	State
Price's cave isopod	<i>Caecidotea pricei</i>	SOC	
Racovitza's terrestrial cave isopod	<i>Miktoniscus racovitzai</i>	SOC	
Rock Creek groundwater amphipod	<i>Stygobromus kenki</i>	SOC	
Rockbridge County cave amphipod	<i>Stygobromus baroodyi</i>	SOC	
Rye Cove isopod	<i>Lirceus culveri</i>	SOC	SSC
Shenandoah Valley cave amphipod	<i>Stygobromus gracilipes</i>	SOC	SSC
Sherando spinosoid amphipod	<i>Stygobromus sp. 7</i>	SOC	
Southwestern Virginia cave amphipod	<i>Stygobromus mackini</i>		SSC
Southwestern Virginia cave isopod	<i>Caecidotea recurvata</i>	SOC	
Tidewater amphipod	<i>Stygobromus indentatus</i>	SOC	SSC
Tidewater interstitial amphipod	<i>Stygobromus araeus</i>	SOC	SSC
Vandel's cave isopod	<i>Caecidotea vandeli</i>	SOC	
INSECTS			
A beetle	<i>Nemadus horni</i>	SOC	
A cave beetle	<i>Pseudanophthalmus gracilis</i>	SOC	
A cave beetle	<i>Pseudanophthalmus pusio</i>	SOC	
A cave beetle	<i>Pseudanophthalmus seclusus</i>	SOC	
A cave beetle	<i>Pseudanophthalmus sp. 4</i>	SOC	

A cave beetle	<i>Pseudanophthalmus sp. 5</i>	SOC
A cave beetle	<i>Pseudanophthalmus sp. 6</i>	SOC
A cave beetle	<i>Pseudanophthalmus sp. 7</i>	SOC
A cave beetle	<i>Pseudanophthalmus sp. 9</i>	SOC
A cave beetle	<i>Pseudanophthalmus sp. 10</i>	SOC
A cave beetle (Hubbardi group)	<i>Pseudanophthalmus sp. 8</i>	SOC
A cave beetle (Pusio group)	<i>Pseudanophthalmus sp. 11</i>	SOC
A cave dipluran	<i>Litocampa sp. 4</i>	SOC
A cave dipluran	<i>Litocampa sp. 5</i>	SOC
A cave dipluran (salamander cave)	<i>Litocampa sp. 1</i>	SOC
A cave obligate springtail	<i>Pseudosinella hirsuta</i>	SOC
A cave pselaphid beetle	<i>Arianops jeanneli</i>	SOC
A cave springtail	<i>Oncopodura hubbardi</i>	SOC
A cave springtail	<i>Arrhopalites caedus</i>	SOC
A cave springtail	<i>Arrhopalites carolynae</i>	SOC
A cave springtail	<i>Arrhopalites commorus</i>	SOC
A cave springtail	<i>Arrhopalites lacuna</i>	SOC
A cave springtail	<i>Arrhopalites marshalli</i>	SOC
A cave springtail	<i>Arrhopalites pavo</i>	SOC
A cave springtail	<i>Arrhopalites sacer</i>	SOC
A cave springtail	<i>Arrhopalites silvus</i>	SOC
A cave springtail	<i>Pseudosinella bona</i>	SOC
A cave springtail	<i>Pseudosinella erewhon</i>	SOC
A cave springtail	<i>Pseudosinella extra</i>	SOC
A cave springtail	<i>Pseudosinella gisini</i>	SOC
A cave springtail	<i>Pseudosinella granda</i>	SOC
A cave springtail	<i>Pseudosinella orba</i>	SOC
A cave springtail	<i>Pseudosinella sp. 2</i>	SOC
A cave springtail	<i>Pseudosinella sp. 3</i>	SOC
A cave springtail	<i>Pseudosinella sp. 4</i>	SOC

### Special Concern Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federa I	State
A cave springtail	<i>Schaefferia hubbardi</i>	SOC	
A cave springtail	<i>Typhlogastrura valentini</i>	SOC	
A geometrid moth	<i>Euchlaena milnei</i>	SOC	
A ghost moth	<i>Hepialus sciophanes</i>	SOC	
A ground beetle	<i>Cyclotrachelus incisus</i>	SOC	
A leaf beetle	<i>Calligrapha pnirsa</i>	SOC	
A mayfly	<i>Isonychia tusculanensis</i>	SOC	
A mirid bug	<i>Bothynotus johnstoni</i>	SOC	
A rove beetle	<i>Atheta trogliphila</i>	SOC	
A shield bug	<i>Galgupha denudata</i>	SOC	
A springtail	<i>Arrhopalites benitus</i>	SOC	
A tiger beetle	<i>Cicindela ancocisconensis</i>	SOC	
A turtle bug	<i>Oncozygia clavicornis</i>	SOC	
An assassin bug	<i>Pnirontis brimleyi</i>	SOC	
Appalachian snaketail	<i>Ophiogomphus incurvatus</i>	SOC	
Appalachian grizzled skipper	<i>Pyrgus centaureae wyandot</i>	SOC	
Arogos skipper	<i>Atrytone arogos arogos</i>	SOC	
Avernus cave beetle	<i>Pseudanophthalmus avernus</i>	SOC	
Barrens itame	<i>Itame sp. 1 (cf. I. Inextricata)</i>	SOC	
Barrens tiger beetle	<i>Cicindela patruela</i>	SOC	
Beartown perlodid stonefly	<i>Isoperla major</i>	SOC	
Benfield's bearded small minnow mayfly	<i>Barbaetis benfieldi</i>	SOC	
Black lordithon rove beetle	<i>Lordithon niger</i>	SOC	
Buchholz's dart moth	<i>Agrotis buchholz</i>	SOC	
Buffalo Mountain mealybug	<i>Puto kosztarabi</i>	SOC	

Burke's Garden cave beetle	<i>Pseudanophthalmus hortulanus</i>	SOC
Catawba cave beetle	<i>Pseudanophthalmus</i> sp. 12	SOC
Cherokee clubtail	<i>Gomphus</i> (= <i>Stenogomphurus</i> ) <i>consanguis</i>	SOC
Chestnut leaf miner moth	<i>Tischeria perplexa</i>	SOC
Cobblestone tiger beetle	<i>Cicindela marginipennis</i>	SOC
Combneck assassin bug	<i>Ctenotrachelus shermani</i>	SOC
Crossroads cave beetle	<i>Pseudanophthalmus intersectus</i>	SOC
Deceptive cave beetle	<i>Pseudanophthalmus deceptivus</i>	SOC
Delicate cave beetle	<i>Pseudanophthalmus delicatus</i>	SOC
Diana fritillary	<i>Speyeria diana</i>	SOC
Dismal Swamp green stink bug	<i>Chlorochroa dismalia</i>	SOC
Doll's merolonch	<i>Merolonche dolli</i>	SOC
Dotted skipper	<i>Hesperia attalus slossonae</i>	SOC
Elusive clubtail	<i>Stylurus notatus</i>	SOC
Fraser fir geometrid moth	<i>Semiothisa fraserata</i>	SOC
Gammon's stenelmis riffle beetle	<i>Stenelmis gammoni</i>	SOC
Green-faced clubtail	<i>Gomphus viridifrons</i>	SOC
Hanson's Appalachian stonefly	<i>Hansonoperla appalachia</i>	SOC
Hebard's noctuid moth	<i>Erythroecia hebardii</i>	SOC
Herodias underwing	<i>Catocala herodias</i>	SOC
Hoffman's cave beetle	<i>Pseudanophthalmus hoffmani</i>	SOC
Hubbard's cave beetle	<i>Pseudanophthalmus hubbardi</i>	SOC
Hubricht's cave beetle	<i>Pseudanophthalmus hubrichti</i>	SOC
Jefferson's short-nosed scorpionfly	<i>Brachypanorpa jeffersoni</i>	SOC
Kanawhole springfly	<i>Diploperla kanawholensis</i>	SOC
<b>Special Concern Faunal Species</b>		

Common Name	Scientific Name	Status <sup>1</sup>	
		Federal	State
Karl's Pit cave beetle	<i>Pseudanophthalmus</i> sp. 14	SOC	
Kosztarab's common stonefly	<i>Acroneuria kosztarabi</i>	SOC	
Lee County cave beetle	<i>Pseudanophthalmus hirsutus</i>	SOC	
Little Kennedy cave beetle	<i>Pseudanophthalmus cordicollis</i>	SOC	
Lobed roach-like stonefly	<i>Tallaperla lobata</i>	SOC	
Long-headed cave beetle	<i>Pseudanophthalmus longiceps</i>	SOC	
Maiden Spring cave beetle	<i>Pseudanophthalmus virginicus</i>	SOC	
Maureen's Hydraenan minute moss beetle	<i>Hydraena maureenae</i>	SOC	
McMullan Cave beetle	<i>Pseudanophthalmus</i> sp. 13	SOC	
Mountain river cruiser	<i>Macromia margarita</i>	SOC	
Mud-dwelling cave beetle	<i>Pseudanophthalmus limicola</i>	SOC	
Natural Bridge cave beetle	<i>Pseudanophthalmus pontis</i>	SOC	
Nelson's cave beetle	<i>Pseudanophthalmus nelsoni</i>	SOC	
Nelson's early black stonefly	<i>Taeniopteryx nelsoni</i>	SOC	
New River Valley cave beetle	<i>Pseudanophthalmus egberti</i>	SOC	
Overlooked cave beetle	<i>Pseudanophthalmus praetermissus</i>	SOC	
Persius duskywing	<i>Erynnis persius persius</i>	SOC	
Petrunkevitch's cave beetle	<i>Pseudanophthalmus petrunkevitchi</i>	SOC	
Precious underwing	<i>Catocala pretiosa pretiosa</i>	SOC	
Pygmy snaketail	<i>Ophiogomphus howei</i>	SOC	
Rare skipper	<i>Problema bulenta</i>	SOC	
Regal fritillary	<i>Speyeria idalia</i>	SOC	
Rotund cave beetle	<i>Pseudanophthalmus rotundatus</i>	SOC	
Saint Paul cave beetle	<i>Pseudanophthalmus sanctipauli</i>	SOC	
Scarce swamp skipper (or Duke's skipper)	<i>Euphyes dukesi</i>	SOC	
Schaum's ground beetle	<i>Sphaeroderus schauvi</i>	SOC	
Septima's clubtail	<i>Gomphus septima</i>	SOC	
Shenandoah rhyacophilid caddisfly	<i>Rhyacophila shenandoahensis</i>	SOC	

Silken cave beetle	<i>Pseudanophthalmus sericus</i>	SOC
Six-banded longhorn beetle	<i>Dryobius sexnotatus</i>	SOC
Skillet clubtail	<i>Gomphus ventricosus</i>	SOC
Smyth's apamea moth	<i>Apamea smythi</i>	SOC
South Branch Valley cave beetle	<i>Pseudanophthalmus potomaca potomaca</i>	SOC
Southeastern myotis bat fly	<i>Basilia boardmani</i>	SOC
Spatulate snowfly	<i>Allocapnia simmonsii</i>	SOC
Spieth's great speckled olive mayfly	<i>Siphloplecton costalense</i>	SOC
Spotted cave beetle	<i>Pseudanophthalmus punctatus</i>	SOC
Straley's cave beetle	<i>Pseudanophthalmus quadratus</i>	SOC
Sweet underwing (or quiet underwing)	<i>Catocala dulciola</i>	SOC
Tawny crescent	<i>Phyciodes batesii</i>	SOC
Thin-neck cave beetle	<i>Pseudanophthalmus parvicollis</i>	SOC
Thomas' cave beetle	<i>Pseudanophthalmus thomasi</i>	SOC
Vicariant cave beetle	<i>Pseudanophthalmus vicarius</i>	SOC
Virginia Piedmont water boatman	<i>Sigara depressa</i>	SOC
Williams' rare winter stonefly	<i>Megaleuctra williamsae</i>	SOC

#### PLANARIANS

A groundwater planarian	<i>Procotyla typhlops</i>	SOC
Chandler's planarian	<i>Sphalloplana chandleri</i>	SOC
Special Concern Faunal Species		

Status<sup>1</sup>

Federa

Common Name	Scientific Name	Federa	State
Powell Valley planarian	<i>Sphalloplana consimilis</i>	SOC	
Rockbridge County cave planarian	<i>Sphalloplana virginiana</i>	SOC	

#### ANNELIDS

A branchiobdelid worm	<i>Ankyrodrilus legacus</i>	SOC
A cave lumbriculid worm	<i>Stylodrilus beattiei</i>	SOC
A cave obligate worm	<i>Cambarincola fallax</i>	SOC

#### CENTIPEDES

Montane centipede	<i>Escaryus cryptorobius</i>	SOC
Whitetop Mountain centipede	<i>Escaryus orestes</i>	SOC

#### ARACHNIDS

A cave mite	<i>Foveacheles paralleloseta</i>	SOC
A cave pseudoscorpion	<i>Apochthonius coecus</i>	SOC
A cave pseudoscorpion	<i>Apochthonius holsingeri</i>	SOC
A cave pseudoscorpion	<i>Chitrella sp. 1</i>	SOC
A cave pseudoscorpion	<i>Chitrella superba</i>	SOC
A cave pseudoscorpion	<i>Kleptochthonius anophthalmus</i>	SOC
A cave pseudoscorpion	<i>Kleptochthonius binoculatus</i>	SOC
A cave pseudoscorpion	<i>Kleptochthonius proximisetus</i>	SOC
A cave pseudoscorpion	<i>Kleptochthonius regulus</i>	SOC
A cave pseudoscorpion	<i>Kleptochthonius similis</i>	SOC
A cave pseudoscorpion	<i>Kleptochthonius sp. 1</i>	SOC
A cave pseudoscorpion	<i>Microcreagris valentinei</i>	SOC
A cave pseudoscorpion	<i>Mundochthonius holsingeri</i>	SOC
A cave spider	<i>Islandiana muma</i>	SOC
A cave spider	<i>Nesticus mimus</i>	SOC
A cave spider	<i>Nesticus paynei</i>	SOC
A cave spider	<i>Nesticus tennesseensis</i>	SOC

A funnel-web spider	<i>Barronopsis jeffersi</i>	SOC
A pseudoscorpion	<i>Chitrella cavicola</i>	SOC
Coyle's purse-web spider	<i>Sphodros coylei</i>	SOC
Gertsch's cave pseudoscorpion	<i>Kleptochthonius gertschi</i>	SOC
Holsinger's cave spider	<i>Nesticus holsingeri</i>	SOC
Lutz's cave pseudoscorpion	<i>Kleptochthonius lutzii</i>	SOC
Robust trapdoor spider	<i>Antrrodiaetus robustus</i>	SOC

## MILLIPEDES

A cave millipede	<i>Pseudotremia</i> sp. 3	SOC
A millipede	<i>Aniulus orientalis</i>	SOC
A millipede	<i>Brachoria dentata</i>	SOC
A millipede	<i>Brachoria insolita</i>	SOC
A millipede	<i>Brachoria separanda calcaria</i>	SOC
A millipede	<i>Brachoria separanda hamata</i>	SOC
A millipede	<i>Brachoria separanda versicolor</i>	SOC

## Special Concern Faunal Species

Common Name	Scientific Name	Status <sup>1</sup>	
		Federal	State
A millipede	<i>Buotus carolinus</i>	SOC	
A millipede	<i>Cleidogona lachesis</i>	SOC	
A millipede	<i>Dixioria pela coronata</i>	SOC	
A millipede	<i>Dixioria fowleri</i>	SOC	
A millipede	<i>Nannaria simplex</i>	SOC	
A millipede	<i>Pseudotremia alecto</i>	SOC	
A millipede	<i>Pseudotremia armesi</i>	SOC	
A millipede	<i>Pseudotremia momus</i>	SOC	
A millipede	<i>Pseudotremia sublevis</i>	SOC	
A millipede	<i>Pseudotremia tuberculata</i>	SOC	
A millipede	<i>Pseudotremia valga</i>	SOC	
A millipede	<i>Rhysodesmus restans</i>	SOC	
A millipede	<i>Rudiloria trimaculata tortua</i>	SOC	
A millipede	<i>Striaria causeyae</i>	SOC	
A millipede	<i>Striaria columbiana</i>	SOC	
A millipede	<i>Striaria granulosa</i>	SOC	
A millipede	<i>Striaria</i> sp. 1	SOC	
A millipede	<i>Trichopetalum dux</i>	SOC	
A millipede (Burkes garden)	<i>Conotyia</i> sp. 1	SOC	
Aeto millipede	<i>Conotyia aeto</i>	SOC	
Big Cedar Creek millipede	<i>Brachoria falcifera</i>	SOC	
Blowing Rock millipede	<i>Cleidogona medialis</i>	SOC	
Brooks millipede	<i>Dixioria brooksi</i>	SOC	
Cedar millipede	<i>Brachoria cedra</i>	SOC	
Celeno millipede	<i>Conotyia celeno</i>	SOC	
Collinwood millipede	<i>Brachoria mendota</i>	SOC	
Duke Forest xystodesmid millipede	<i>Nannaria conservata</i>	SOC	
Faithful millipede	<i>Cleidogona fidelitor</i>	SOC	
Hoffman's cleidogonid millipede	<i>Cleidogona hoffmani</i>	SOC	
Hoffman's xystodesmid millipede	<i>Brachoria hoffmani</i>	SOC	
Keeton's millipede	<i>Brachoria laminata</i>	SOC	
McGraw Gap xystodesmid millipede	<i>Nannaria ericacea</i>	SOC	
Melinda millipede	<i>Conotyia melinda</i>	SOC	
Powell Mountain millipede Sp. 2	<i>Brachoria</i> sp. 2	SOC	
Shenandoah Mountain xystodesmid millipede	<i>Nannaria shenandoah</i>	SOC	
Smith Creek xystodesmid millipede	<i>Nannaria laminata</i>	SOC	
South Branch Valley cave millipede	<i>Pseudotremia princeps</i>	SOC	
Turner's millipede	<i>Brachoria turneri</i>	SOC	

Venetia millipede

*Conotyla venetia*

SOC

For further information or details regarding this list or any species listed herein, please contact:

Wildlife Diversity Division  
Virginia Department of Game and Inland Fisheries  
4010 W. Broad St.  
Richmond, Virginia 23230  
(804) 367-6913

**APPENDIX G**

**SPECIES GUILDS OBSERVED AT NORFOLK INTERNATIONAL AIRPORT,  
AUGUST 2010 THROUGH JULY 2011**

GUILD AND SPECIES	TOTAL OBSERVATIONS
European Starling	11,118
<b><u>Blackbirds</u></b>	<b><u>9,994</u></b>
Common Grackle	8,120
Red-winged Blackbird	1,371
Unknown Blackbirds	500
Brown-headed Cowbird	3
<b><u>Gulls</u></b>	<b><u>3,070</u></b>
Ring-billed Gull	1,884
Laughing Gull	462
Unknown gull	462
Great Black-backed Gull	206
Herring Gull	56
<b><u>Corvids</u></b>	<b><u>2,616</u></b>
American Crow	2,616
<b><u>Cormorants</u></b>	<b><u>1,084</u></b>
Double-crested Cormorant	1,084
<b><u>Waterfowl</u></b>	<b><u>954</u></b>
Canada Goose	581
Mallard	173
Hooded Merganser	120
Gadwall	37
Pied-billed Grebe	26
Ring-necked Duck	16
Unknown Duck	16
Muscovy	4
Northern Shoveler	3
Green-winged Teal	2
Wood Duck	2
<b><u>Swallows</u></b>	<b><u>281</u></b>
Barn Swallow	263
Tree Swallow	16
Purple Martin	2
<b><u>Columbids</u></b>	<b><u>224</u></b>
Mourning Dove	169

GUILD AND SPECIES	TOTAL OBSERVATIONS
Rock Dove	55
<b><u>Wading Birds</u></b>	<b><u>192</u></b>
Great Egret	97
Great Blue Heron	88
Green Heron	7
<b><u>Other Passerines</u></b>	<b><u>136</u></b>
American Robin	50
Eastern Bluebird	31
Northern Mockingbird	31
Eastern Kingbird	16
House Finch	4
Unknown Sparrow	3
Carolina Wren	1
<b><u>Raptors</u></b>	<b><u>116</u></b>
Osprey	53
American Kestrel	35
Turkey Vulture	7
Red-tailed Hawk	7
Bald Eagle	7
Northern Harrier	4
Unknown Buteo	2
Sharp-shinned Hawk	1
<b><u>Meadowlarks</u></b>	<b><u>98</u></b>
Eastern Meadowlark	98
<b><u>Shorebirds</u></b>	<b><u>64</u></b>
Killdeer	64
<b><u>Terns</u></b>	<b><u>40</u></b>
Common Tern	26
Royal Tern	6
Unknown Tern	6
Least Tern	2
<b><u>Pelicans</u></b>	<b><u>6</u></b>
Brown Pelican	6
<b><u>Woodpeckers</u></b>	<b><u>6</u></b>

GUILD AND SPECIES	TOTAL OBSERVATIONS
Northern Flicker	6
<b><u>Kingfisher</u></b>	<b><u>5</u></b>
Belted Kingfisher	5
<b><u>Unknown Species</u></b>	<b><u>40</u></b>
<b>GRAND TOTAL</b>	<b>30,044</b>