WILDLIFE HAZARD ASSESSMENT
OCALA INTERNATIONAL AIRPORT
Marion County, Florida
ERS Job No. 09071

PREPARED FOR:

OCALA INTERNATIONAL AIRPORT
750 SW 60TH AVENUE
OCALA, FLORIDA 34474

PREPARED BY:

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TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

Aircraft collisions with wildlife, also commonly referred to as wildlife strikes, cost the civil aviation industry an average of $123 million dollars annually based on damage reported to the Federal Aviation Administration (FAA) Wildlife Strike Database. When taking into consideration that 80% of strikes are not reported, the cost could be as high as $614 million dollars per year. Since 1990, there have been 49 civil aircraft either destroyed or damaged beyond repair. The economic costs of wildlife strikes can be extreme; however, the cost in human lives (16 fatalities since 1990) when aircraft crash because of a wildlife strike best expresses the need for the development of a Wildlife Hazard Management Plan (WHMP).

Per the strike database, the first reported bird strike was by Orville Wright in 1905 and 55 years later, the bird strike that resulted in the largest loss of life occurred on October 4, 1960. Eastern Air Lines Flight 375 was struck by a flock of European starlings during take off. All four engines were damaged and the aircraft crashed into Boston Harbor, resulting in 62 fatalities. Since the creation of the FAA Wildlife Strike Database, there have been over 100,000 (Civil and U.S. Air Force) wildlife strikes (1990-2008). Since 1990, there have been a total of 23 fatalities and 209 injuries attributed to wildlife strikes with US civil aircraft.

A Wildlife Hazard Assessment (WHA) is defined as an ecological study conducted by a wildlife biologist that provides the scientific basis for the development, implementation, and refinement of a WHMP.

According to the Code of Federal Regulations [CFR Part 139.337 (b)(1-4)], a WHA is mandated when any of the following events occurs on or near the airport:

a. An air carrier aircraft experiences multiple wildlife strikes;
b. An air carrier aircraft experiences substantial damage from striking wildlife;
c. An air carrier aircraft experiences an engine ingestion of wildlife; or
d. Wildlife of a size, or in numbers, capable of causing one of the above-mentioned events is observed to have access to any airport flight pattern or aircraft movement area.

In December 2009, Environmental Resource Solutions, Inc. (ERS) initiated a WHA at Ocala International Airport (OCF). ERS was tasked with evaluating the specific wildlife hazards known to exist on, or near, the airport.

OCF is located in central Florida and is surrounded by residential and commercial development, agriculture and livestock production, and other open spaces. OCF has one reported wildlife strike from Decernber 7, 1994. On approach to Runway 18 a Cessna-560 struck approximately 5 doves (likely mourning doves). The pilot reported seeing a flock of 15-25 birds flushed from the runway and striking at least 5 of the birds. The left recognition light lens and some hardware were destroyed, but overall damage was minor. No other strikes have been reported to the strike database.

2.0 OBJECTIVES

The objectives of conducting the WHA at OCF are as follows (per CFR 139.337 (c)(1-5)):

1. Analyze the event or circumstances that prompted the study.
2. Indentify the wildlife species observed, and their numbers, locations, local movements, and daily and seasonal occurrences.
3. Identify and locate features on and near the airport that attract wildlife.
4. Provide a description of the wildlife hazards to air carrier operations.
5. Recommend actions for reducing identified wildlife hazards to air carrier operations.

3.0 BACKGROUND

3.1 Description of OCF

Ocala International Airport is located approximately 31 miles south of the City of Gainesville, directly west of SW 60th Avenue and south of State Road 40 in Sections 17, 20, and 29, Township 15 South, and Range 21 East in Marion County, Florida (Exhibit 1). OCF property totals 1532 acres and is owned by the City of Ocala. It is located specifically at 29.1718768 North latitude and -82.2241146 West longitude. OCF experiences mild weather with an average low of 46°F, typically occurring in January, and an average high of 92°F occurring in July. June exhibits the highest average rainfall of 7.20 inches and Ocala receives approximately 51.9 inches of rainfall annually.

OCF is predominantly surrounded by open agricultural lands and residential developments (Exhibit 2). There are a few notable adjacent land uses bordering the property. Ocala Regional Sportsplex is a city-owned recreation park and borders OCF along the southwest side. The sportsplex is home to softball fields, soccer fields, football fields, sand volleyball courts, basketball courts, picnic pavilions, playground equipment, and live oak trees. This location attracts youth sporting events from around the region. A Marion County Historical Solid Waste Disposal Site (Martel Landfill) is located adjacent to and northwest of the airport. The landfill opened in 1962 when waste was disposed of in trenches, where it was burned and buried. In 1971, the previously used portion of the landfill was filled and waste was buried on the eastern portion of the site, but not burned. Waste disposal ended at this site in 1982 (Jones, 2008).

Ocala Breeder Sales (OBS) is directly across SW 60th Avenue, just east of OCF. OBS is a horse racing venue with a complete racetrack that provides major racehorse sales events and race simulcasting. During these sales events, OBS transforms into a very active site, however, it appears quite dormant most of the time. Southwest of (and adjacent to) the airport lies the City's newest and most advanced water treatment facility, the Michael A. Finn Water Reclamation Facility #3. This facility's advanced technologies allow for effluent disposal through spray irrigation throughout the adjacent fields. Some of the irrigation lines run under OCF's Air Operations Area (AOA).

OCF experiences an average of 56,000 aircraft movements annually (approximately 233 movements per day). The primary runway is North/South Runway 18-36, with dimensions of 7,467 feet by 150 feet. Runway 18-36 is served by an Instrument Landing System (ILS) and a Medium

Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) at the south end. The secondary runway is West/East Runway 8-26, with dimensions of 3,009 feet by 50 feet. In 1968, OCF began providing commercial service by Eastern Airlines and then Allegheny Commuter Airlines. Commercial service was discontinued in the 1980s. OCF has an active general aviation (GA) community with Landmark Aviation serving as its Fixed Base Operator (FBO). GA flights (both local and transient) make up almost 100% of total aircraft movements at OCF, with military and air taxi flights accounting for less than 1% of total aircraft movements (www.airnav.com).

3.2 Identifying Wildlife Attractants

Wetlands/Surface Waters & Ditches

Wetlands/surface waters include natural forested and herbaceous wetlands, created wetland areas, man-made stormwater treatment ponds and ditches, and areas of standing water in the AOA. These areas are attractive to many species of wildlife, including wading birds, turtles, and alligators that depend on wetlands and surface waters for nesting, roosting, and foraging opportunities. Small mammals also use these areas for fresh water sources, thereby attracting larger predators, such as hawks and coyotes.

Ditches provide preferable conditions for nesting waterfowl, especially if the vegetation along a ditch is allowed to grow and become dense. Vegetation in and along ditches provides ideal nesting habitat with access to food, water, and cover; the three essential factors wildlife need to survive and thrive. The presence of young waterfowl is attractive to a variety of larger predators, such as foxes, coyotes, and raccoons. Ditches also provide corridors for alligators and turtles to navigate from pond to pond. Common ditch vegetation includes cattail (*Typha* sp.), willow (*Salix* spp.), various rushes (*Juncus* spp.); and sedges (*Rhynchospora* spp.).

Open Grass Fields

Open grass fields provide good foraging habitat for many grassland species such as cattle egrets, sparrows, and meadowlarks. The FAA recommended height for grasses in the AOA is between 6 and 12 inches. Intermediate grass height disrupts inter-flock communication, obscures insect food sources, limits predator detection, impedes ease of movement, out-competes weedy vegetation, has a slower growth rate, and requires less frequent mowing. Grass fields also include substantial weedy vegetation (non-grass species) that is preferred by most wildlife. These "weeds" produce flowers and seeds that attract insects, birds, etc. However, true grasses (kept between 6 and 12 inches) are considered indigestible by most wildlife and therefore, not an eligible food source. Maintaining not only an intermediate grass height, but also a dense field of true grass, is recommended to help naturally eliminate these "weed" species.

Bare Areas

Bare areas include movement areas, mower ruts, access routes, and old operating surfaces. These areas can be highly attractive to gulls, as bare ground increases gulls' visibility during storms. They also provide ideal nesting habitat for killdeer and serve as a food source for doves and pigeons (birds that must ingest grit to aid in digestion). Allowing vegetation to grow through cracks and/or voids in these surfaces makes these areas especially attractive and should be avoided.

Facilities & Structures

Facilities and structures include, but are not limited to, hangars, terminal buildings, antennae and radar systems, and runway/taxiway lights and signs. These areas are particularly attractive for perching and nesting. Many bird species, including hawks and crows, use these structures to perch and hunt for prey on the AOA. This not only leads to large birds crossing movement areas to travel from their perches to their prey and back, but also leaves the structures covered in feces or "white wash".

Hangars and buildings provide excellent nesting sites for birds, particularly mourning doves, European starlings, swallows, and house sparrows. Building eaves, rooftops, chimneys, window sills, ledges, and any support beam structures are ideal places for these birds to build nests and raise young. These areas provide protection from the elements and predators, as well as supplying the adults with a near-by food source. Nesting not only creates a mess of bird feces and nesting materials, but also encourages a dramatic bird population increase on the airfield in the late summer when the nestlings will be ready to fledge (leave the nest). After fledging, the airport becomes their primary feeding grounds and they will be likely to build their own nests nearby in the following nesting season.

Airport Landscaping

Planted or maintained plants in landscape settings can produce food, harbor insects, and provide roosting, denning, and nesting opportunities, and thus attract a wide range of wildlife. Many species of birds are attracted to open water such as ponds, and often roost gregariously on certain trees or groups of trees near water sources. Large birds of prey prefer to survey from an exposed perch, as they are attracted to prey such as mice, rats, rabbits, and other birds. Since, these prey animals are, in turn, attracted by the food and shelter provided by the planted vegetation, consideration of plant selection, installation, design, and maintenance should be taken into account when attempting to reduce the population of incidental wildlife of all kinds. When considering plant species, it is important to note that nativity, large or bountiful fruit or seeds, dense growth, and proximity to other attractants all increase the likelihood of usage by wildlife. Natural, naturalistic, or dense and unmaintained settings are usually more productive and attractive to wildlife than highly maintained settings. In addition, for trees, horizontal branching and height also increase usage.

Trees that have branching structure that is highly conducive to perching, roosting, or nesting, or those that are commonly used by birds for this purpose, are highly attractive. Oaks, specifically fall into this category and should be avoided. Shrubs, vines, and groundcover species are more desirable to wildlife based on the thickness of typical growth. Thickness of shrubs and groundcover

influences the preference wildlife has for burrowing or nesting sites. Most importantly, plants commonly used for landscaping produce a high volume of mast, or food. For example, squirrels may eat buds, shoots, bark, seeds, and nuts. Raccoons and opossums eat fruit and nuts, often climbing the trees to get them. Deer and hogs eat fruit, seeds, and nuts on the ground. Coyotes will eat many kinds of fruit and nuts, and will of course eat any smaller animals they find eating such material. Some birds eat insects from rotting trees (woodpeckers). Some eat sap from living trees (sapsuckers). Others eat insects that live on and in trees, shrubs, and the ground, and still others eat fruit and berries. Some winter migrants eat berries that resident birds will not. Plants that attract insects (as a source of food, cover, or both) can be attractive to animals that eat insects and should be avoided. Airport landscaping must be well planned for wildlife attractiveness before any planting takes place.

Man-made Waste

Human-produced garbage attracts a variety of wildlife species, including crows, raccoons, pigeons, and gulls. Outside of the terminal building, hangars, FBO, and restaurants are common places to find these species. Making sure all trash is properly disposed of and contained is a simple, but efficient, way to eliminate this potential attractant.

Small Mammals

Small mammals, including rats, mice, and rabbits, are not generally a wildlife hazard themselves, but rather a wildlife attractant risk. Large birds of prey (hawks, eagles, owls, falcons, etc.), which are potential strike hazards, are highly attracted to small mammals as prey. If there is an abundance of small mammals in a particular area, a significant number of predators are guaranteed to be in the area as well. Small mammals make up the majority of most bird predators' diets.

Off-Airport Attractants

Wildlife hazards at airports frequently are attributable to off-site attractants, such as wetlands, restaurants, golf courses, and landfills. Birds and other wildlife will cross the airfield en route to these off-site attractants, causing a hazard within the AOA. FAA issued an Advisory Circular (A/C 150/5200-33B *Hazardous Wildlife Attractants on or Near Airports* on August 28, 2007) to identify land use practices that attract or sustain hazardous wildlife and recommend minimum separation criteria for those land uses to the vicinity of airports (Appendix A). FAA recommends a separation distance of at least 5,000 feet between hazardous wildlife attractants and airports serving piston-powered aircraft, at least 10,000 feet between attractants and airports serving turbine-powered aircraft, and a distance of 5 miles between any airports' AOA and the hazardous wildlife attractant *if* the attractant could cause wildlife movement into or across the airspace. A/C 150/5200-33B outlines the following land uses as hazardous wildlife attractants: landfills, water management facilities, wetlands, spoil containment areas, agricultural activities, golf courses, and landscaping.

Historically, landfills have been of greatest concern as they attract very large numbers of vultures and gulls. For the reason, FAA issued an additional Advisory Circular (A/C 150/5200-34A *Construction or Establishment of Landfills Near Public Airports* on January 26, 2006) to provide guidance to airport operators, aviation planners, and local agencies on minimizing this specific

wildlife attractant (Appendix B). In general, the A/C states that persons considering construction or establishment of a landfill must first determine its proximity to public airports. The A/C specifies a minimum separation distance of 6 miles between a new landfill and a public airport.

3.3 History of Wildlife Strikes at OCF

Per A/C No. 150-5200-32A (Appendix C), a wildlife strike has occurred when:

1. A pilot reports striking one or more birds or other wildlife;
2. Aircraft maintenance personnel identify aircraft damage as having been caused by a wildlife strike;
3. Personnel on the ground report seeing an aircraft strike one or more birds or other wildlife;
4. Bird or other wildlife remains, whether in whole or in part are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified; or
5. The animal's presence on the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal).

According to the FAA National Wildlife Strike Database (http://wildlife-mitigation.tc.faa.gov), Florida is ranked third in the number of reported wildlife strikes to civil aircraft, preceded only by California and Texas. OCF has reported one wildlife strike from December 7, 1994. The following table summarizes the (reported) strike history at OCF.

Table 1: Reported wildlife strikes at OCF from 1990 to 2009 (according to the FAA National Wildlife Strike Database)

Date	Aircraft Type	Species	Number Struck	Damage	Comments
12/7/1994	C-560	Dove/Pigeons	2-10	M	Birds flew up from RWY as A/C crossed threshold of RWY 18 on landing. Flock had 15-25 birds and A/C struck at least 5. One impact destroyed left recognition light lens and some hardware.

3.4 Existing wildlife hazard management techniques at OCF

Passive management techniques utilized by OCF staff prior to/during this WHA include regular mowing, maintaining proper drainage of water from the airfield with detention ponds, and keeping culverts/ditches free of vegetation (Photo 3-1). OCF staff obtained a U.S. Fish and Wildlife Service (USFWS) Depredation Permit in March of 2010 (Appendix D).

Photo 3-1. Culverts at OCF. These culverts are free of vegetation that could potentially impede water flow. Water is allowed to move quickly and easily through these culverts to properly drain the AOA.

Amy Anderson (previously Wester) and Amy Johnson of ERS conducted wildlife hazard management training at OCF in June 2010. FAA AC No. 150/5200-36 *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports* includes a training curriculum outline for airport personnel involved in implementing Wildlife Hazard Management Plans (Appendix E). The training curriculum requires annual, recurrent training and testing for these personnel. The ERS training module is based on the FAA curriculum and includes a classroom presentation, 35 question test, and airport tour to discuss specific hazards at OCF and observe field examples. ERS utilized information collected during the initial months of the WHA to identify the wildlife hazards at OCF and modified our training module accordingly. Thus, the training focused on species and related hazards specific to OCF. A follow-up training session is scheduled for the close of the WHA.

4.0 LEGAL STATUS OF WILDLIFE AND REQUIRED PERMITS

Approximately 90% of all bird strikes involve species protected under the USFWS Migratory Bird Treaty Act of 1918 (MBTA). A copy of the MBTA is included as Appendix F. A migratory bird is defined as any species of bird that live, reproduce, or migrate within or across international borders at some point during their life cycle. The MBTA makes it illegal for people to "take" migratory birds, their eggs, feathers, or nests without necessary permits. "Take" is defined as any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof. In total, 836 bird species are protected by the MBTA, including cattle egrets and vultures. The USFWS issues a Depredation Permit to airports that allow them to take migratory birds that pose a threat to human safety. **OCF obtained a Depredation Permit in 2010 (Appendix D). The permit is renewed annually every March.**

The Endangered Species Act of 1973 (ESA) also protects over 1,800 species of flora and fauna throughout the United States (see Appendix G). Although Incidental Take Permits (ITP) can be issued by USFWS allowing for the taking of federally endangered and threatened species, these permits are more difficult to obtain. Killing of endangered species should be avoided; however, public safety is still paramount. USFWS has signed a Memorandum of Agreement (MOA) with FAA, and other federal agencies, acknowledging the risk that wildlife strikes pose to safe aviation and agreeing to coordinate their missions to more effectively address environmental conditions contributing to aircraft-wildlife strikes (Appendix H). **To date, no federally endangered species have been struck at OCF and OCF does not possess a USFWS ITP.** Species protected by the ESA and with the *potential* to be struck at OCF are wood storks, whooping cranes, and the Florida panther (*Puma concolor coryi*).

The Bald and Golden Eagle Protection Act of 1940 (BAGEPA) adds another layer of protection to native eagles (Appendix I). Although the bald eagle is no longer listed as an endangered species, and therefore not protected by the ESA, they are still afforded protection under MBTA and BAGEPA. BAGEPA prohibits anyone, without a permit, from taking, possessing, selling, purchasing, bartering, offering to sell, purchase, or barter, transporting, exporting or importing eagles, alive or dead, including their parts, nests, or eggs. BAGEPA defines "take" as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" an eagle. Whereas, "disturb" is defined as "to agitate or bother an eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

The Florida Fish and Wildlife Conservation Commission (FWC) is the state agency involved with regulating Florida's wildlife. FWC Rule 68A-9.012 *Take of Wildlife on Airport Property* (Appendix J) took effect on July 27, 2010 and allows for the take and/or harassment of state-listed threatened and endangered species and species of special concern (SSC), on airports, without a permit, in emergency situations or after persistent harassment has failed. Persistent harassment must be documented to justify taking of a protected species. Gopher tortoises are exempt from this rule and still require a permit to be relocated off airport property. The taking of gopher tortoises is prohibited under any circumstance.

5.0 METHODOLOGY

Prior to conducting the on-site WHA, ERS reviewed pertinent background information to gain familiarity with the natural surroundings at each site that might imply the types of wildlife that may be expected to cause hazards. The following map and image source(s) aided in the assessment process:

- True Color Aerial Photography (source data: SJRWMD, 2009)
- Digital orthophoto quads at 1 m^2 pixel resolution (source data: SJRWMD, 2004 & 2009)
- *Marion County Soil maps* (source: USDA-NRCS, 1998)
- Digital National Wetlands Inventory maps (source data: USFWS)

Additionally, protected species occurrence Geographical Information Systems (GIS) records from FWC and Florida Natural Areas Inventory (FNAI) were reviewed for the site and surrounding areas. The purpose was to help determine the potential for endangered or threatened species, or species of special concern to present hazards from any of the sites (Exhibit 3).

Historical and current aerial photography and soils maps provided information for identifying contiguous forested areas and wetland systems. Such habitats provide potential corridors for wildlife travel and/or roosting opportunities for congregations of wading birds. The current aerial photographs provided an overall view of the airport property in relation to its natural surroundings or manmade facilities (e.g. landfills) that may pose as wildlife hazards. Once the remote data sources were reviewed, the information was summarized and used as reference material during the airport personnel interviews and field assessments.

ERS conducted interviews with the airport manager and airport operations personnel, and collected wildlife strike data from the FAA Wildlife Strike Database along with observation records from OCF staff to determine previous wildlife observations or strike occurrences. At the time of the interviews, ERS also conducted a detailed site visit of OCF property to gain knowledge of property boundaries, fencing locations and to inspect areas where previous wildlife observations or strikes have occurred. This effort was initiated in December 2009.

ERS initially determined the location of five stations which would be routinely inspected during the monitoring iterations. Station 6 was added in April 2010 for a total of six observation stations (See Photo 5-1 and Exhibit 4). The stations were chosen based on the potential for wildlife hazards in the areas comprising desirable habitat such as wetlands, forested areas within and adjacent to the perimeter fence, ditches, areas of inundation, bare areas and herbaceous fields.

Photo 5-1. Location of observation stations (1 through 6) at OCF.

Station 1

Station 1 is located just south of Runway 8-26 and north of the approach end of Runway 18 near the VOR. This location was chosen for the expansive view. Both ends of the AOA can be seen from this point. The nearby man-made structures also serve as potential attractants due to dumpsters, available perches, and surrounding landscaping.

Station 2

Station 2 is located west of the approach end of Runway 8. This station was chosen due to its proximity to the runway and the small patch of woodlands located inside the perimeter fence. This station also lies near the perimeter fence at a critical area for monitoring any fence breaches.

Station 3

Station 3 is centrally located on the AOA, west of Runway 18-36. The area consists of open grass fields and woodlands outside the perimeter fence. This station was chosen to monitor the height of the grass and the presence of birds in the area utilizing the open fields. Grass height is important, as it often determines the type of species which will utilize the area. The U.S. Department of Agriculture (USDA) in conjunction with the FAA recommends that grass height be maintained between 6 to 12 inches. This station also lies along the perimeter fence at a critical area for monitoring any fence breaches.

Station 4

Station 4 is south of the approach end of Runway 36, adjacent to the MALSR lighting system. The habitat consists of open grass fields and shrub-scrub habitat. The scrub vegetation consists of saw palmetto (*Serenoa repens*), woolly paw-paw (*Asimina incana*), and prickly pear cactus (*Opuntia humifusa*). This area was chosen due to the desirable habitat for gopher tortoises and its proximity to the approach zone for Runway 36.

Station 5

Station 5 is located inside the perimeter fence, east of the approach end of Runway 36, between two detention ponds, and adjacent to a large wooded area also within the perimeter fence. The habitat in this area comprises forested uplands, open grass fields, bare areas (when the ponds are dry), and temporary standing water. This area was chosen due to the desirable habitat for avifauna (e.g. large wading birds and killdeer) and mammals (raccoons, armadillos, and coyote) that are commonly attracted to forested uplands, areas of standing water, and culverts.

Station 6

Station 6 is located east of Runway 18-36 within the FBO ramp area. The surrounding area consists of open grass fields, ditches, asphalt, and numerous man-made perching

structures. This station was added in April after several birds were repeatedly observed loafing throughout the ramp.

The bulk of the WHA was spent conducting twelve months of surveys to identify the species utilizing OCF property, how species occurrence may change with each season, and their movements and patterns on-site, as well as off-site.

The survey methods included:

a) Fixed-Point Surveys: Amy Anderson, Amy Johnson, and Dave Yow (ERS wildlife biologists) conducted fixed-point surveys every other week for one year (December, 2009 through November, 2010) at pre-determined "Observation Stations". The observation stations are located along a survey circuit throughout the OCF AOA (Photo 5-1 or Exhibit 4). Each bi-weekly survey consists of four separate surveys, two at dawn and two at dusk, conducted over a two day period. Morning surveys began at dawn (approximately 15 minutes before sunrise) and dusk surveys started approximately 2.5 hours prior to sunset. Starting points were chosen randomly. Bird counts took approximately 2.5 hours to complete. A minimum of 96 dawn and dusk fixed-point surveys were conducted during the WHA at OCF. The wildlife biologists recorded all species observations within a 10 minute interval at each observation station. All observations are recorded on an "Airport Observation Sheet" (Appendix K). One survey iteration is defined as a visit to each observation station on the survey circuit for the designated time interval. Binoculars were used to observe and identify species.

An assumption of this survey method is that all birds are seen and identified. This assumption was likely defied due to the presence of small, solitary species that occasionally went unnoticed, or were too fleeting for a positive identification. However, the intent of the survey was to record the occurrence and behavior of larger-bodied and/or flocking birds that pose a greater risk to aircraft, therefore this oversight is acceptable.

b) General Observations: General observations included any incidental wildlife observations made when not conducting a fixed-point survey at a station, e.g., observations made while traveling between stations or while conducting other activities on OCF property. These observations were recorded and included in the WHA report. General observations also include an inspection of the interior and exterior perimeter fences adjacent to the AOA. Signs of wildlife activity, breaches, and/or vegetative disturbance to the fence were noted and the locations marked with flagging tape.

c) Night Spotlight Surveys: Spotlight surveys were conducted once a month following a fixed-point dusk survey, approximately 1-2 hours after sunset. Biologists drove along service and perimeter roads on OCF property, and recorded all wildlife observations. A minimum of 12 spotlight surveys were conducted during the WHA at OCF.

d) Small-mammal Transects: ERS established several small-mammal trapping transects in order to determine the presence or absence of small mammals on the airfield. Twenty (20) Sherman live-traps were set along five transects, for a total of 100 traps (See Exhibit 4 for a map of the transect locations). Each trapping event lasted for two consecutive nights. Small-mammal transects were surveyed twice during the 12 month assessment, once each during the spring and fall seasons. Small-mammal data was recorded and is included in the WHA.

In addition to individual species, habitat types, and human activities, other environmental factors influence the occurrence of potentially hazardous wildlife at OCF. FAA AC No. 150/5200-33B *Hazardous Wildlife Attractants On or Near Airports* (Appendix A) provides guidance to help identify potential attractants on-site. To identify these wildlife attractants and their locations, ERS also utilized the following data sources and on-site reconnaissance:

a) Recent aerial photograph: ERS reviewed aerial photographs of OCF and the surrounding area to gain information regarding the location of on-site and nearby wetlands and surface waters as well as the location of other potential wildlife attracting features in the surrounding areas. Of particular interest were the Ocala Regional Sportsplex and Michael A. Finn water reclamation facility #3 located to the west, OBS to the east, and the adjacent Marion County Landfill property (no longer in use). All of these are potential wildlife attractants that may promote the presence of wildlife and the movement of wildlife on or over the airfield.

b) Interviews with airport personnel: Amy Anderson, Amy Johnson, and Dave Yow of ERS conducted brief meetings with OCF airport operations personnel throughout the assessment to become more familiar with specific wildlife issues and obtain a general idea of any daily and/or seasonal effect patterns that operations personnel have had the opportunity to observe.

c) Habitat observations during the fixed-point surveys: While conducting the fixed-point surveys and traveling between the monitoring stations, ERS biologists took note of ditches, overgrown vegetation, low areas on the airfield, fence breaches, trees (also towers and signage) suitable for nesting or roosting on or near the airfield, dry retention ponds, and food sources (insects, waste, etc.) that could potentially attract wildlife on OCF property. All of the observations were noted.

d) General inspections of on-site and off-site areas: On-site inspections included inspections of the hangars and other buildings or structures on the airfield that contained nesting or roosting sites; inspection of dumpsters and other waste receptacles that may be attracting small mammals and birds. Off-site inspections of surrounding city parks, old landfills, water reclamation facilities, agricultural fields, etc. were observed throughout the assessment.

6.0 RESULTS

During the WHA, a minimum of 63 species of birds, 9 species of mammals, and 1 herpetofaunal (herp) species (reptiles and amphibians) were observed on or adjacent to the AOA.

6.1 Birds

A minimum of 63 species of birds were observed at OCF from December 2009 through November 2010. There are 5 categories listed below of "unidentified species". These birds were identified to species group (e.g. "unidentified blackbird" or "unidentified hawk") and; therefore, could still be included in the data set.

Table 2: Bird species observed at OCF during this WHA (December 2009 through November 2010), including number of sightings, average flock size, and range of flock size for each species.

Species*	Number of Sightings	Average Flock Size (Range)
AM.KE	227	1 (1-4)
AMCR	491	3 (1-60)
AMRO	12	24 (1-150)
ANHI	1	1 (1)
BADO	1	1 (1)
BAEA	4	1 (1)
BARS	3	4 (2-5)
BLGR	12	2 (1-3)
BLJA	20	2 (1-10)
BOBO	3	6 (1-10)
BRTH	6	1 (1)
BTGR	39	4 (1-20)
BUOW	16	2 (1-2)
CACH	1	3 (3)
CAEG	172	23 (1-300)
CANG	1	30 (30)
CARW	1	1 (1)
CEDW	2	40 (20-60)
CHSP	2	7 (3-10)
CHSW	8	4 (1-10)
COGD	1	1 (1)
COGR	13	4 (1-15)
CONI	12	2 (1-4)
CWWI	3	2 (1-2)
DCCO	1	4 (4)
EABL	19	2 (1-9)
EAKI	1	1 (1)
EAME	268	4 (1-30)
EAPH	45	1 (1-5)
EATO	12	1 (1-3)
ETTI	6	1 (1-2)
EUST	13	41 (1-300)
FICR	3	2 (1-5)
GBHE	2	1 (1)
GCFL	12	1 (1-2)
GREG	3	1 (1)
GRSP	1	1 (1)
KILL	107	7 (1-50)
LBHE	2	1 (1)
LOSH	29	1 (1-2)
MODO	170	3 (1-40)

Species*	Number of Sightings	Average Flock Size (Range)
NOBO	19	2 (1-6)
NOCA	19	2 (1-6)
NOHA	14	1 (1)
NOMO	29	1 (1-2)
NOPA	2	1 (1)
OSPR	1	1 (1)
PAWA	38	4 (1-10)
PIWO	4	1 (1)
RBWO	2	1 (1-2)
ROPI	1	2 (2)
RSHA	6	1 (1-2)
RTHA	54	1 (1-2)
RWBL	22	87 (1-1000)
SACR	2	8 (1-15)
SOSP	9	9 (1-20)
STKI	1	1 (1)
TRES	11	4 (1-10)
TUVU	37	6 (1-100)
UNBL	7	51 (15-200)
UNDU	2	5 (1-10)
UNGU	14	8 (1-30)
UNHA	2	1 (1)
UNSP	22	5 (1-5)
WEVI	3	1 (1)
WHIB	4	12 (1-30)
WOST	1	1 (1)
YRWA	8	6 (1-10)

*All bird species are listed here by Four-letter (English Name) Alpha Codes for 2055 Bird Species prepared by Peter Pyle and David F. DeSante at The Institute for Bird Populations (www.birdpop.org). For a complete list of Alpha codes and species names, see Appendix L.

To analyze the bird data, the various species were organized into groups. The groupings were based on similar behavior and/or habitat preferences, and not necessarily species relationships. For example, Canada geese, great blue herons, and ducks were grouped together as "waterfowl." The "passerines" group comprises Northern cardinals, loggerhead shrikes, Eastern meadowlarks, warblers, Northern mockingbirds, brown thrashers, Carolina chickadees, wrens, Eastern phoebes, etc. Cattle egrets were characterized separately from the other groups because they were one of the most abundant species observed during the assessment. While some of these birds may be taxonomically different and have different diets, they typically behave in similar ways and are found in similar vegetative habitats. For a list of all bird groups and associated species, see Appendix M. Tracking birds of similar behavioral characteristics was important in determining which species of birds were most likely to be involved in bird-aircraft strikes. Also, birds of similar behavior tend to respond to the same control methods such as habitat modification, hazing, or types of exclusion. For each group, descriptions, attractants, risks, legal status, location, control measures, and strike history are presented. Groups appear in the order of most abundant to least abundant at OCF;

however, that does not imply that groups which were observed infrequently were less of a strike hazard. Although ERS biologists attempted to identify all wildlife to the species level, this was not always possible.

The species diversity observed at OCF was typical for the region. Most of the species recorded are common residents of, or migrants to, Florida. The most commonly observed group of birds at OCF were the passerines (small, perching songbirds), followed by corvids (crows), birds of prey, cattle egrets, doves/pigeons, shorebirds, blackbirds, vultures, aerial foragers, waterfowl, game birds, and gulls (Figure 6-1).

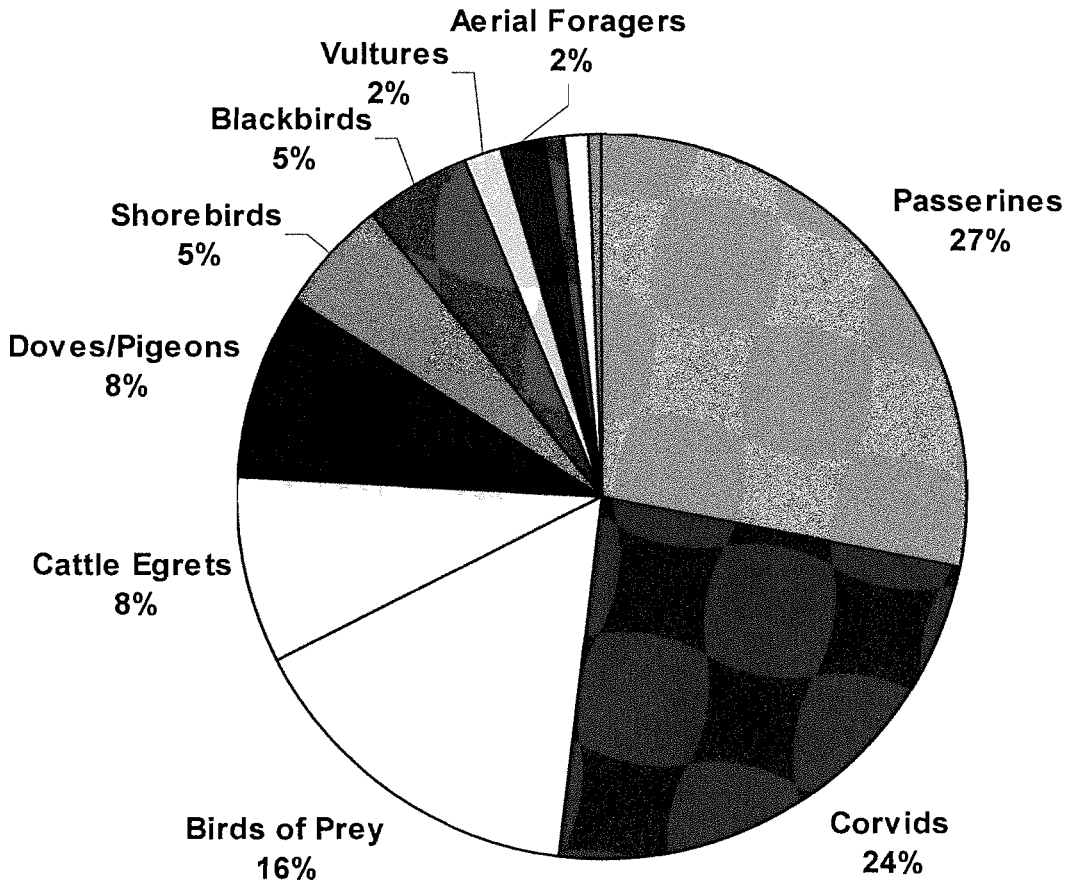


Figure 6-1. Abundance of bird groups observed at OCF from December 2009 to November 2010. Waterfowl, game birds, and gulls are not labeled as they each total less than 1% of all observations.

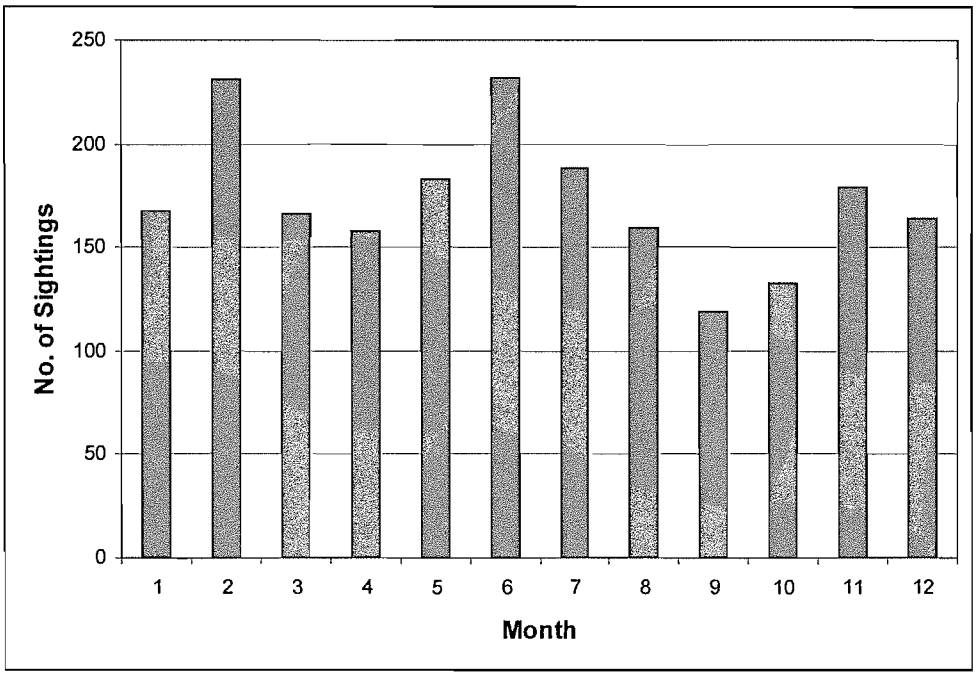


Figure 6-2. Number of bird observations made per month at OCF from December 2009 to November 2010.

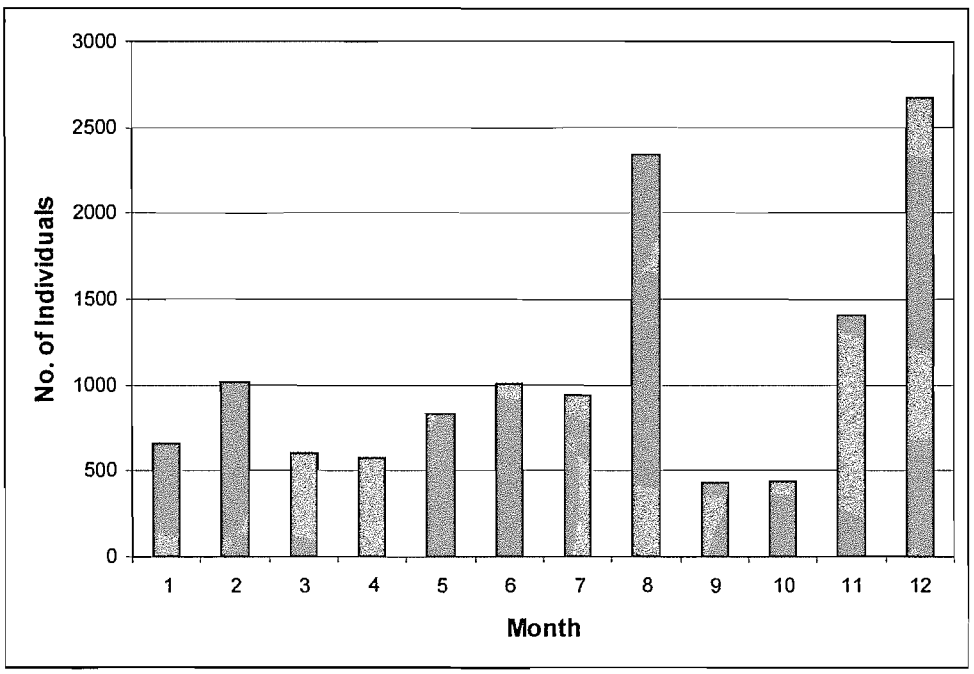


Figure 6-3. Number of individuals counted per month at OCF from December 2009 to November 2010.

There were approximately the same number of bird sightings made each month of the WHA, with the exception of September and October. Observations dropped to less than 150 sightings during these months (Figure 6-2). However, when looking at the number of individual birds counted during each month (Figure 6-3), the greatest number of birds occur at OCF during August and December. This is likely a reflection of cattle egret and blackbird migration events, when flock sizes typically increase. This will be discussed further in the cattle egret and blackbirds sections.

Among the various available habitats at OCF, the majority of birds (33%) were observed crossing the entire AOA, meaning they flew over a majority of the airfield (Figure 6-4). Approximately 23% of birds were observed in the short, mowed grass. Birds were seen perched on structures (perimeter fence, antennae, lights, runway and taxiway signs, and hangars) 9% of the time. Approximately 9% of the bird species were observed in the wooded areas surrounding the airport as well. Bird sightings within the movement areas (runways, taxiways, and ramp) totaled about 22%. Sightings in the long grass totaled less than 1% of all observations. It appears short grass is more attractive to most species.

When looking only at observations within the movement areas, birds were seen on, or crossing over, taxiways 40% of the time. They were seen in the GA ramp area approximately 3% of the time. Loafing on or crossing over a runway was observed 57% of the time (Figure 6-5).

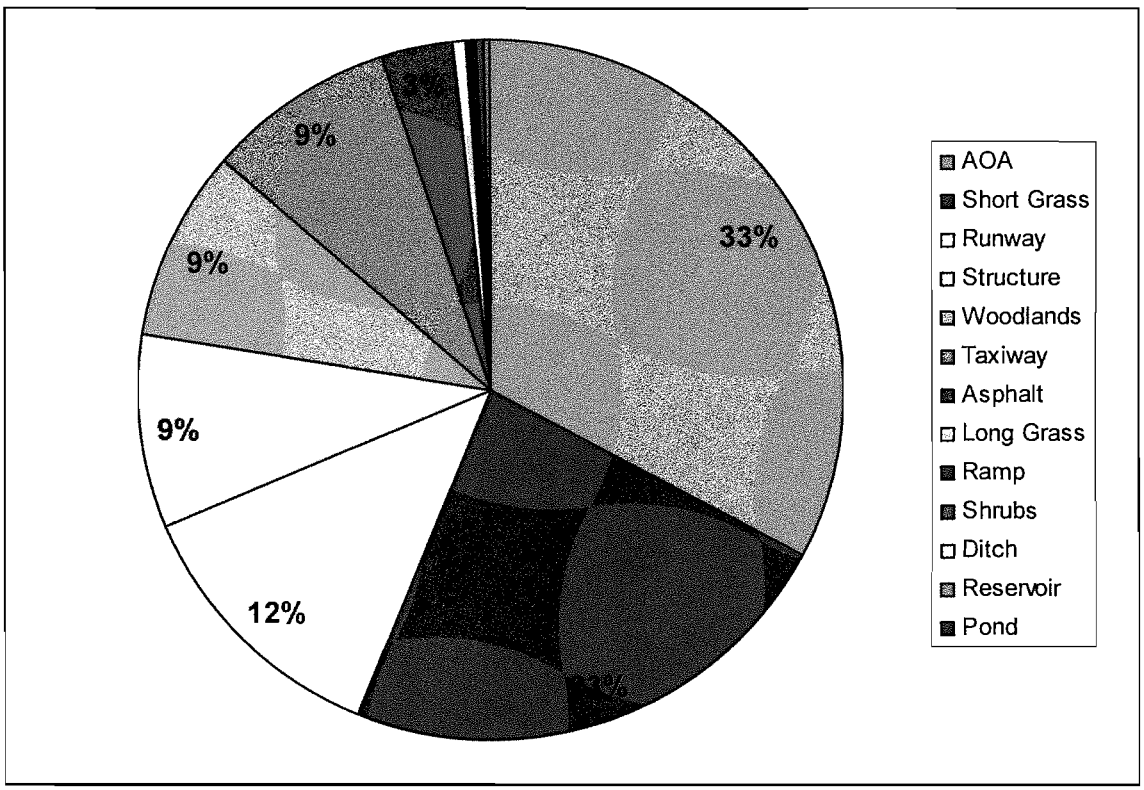


Figure 6-4. Proportion of birds observed at various locations on OCF from Dec. 2009 to Nov. 2010. Temporary standing water accounted for less than 0.1% of the total recorded observations and, therefore, is not included here.

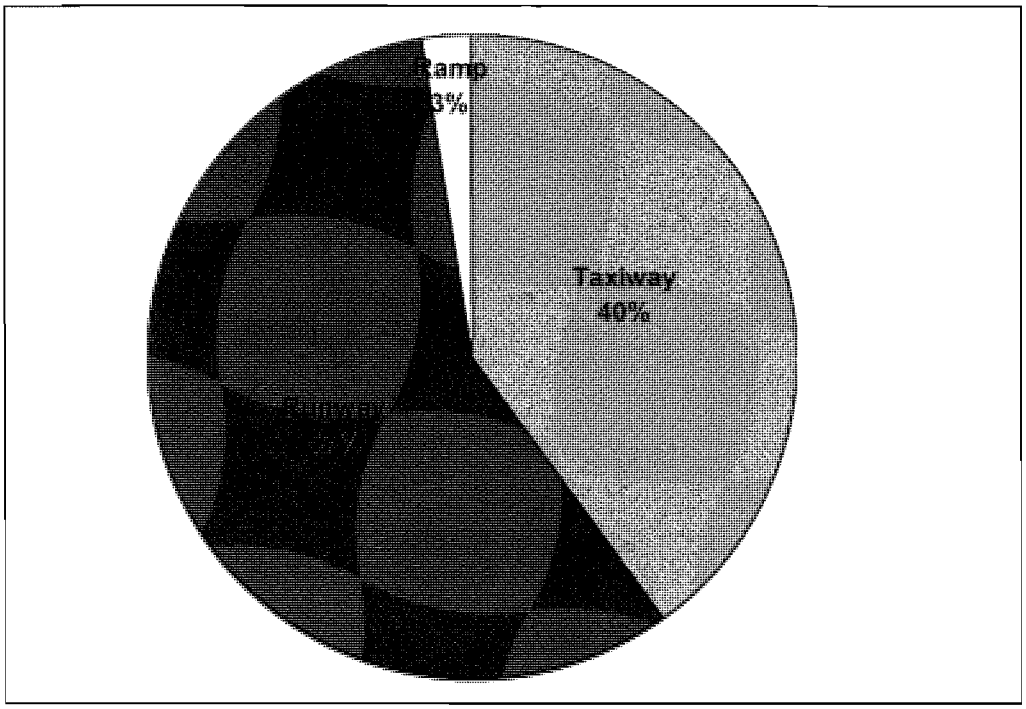
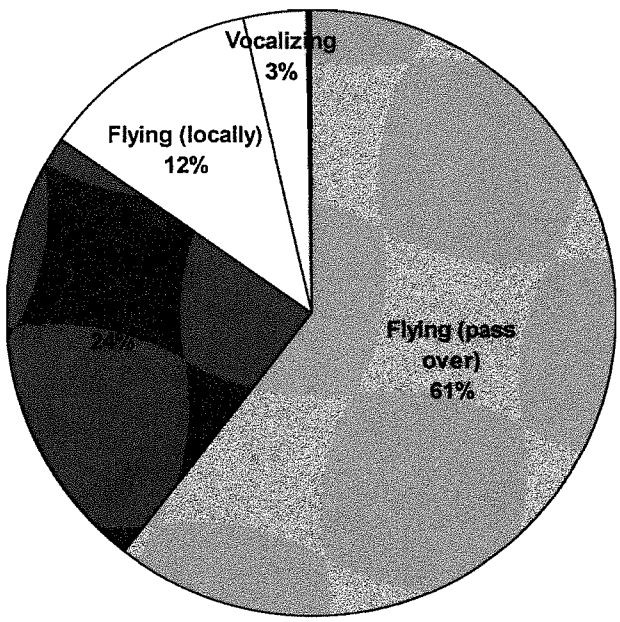


Figure 6-5. Proportion of birds observed on or around the movement areas at OCF from Dec. 2009 to Nov. 2010.

Behavior of all birds at OCF was recorded with each observation (Figure 6-6). Flying (locally) can be defined as: hunting aerially, flying from one part of the airfield to another, defending territories, performing mating displays, etc. These birds were not leaving the airfield. Those that were recorded as flying (pass over) were crossing a portion, or all, of the AOA from one side to another. They did not stop to land or loaf on the airfield. Loafing is defined as standing on the ground, sleeping, possibly feeding, resting, or perching.

Figure 6-6. Proportion of bird behaviors observed at OCF from Dec. 2009 to Nov. 2010. Roosting, feeding, standing, running, nesting, and hawking insects are not labeled as they each comprised 1% or less of the total.



Roosting, feeding, standing, running, nesting, and hawking insects were additionally recorded behaviors; however, each of these categories comprised 1% or less of the total recorded activities. Therefore, they are not labeled on the graph. The behaviors are not mutually exclusive since birds that were vocalizing might also have been flying, etc. Birds were characterized by their most obvious action(s). Approximately 73% of bird observations were noted as "flying". Flying is considered the most hazardous behavior because of the increased chance of an aircraft collision.

6.1.1 Passerines

Description Please see Appendix M for a complete listing of all species included in this group. It is best to consult a field guide for the specifics on these species, however, in general, passerines are small perching songbirds that are typically found alone or in pairs during the breeding season (summer) and in flocks during the non-breeding months (winter). The most commonly observed passerines at OCF were Eastern meadowlarks, Eastern phoebes, and palm warblers, therefore, they will be the focus of this discussion (Figure 6-7).

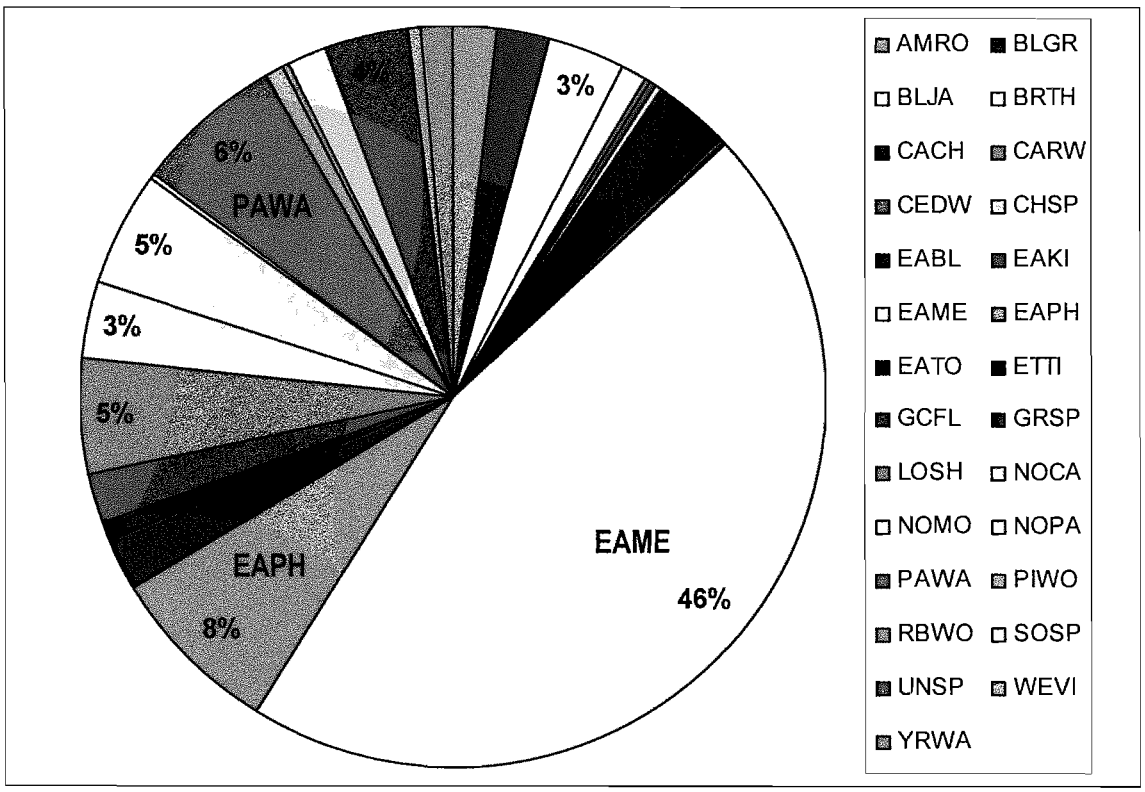


Figure 6-7. Abundance of species observed within the Passerine group at OCF from December 2009 through November 2010. Species not labeled here account for 2% or less of the total group.

Eastern meadowlarks are heavy-bodied, short-tailed, and long-billed. Their underside is almost completely yellow with a distinct black "bib" or "V". They have white outer tail feathers that are obvious in flight. Quite often, meadowlarks are heard but not seen. Their song is a simple, clear whistle sounding like *seeeeooaaa seeeeadoo*. Eastern phoebes are medium-sized flycatchers with pale yellow bellies and dark heads. They are most often seen solitary on a conspicuous perch, dipping their tails in a characteristic motion. Phoebes have a short, nasally call that sounds like they are saying their own name, "*fee-bee, fee-bee*". Palm warblers are often hard to identify as they are small and look much like many other winter warblers. They are yellowish overall and constantly pump their tail when at rest. This constant pumping can help to distinguish them from other birds (Sibley, 2000). Passerines were present throughout the year, however, they were seen less during the late summer/fall months (Figure 6-8). The meadowlarks follow this same overall trend. Phoebes and palm warblers were most common during the colder months and were seen less during the warm, summer months (Figure 6-9). When comparing the number of sightings to the actual number of recorded individuals, the trends are similar. This is because most of these species do not typically form large flocks and were often recorded as a single individual.

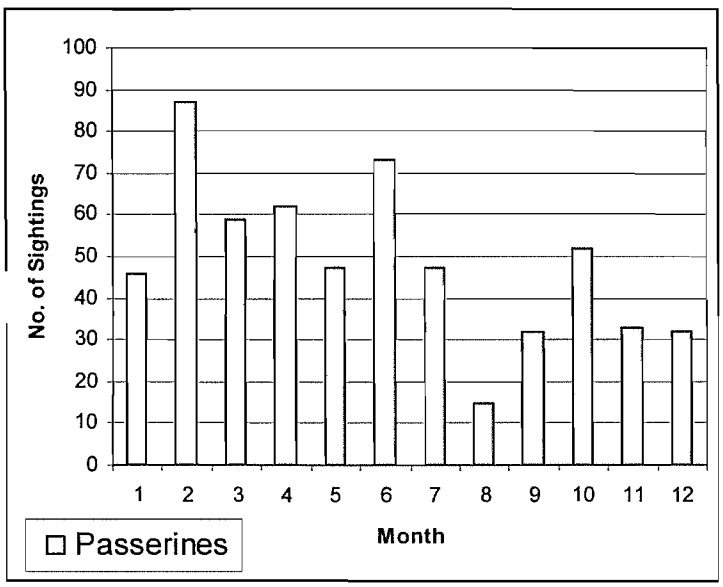


Figure 6-8. Number of Passerine sightings per month at OCF from December 2009 through November 2010.

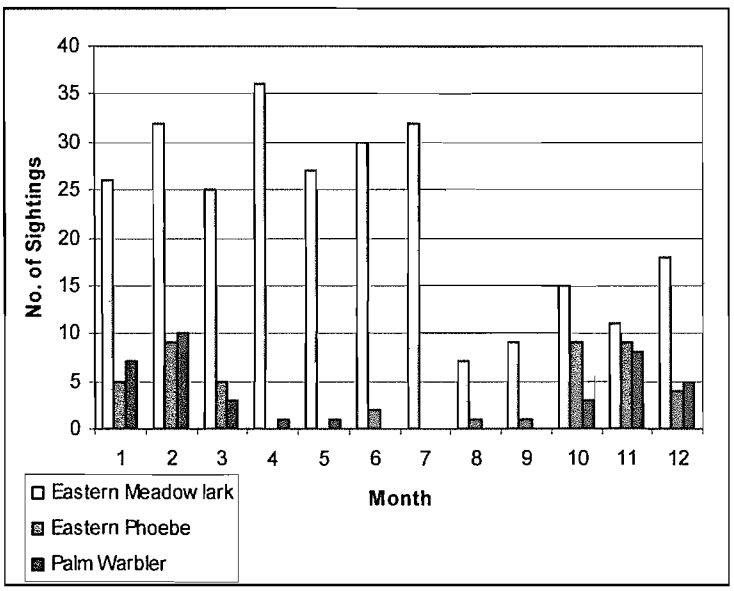


Figure 6-9. Number of meadowlark, phoebe, and palm warbler sightings per month at OCF from December 2009 through November 2010.

Attractants Eastern meadowlarks are found in open, grassy habitats, often perched on fences or other objects, and in small, disconnected flocks. They build domed nests of grass on the ground. Their preferred food source is insects (especially grasshoppers) and their larvae. For these reasons, the AOA is very attractive to meadowlarks. Any perching structure in a grass field also attracts meadowlarks, as they often perch to search for food, defend territories, or attract a mate. Eastern phoebes prefer open woodland or edge habitat. Areas where woodlands (with nesting and perching opportunities) meet open grass fields (where they can easily catch flying insects) are ideal. They are also commonly found near water or wetlands. In the winter, palm warblers are found in a variety of wooded habitats, thick secondary growth, near water, and/or in open fields.

They prefer to forage on the ground during the winter months. Their primary diet is insects, but they will feed on seeds and some fruits in winter (allaboutbirds.org).

Risks Meadowlarks are a common species on most airports. They are a medium-sized bird, weighing approximately 3.2 oz (90g) and having a 14 inch wingspan (Sibley, 2000). Because of their attraction to open grass fields, they are likely to be found loafing or crossing the movement areas, which increases their risk of an aircraft collision. However, one meadowlark is not likely to cause significant damage to an aircraft. Several larger flocks (up to 30 individuals) were observed loafing throughout the infields during the spring. Fortunately, meadowlarks do not frequently form large flocks or fly long distances. Meadowlarks were the second most commonly seen bird at OCF and, therefore, are a high strike risk due to their abundance. However, their size and behaviors make them a low risk for causing significant damage to aircraft. In summary, they are at a high risk of being struck, but a low risk for causing substantial damage. Eastern phoebes weigh approximately 0.6 oz (16g) and have a wingspan of approximately 10 inches. They are often alone and rarely come in contact with other phoebes, even when nesting. They were most commonly observed perched along the perimeter fence. Palm warblers are very small birds, weighing 0.3 oz (10g) and having a wingspan of approximately 8 inches (Sibley, 2000). They do not form large flocks and the largest group observed at OCF was 10 individuals. They also do not fly long distances, except during migration. Palm warblers prefer dense vegetation near the woodlands or along the ditches. They were not observed crossing the movement areas. Neither Eastern phoebes, nor palm warblers are a threat to aviation safety. Overall, passerines are a low priority for wildlife hazard management.

Legal Status All members of the "passerines" group observed at OCF are protected by the MBTA and require a USFWS depredation permit to remove, take, kill, or possess. There is no additional state protection for any of these species.

Location Meadowlarks were always seen in open grass fields and most commonly at observation stations 1 and 4 (Figure 6-10). Eastern phoebes were commonly seen at observation station 3, perched along the fence between the woodlands and the grass fields throughout the AOA. Palm warblers were also predominantly observed at station 3 along the perimeter fence nearest the wooded areas or perched in dense vegetation along the ditches.

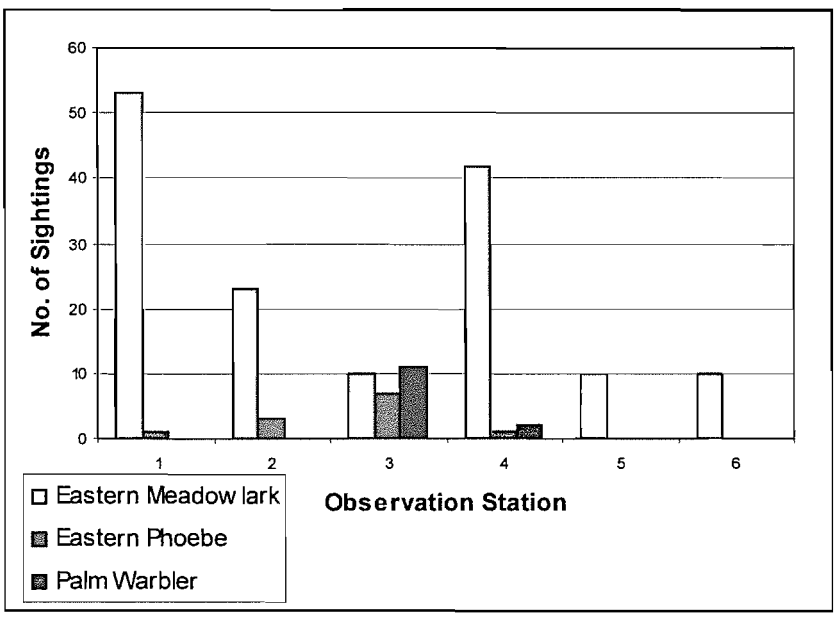


Figure 6-10. Number of Eastern meadowlark, Eastern phoebe, and palm warbler sightings at each observation station at OCF from December 2009 to November 2010.

Control Measures Maintaining a dense monoculture of bahia grass will help reduce the attractiveness of the airfield to meadowlarks. Also, keeping the grass height at a minimum of 6 inches will help reduce their ability to see each other and their prey. There was no observed evidence of meadowlarks nesting on the AOA, but if nests are found, they should be destroyed. Also, eliminating unnecessary perching structures throughout the AOA will reduce the favorable habitat (Photo 6-1). Adding perching deterrents (bird spikes, bird spiders, etc.) to the unavoidable structures (runway signs, antennae, etc.) will help eliminate those perching opportunities as well. The primary food source for meadowlarks is insects, so spraying insecticides could possibly be used reducing the number of meadowlarks at OCF. However, this can be quite costly. As they are ground-dwellers, pyrotechnics and shooting are not recommended control methods. Removing berry or fruit-bearing landscaping may help eliminate other passerines.

Photo 6-1. Unnecessary perching structures placed throughout the field west of Runway 18-36.

Strike History Nationally, these types of passerines or "perching birds" account for approximately 11.5% of all known species bird strike reports. However, strikes with perching birds have caused only $2,781,895 (1.2%) in total damages (Dolbeer et al., 2009). Eastern meadowlarks account for 45% of the bird strikes in the "meadowlark" group. Eastern phoebes are only listed once in the database and there were only four reported palm warbler strikes in the national database. Meadowlarks and sparrows are ranked 22 and 24 respectively on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005).

6.1.2 Corvids

Description Two species of crows were observed at OCF during this WHA: American crows and fish crows. Both species, males and females, look almost identical. They are large birds with all black plumage, a short tail, and broad wings. American crows weigh approximately 1 lb (450g) and have a 39 inch wingspan. Fish crows are slightly smaller with a slightly longer tail, weighing approximately 10 oz (280g) and having a wingspan of 36 inches. However, the two species are best distinguished by voice. American crows make a stereotypical "crow" call (*carrr* or *caaaw*), whereas fish crows have a short, nasal call, "*cah-ah*" or "*uh-uh*" (Sibley, 2000). American crows were observed more frequently at OCF than fish crows (only 3 sightings), so they will be the focus of this discussion. American crows were the most frequently observed species at OCF. Corvids were observed during every survey, month, season, and time of day, but they were observed most frequently in May and November (Figure 6-11) and in the greatest numbers in November (Figure 6-12). Average flock size peaked in September with 6 individuals per flock. The largest flock recorded was approximately 60 individuals observed in September 2010.

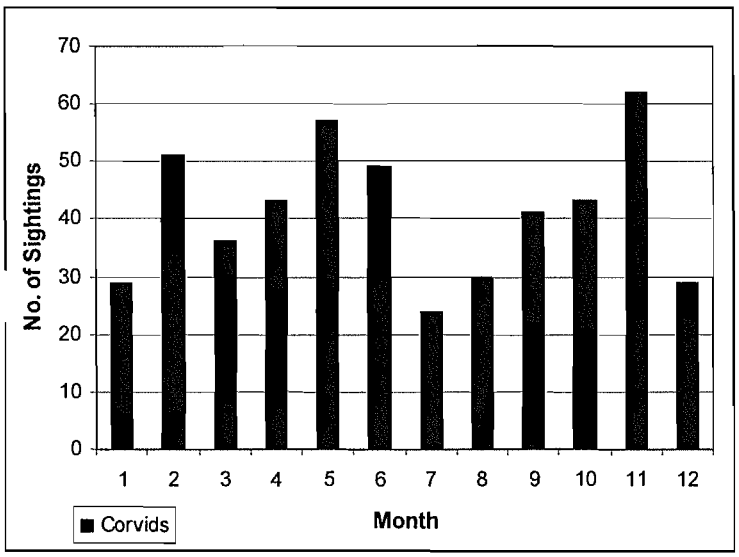


Figure 6-11. Number of Corvid sightings per month at OCF from Dec. 2009 to Nov. 2010.

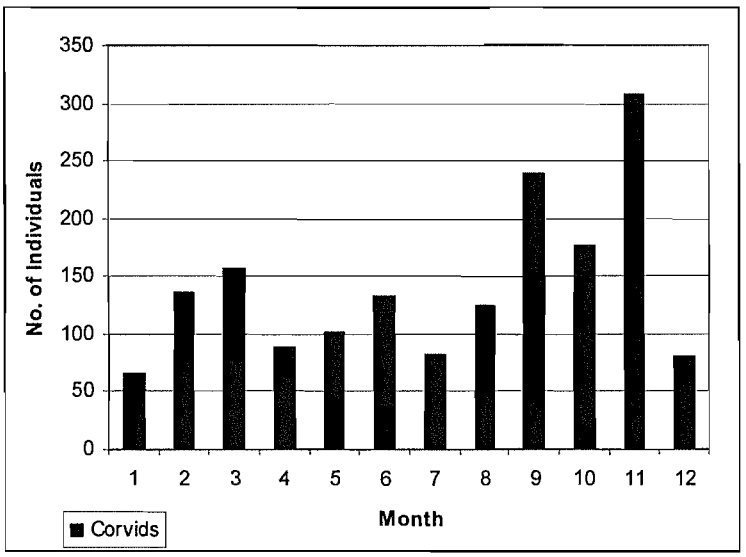


Figure 6-12. Number of individual Corvids counted per month at OCF from Dec. 2009 to Nov. 2010.

Attractants American crows are truly omnivorous, eating anything and everything. They easily adapt different food habits to changing seasons and availability of food. They are equally skilled at hunting, pirating, and scavenging for food. One-third of a crow's annual diet consists of animal matter, including insects, worms, herps (reptiles and amphibians), eggs, small birds, and carrion (e.g. road kill). The remainder of their diet (two-thirds) comes from vegetable or plant matter, including grains, nuts, fruits, and garbage. Therefore, it would be hard to eliminate a food source for these birds. Reducing the amount of seed-producing vegetation (e.g. weeds), spraying for insects, removing earthworms and carrion from the movement areas, and keeping dumpster lids secure can help to reduce the amount of available food located on the AOA. The ideal habitat of an American crow is a mixture of open fields where food can be found (e.g. the AOA) and woodlands where there are trees for nesting and roosting. However, they are highly adaptable and are found in many urban or suburban areas (Hygynstrom et. al., 1994).

The crows were most frequently observed in the woodland areas along the east side of the Runway 18-36, inside the perimeter fence, and throughout the woodlands bordering the west side of the airport, outside the perimeter fence. The crows commonly make flights between the two wooded areas, crossing Runway 18-36. They continuously cross the runway throughout the day. There was no evidence of a large crow roost on the AOA at OCF, but there may be small roosting/nesting sites within the woodland areas bordering the AOA.

Risks Corvids are large birds and could cause significant aircraft damage if struck. They are not commonly observed in large flocks; however, they will form large congregations of smaller flocks in the fall and throughout winter. During the nesting season (February to May) they are seen only in pairs or in small family groups. Also, their large population sizes are likely to persist as they are highly intelligent and adaptable, can lay 2 broods per year of 4 to 6 young each, and have very few natural predators as adults. Despite these facts, crows are a relatively low hazard risk at airports. Because of their intelligent, cautious behavior, crows are able to avoid collisions with aircraft. They move quickly out of the way of a plane during take off or landing and are not commonly found soaring at high elevations with aircraft. Proof of this can be observed on highways where crows are frequently found scavenging on carcasses, but rarely found as road kill themselves (Hygynstrom et. al., 1994). At OCF, the crows are a moderate hazard risk due to the large number observed and the frequency they were observed crossing Runway 18-36.

Legal Status American and fish crows are protected by MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. There is no additional state protection for any of these species.

Location Crows were most commonly observed at Stations 3 and 5 (Figure 6-13). This is because these stations are adjacent to sections of woodlands where the crows have roosting/nesting opportunities. Most often, they were seen flying to and from the patches of trees between these two areas, crossing Runway 18-36 every time.

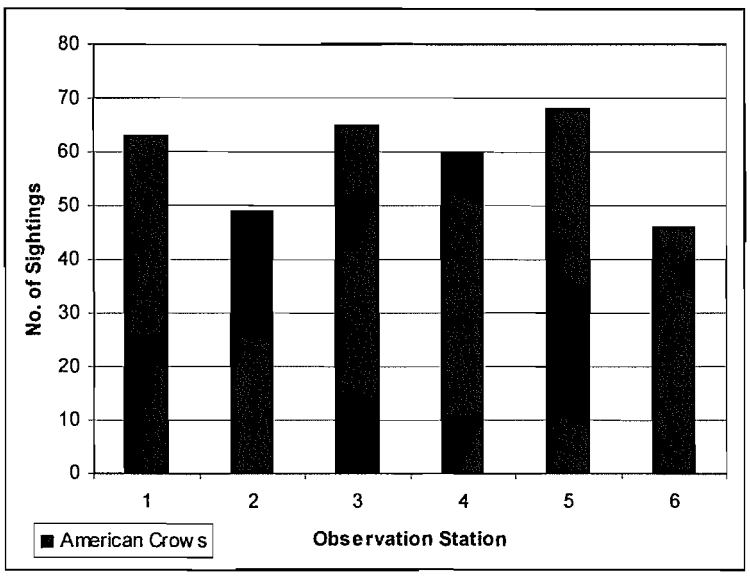


Figure 6-13. The abundance of crows observed at each station at OCF from Dec. 2009 to Nov. 2010.

Control Measures Eliminating the woodland areas inside, and adjacent to, the perimeter fence will reduce the population of crows roosting and feeding at the airport. This will also lead to a decrease in the frequency with which the crows are observed crossing the runway. Thinning the interior branches of all landscaping trees (e.g. live oaks) on OCF property may help eliminate roosting opportunities as well. Frightening techniques are proven effective in dispersing crows; however, a combination of several tactics used together must be employed to avoid habituation. This is true with all birds, but especially crows that are highly intelligent. Dispersing crows also requires patience and persistence as they will continue to return to their same feeding/roosting grounds (Hygynstrom et. al., 1994). Pyrotechnics and shooting (as reinforcement) should be employed every time crows are loafing or creating a hazard on the airfield (e.g. large flocks or individual birds consistently crossing the movement areas).

Photo 6-2. Crows loafing inside the perimeter fence, adjacent to patches of woodlands.

Strike History Nationally, crows account for less than 1% of all known species bird strike reports. The vast majority of the strikes listed in the database under the corvid group are American crows. American crows have caused approximately $1,265,113 (0.4%) in damage (Dolbeer et. al., 2009). Corvids (crows and ravens combined) are ranked 16 on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005). There are no previous records of corvids being struck at OCF.

6.1.3 Birds of Prey

Description The following "birds of prey" were observed at OCF during this WHA: red-tailed hawk, red-shouldered hawk, American kestrel, bald eagle, osprey, Northern harrier, swallow-tailed kite, burrowing owl, and barred owl. These species are all predatory birds that possess hooked bills and talons for catching and killing prey. They are very aerial birds and commonly soar for long distances in search of food (except the burrowing owl). The variations in wing shapes and body proportions are related to their hunting styles and preferred prey. Buteos (red-tailed and red-shouldered hawks) have very broad wings and a short tail. They are often seen perched or soaring. Falcons (kestrel) and accipters (harrier) have longer, narrow wings that come to more of a point than a buteo. The also have long tails and commonly fly with their wings in a "V" formation. Northern harriers are easily recognized by a conspicuous white rump patch. Kites have long, pointed wings, long tails, and the most graceful flight (Sibley, 2000). They are rarely seen perched. Bald eagles were seen perched or soaring, but mostly flying over OCF. They are very large birds, weighing 9 to 15 pounds and having a wingspan of 7 to 8 feet. They fly with their wings held straight out from the body. All eagles, even juveniles, have conspicuous large, yellow feet. Osprey are a unique species resembling gulls more than hawks. Their long, narrow wings are always angled and bowed down in flight. Burrowing owls are small owls just bigger than a robin (approximately 9 inches). They are brown and white with long legs and yellow eyes. Burrowing owls are most commonly found on the ground, near their burrows. Barred owls are large, stocky, round-headed, broad-winged, and have a short tail (Sibley, 2000). American kestrels were the most commonly observed species in this group at OCF; therefore, they will dominate the discussion (Figure 6-14).

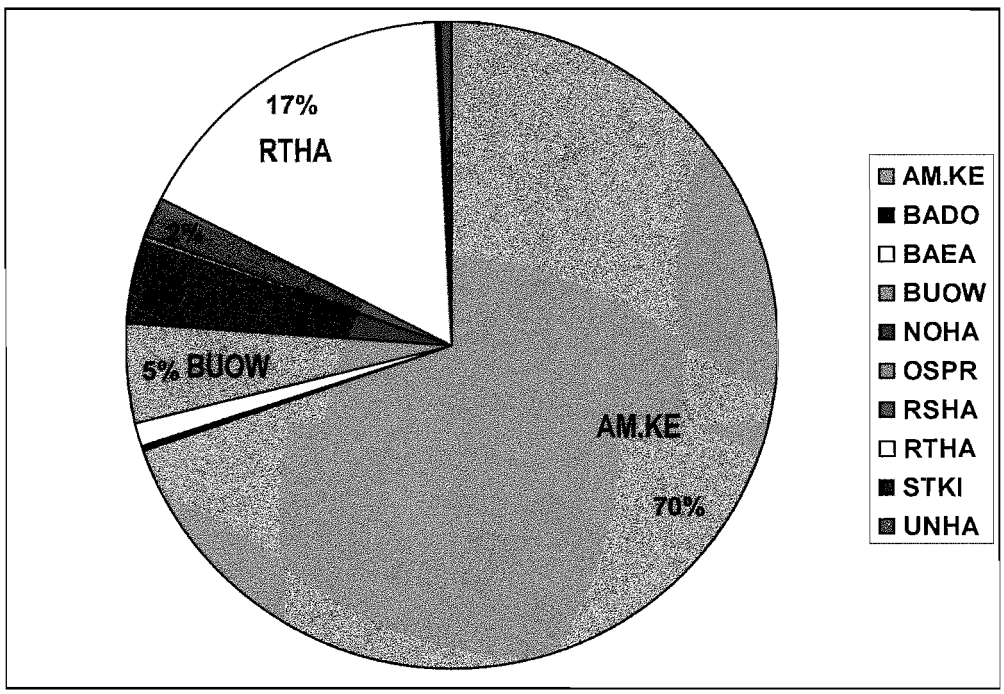


Figure 6-14. Abundance of each species observed in the "birds of prey" group at OCF from Dec. 2009 to Nov. 2010. The barred owl, bald eagle, osprey, "unidentified hawk" and swallow-tailed kite each comprised 1% or less of the total number of raptors observed and is not labeled here.

Attractants All birds of prey are chiefly attracted to an available food source. For most species, this means a healthy population of small mammals (rodents and rabbits). However, kestrels will prey on larger insects (grasshoppers and beetles) and herps (anoles, frogs, etc.). Ospreys are strictly fish eaters, and therefore attracted to water. Kites are known to eat snakes, but will eat insects as well. Bald eagles rely heavily on fish and carrion, but will feed on other birds and small mammals. Burrowing owls prefer smaller prey like insects (beetles, grasshoppers) and small rodents. Raptors also seek out available nesting habitat where there are plentiful food resources. Red-shouldered hawks, red-tailed hawks, burrowing owls, barred owls, eagles, and osprey commonly breed in Florida and can be found in the state year-round. Kites breed in Florida, but spend winters in South America. Harriers and kestrels tend to be more common in the winter months and breed farther north; however, they can be found in Florida all year as well. Preferable nesting habitat for most raptors consists of dense forest areas or woodlots, where their nests can be easily concealed (Hygynstrom et. al., 1994). They often nest in tall, mature trees. In Florida, eagles nest almost exclusively in mature pine trees found in, or adjacent to, wetlands or open water. Osprey commonly choose to nest in man-made structures, such as cell phone towers, power lines, and light poles along coasts, large lakes, and rivers. Burrowing owls are attracted to dry, sandy soils where they can dig their burrow or inhabit an existing burrow originally excavated by gopher tortoises, pocket gophers, etc.

Risks Although most raptors are found flying solo or in pairs, they pose a significant threat to aircraft due to their large size. The species observed at OCF range in weight from 4.1 oz (American kestrel) to 9.5 lbs (bald eagle), with an average weight of over 2 lbs. Wingspan's range from 22 in to 80 in, with an average wingspan of almost 4 feet (Sibley, 2000). Also, these birds are generally observed soaring or hunting in flight and, therefore, have a higher risk of colliding with aircraft. Kestrels "hover" before grabbing their prey. They rapidly beat their wings and remain stationary over prey, until finally dropping down on them. Red-tailed hawks commonly hunt from a perch, but will spend time soaring over open areas, especially during midday. They use thermal columns to soar like vultures (see Section 6.1.8 Vultures for more information on "thermals"). Burrowing owls do not hunt far from their burrows. They will lure insects to them by placing dung around the mouth of the burrow. They do not commonly fly and are, therefore, not a significant strike hazard. However, they do create large holes throughout the safety area, which creates a safety risk for aircraft. Finally, kites and osprey sometimes congregate in flocks; however, this behavior was not observed at OCF and these species were recorded only once.

Legal Status All raptors are protected by MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. Bald eagles are afforded an additional layer of protection under the federal BAGEPA law (see Section 4.0 Legal Status of Wildlife and Required Permits for more information). FWC lists the osprey as a Species of Special Concern (SSC), but only for the Monroe County population. However, osprey nests are protected throughout the state and require permits to relocate or destroy. Burrowing owls are also listed as a SSC throughout the state. The Southeastern American kestrel (*Falco sparverius paulus*) is listed by FWC as threatened, however, this only pertains to resident kestrels, not the migratory individuals commonly found at OCF. A few kestrels were observed during the warmer months (Figure 6-15). These individuals may be the listed Southeastern subspecies; however, it is impossible to tell by appearance alone. If a kestrel strike occurs during the summer months, it is best to send the remains to the Smithsonian for proper species identification (See Appendix N for details). Airports with USFWS Depredation Permits and operating under an FAA approved WHMP

are allowed to take state listed species without an additional permit (FWC Rule 68A-9.012 Take of Wildlife on Airport Property, Appendix J).

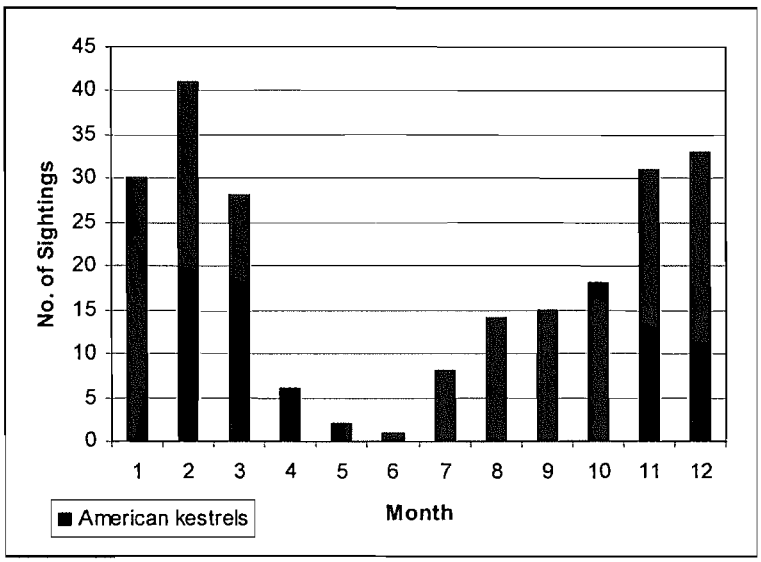


Figure 6-15. Number of American kestrel sightings per month at OCF from December 2009 to November 2010.

Location Red-tailed and red-shouldered hawks were commonly observed perched on the VOR, windsock, and perimeter fence along the wooded areas. Burrowing owls were always observed near their burrows throughout the infields in the northeast corner of the AOA. American kestrels primarily utilized man-made structures and were consistently observed perched on the VOR, along the perimeter fence, and on the approach lighting system for Runway 36. Kestrels were most commonly noted at observation station 1, near the VOR, at the approach end of Runway 18 (Figure 6-16). Open, grassy habitat is preferred by kestrels to hunt and hover for their prey. Unfortunately, this location coupled with a kestrel's hovering behavior, may increase the risk of a collision with aircraft.

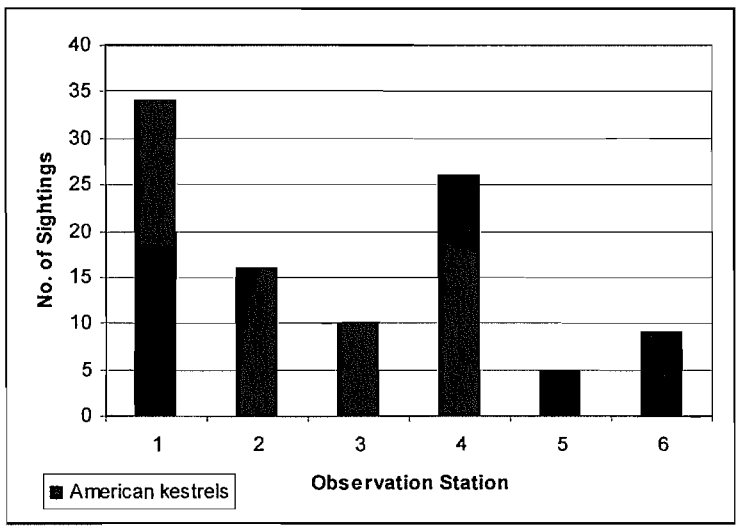


Figure 6-16. The number of American kestrel sightings at each observation station during the WHA conducted at OCF from December 2009 to November 2010.

Control Measures The long-term solution to raptor hazards is to make the airfield, and surrounding airspace, unattractive to these predators by eliminating perching/nesting opportunities and food sources. Most kestrels and hawks will perch on a snag or large, isolated tree before attacking their prey. In the cases of airports, they will also use man-made structures such as windsocks, instrument antennas, and light poles. Adding perching deterrents, such as bird spiders, to man-made structures or removing snags and tall trees from wooded areas can eliminate these perching opportunities. Small mammals (common raptor prey) were present throughout the wooded areas at OCF. Reducing small mammal populations on the AOA will reduce the birds' primary food source. This is discussed further in the mammal section (Section 6.2.3).

Habitat management techniques for discouraging burrowing owls from nesting on airports are difficult because the owls prefer open, cleared pastures and grass fields. There is no way to eliminate this habitat from the airfield, however, keeping the grass at a taller height (between 6 and 12 inches) will help reduce the preference for the AOA. The owls prefer to stand or perch outside their burrows and clearly see the environment around them (Photo 6-3). Burrowing owls are only approximately 9 inches tall, so keeping the grass at a taller height, will obstruct their view and make them too uncomfortable to excavate or inhabit a burrow. Burrows found within the safety area should be filled only if the burrow is inactive (i.e. no eggs or flightless young are present). Nesting season for these owls is from February through July. If there is an adult seen at the burrow during this time, the nest is presumed active. Destroying a burrow typically requires an FWC issued take permit, however, airports are exempt from state-listed species requirements as long as they have a USFWS Depredation Permit and are operating under an FAA approved WHMP (see Appendix J for further information). Burrows found outside the safety areas should be allowed to remain, as burrowing owls themselves do not pose a risk to aviation safety.

Photo 6-3. Burrowing owl standing adjacent to its burrow on the AOA at OCF.

Shooting to kill is never recommended for any of the aforementioned species. It can create negative press for the airport and is removing an important member from the surrounding biological community.

Strike History Nationally, "Raptors" (or Birds of Prey), which include hawks, eagles, and vultures, account for approximately 13% of all known species bird strike reports. Strikes with raptors have caused as much as $40,224,236 (13%) in damage (Dolbeer et al., 2009). Therefore, a strike with a raptor is likely to cause damage. The vast majority of the strikes in this group were vultures (discussed separately in Section 6.1.8), red-tailed hawks, and kestrels. American kestrels make up 35% of the total reported raptor strikes and 3% of the total raptor damages. Red-tailed hawks are responsible for 19% of the total reported raptor strikes and 14% of the total raptor damages. Red-

tailed hawks are a significant hazard as they account for less overall strikes than the kestrels, but more of the overall damage costs. Eagles, osprey, hawks (buteos), owls, and kestrels are all listed on the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005).

6.1.4 Cattle Egrets

Description Cattle egrets are a medium-sized, stocky, white "wading bird" with a buffy crown, breast, and back during breeding season (spring and summer). Legs are pale yellow to orange in adults, black in juveniles. Bill is yellow or orange in adults and black in juveniles. They are the only small, white "wading bird" with a yellow bill. Cattle egrets are common at OCF throughout the warmer months (Figure 6-17 and 6-18).

Attractants Cattle egrets have different habitat and food requirements than most egrets or "wading birds". They are typically found in dry, upland habitats, often near livestock where they follow behind the livestock catching the insects they disturb when grazing. Cattle egrets prefer open grass fields and feed primarily on insects. Short grass and open, mowed fields are the major attractants to airports for cattle egrets. They prefer to follow a mower and catch any insects that may get disturbed along the way. They have also been known to stand at the end of runways, catching insects that are disturbed by planes during take-off.

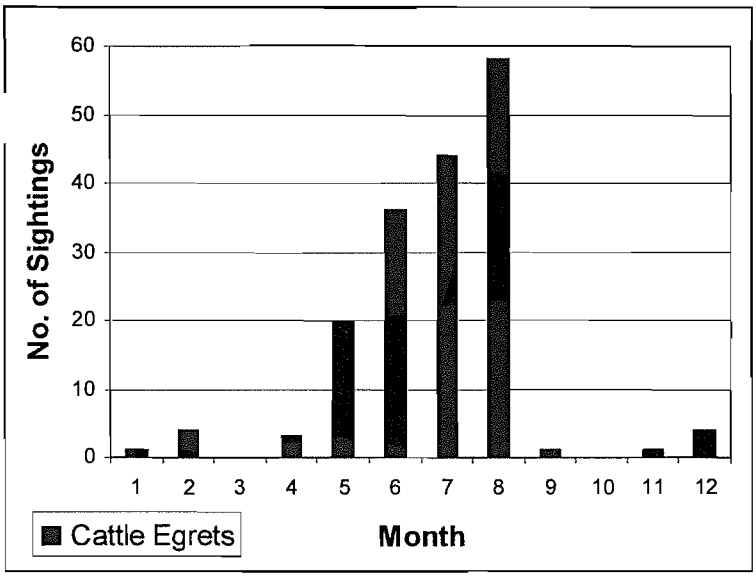


Figure 6-17. The number of cattle egret sightings per month at OCF from December 2009 through November 2010.

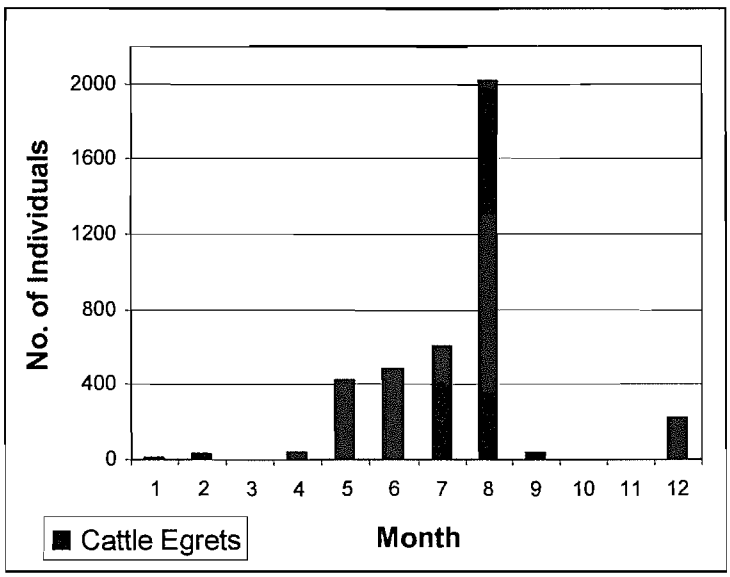


Figure 6-18. The number of individual cattle egrets counted per month at OCF from December 2009 through November 2010.

Risks Cattle egrets are medium-sized birds weighing approximately 12 oz (340 g) and having a wingspan of 3 feet (Sibley, 2000). They are most often found in flocks. Cattle egrets were seen in larger numbers (up to 300 individuals) at OCF throughout the summer months, when the insect populations and the mowing frequency are highest. They were observed crossing the AOA in the mornings and evenings in continuous groups of approximately 25 to 50 individuals. Cattle egrets

have slow, generally low flight and forage mainly on the ground using a "stand and wait" approach (allaboutbirds.org). Their foraging preferences often put them in close proximity to the movement areas as well. Due to these behaviors, they are a more serious risk to aircraft.

Legal Status Cattle egrets are protected under MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. There is no additional state protection for this species.

Location Cattle egrets were consistently observed flying over the AOA, specifically Runway 18-36. They most commonly would fly south/southwest at dawn and north/northeast at dusk traveling from agricultural field to agricultural field and passing over the airport. They were occasionally observed loafing throughout the grass fields at OCF.

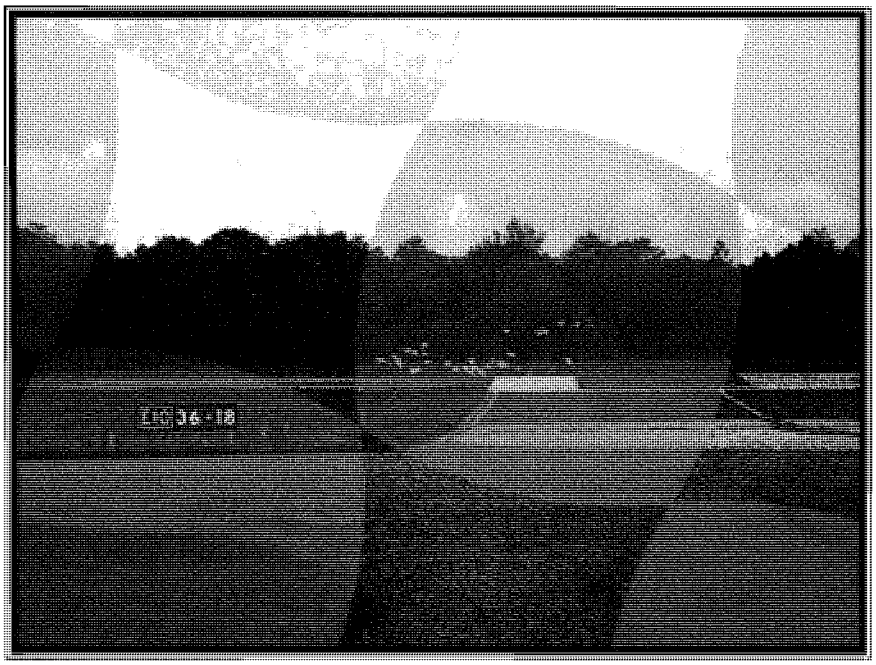


Photo 6-4. Cattle egrets traveling south over the airport during a dawn survey in August. They were commonly observed flying directly over Runway 18-36 when passing over OCF.

Control Measures One way to reduce the number of cattle egrets loafing and feeding on the AOA is to eliminate their food source (insects). Keeping the grass height between 6 and 12 inches will help to reduce their prey visibility, and their ability to see one another in the flock. Maintaining a dense stand of grass many increase the number of invertebrates in the fields, however, it will make prey capture more difficult. Finally, if cattle egrets are seen following the mower in large numbers (flocks greater than 10 individuals), it would be best to mow only at night. Cattle egrets only feed during the day and return to their roost at night. If mowing can not be conducted at night, it should be conducted as close to dawn as possible. Cattle egrets will typically arrive at the airfield 1-2 hours after dawn and leave the airfield approximately one hour before dusk (allaboutbirds.org). Spraying insecticides throughout the summer may help to reduce the egret prey populations as well, but can be very costly. There was no evidence of cattle egrets roosting or nesting on airport property during this study.

Most of the cattle egrets observed at OCF were not stopping to loaf and feed on the AOA, but rather crossing the AOA on their way to and from agricultural fields. This can be a more challenging problem as habitat modification will not directly affect these birds. Harassment and lethal control must be incorporated into the cattle egret control program. If the birds are made to feel unsafe while flying over (or foraging on) the airfield, they will eventually look elsewhere for corridors and feeding grounds. As with all methods of frightening wildlife, patience and persistence are required to keep the egrets off of the AOA. Pyrotechnics will not work alone and should be combined with lethal methods (shooting). A propane cannon may be useful for scaring cattle egrets if it is relocated to a new part of the AOA often (i.e. at least once per week). Cattle egrets should not be allowed to loaf or feed on the airport for any length of time (Hygynstrom et. al., 1994).

Strike History Nationally, cattle egrets account for less than 1% of all known species bird strike reports. Cattle egrets have caused approximately $12,750 in damage (Dolbeer et. al., 2009). There are no previous records of cattle egrets being struck at OCF.

6.1.5 Doves/Pigeons

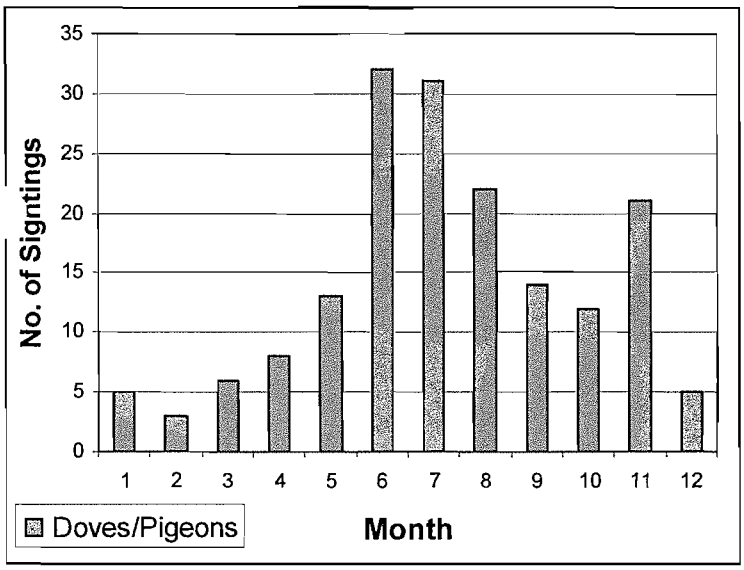


Figure 6-19. Number of Dove/Pigeon sightings per month at OCF from Dec. 2009 to Nov. 2010.

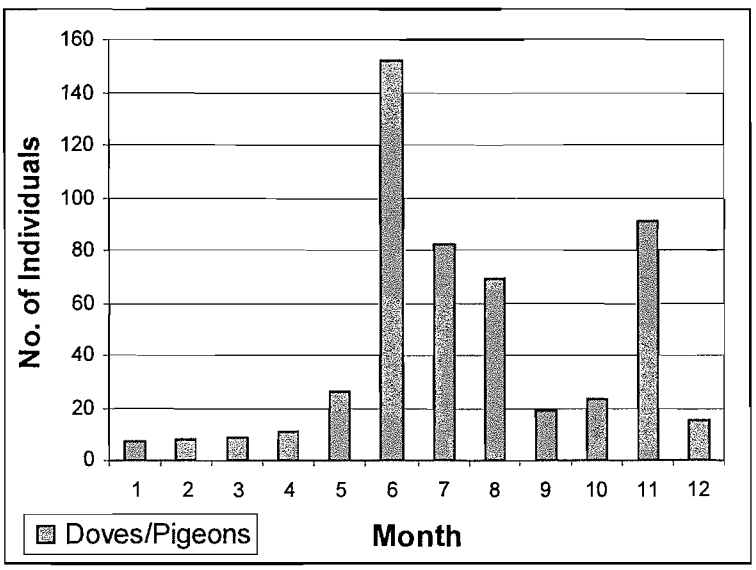


Figure 6-20. Number of Dove/Pigeon sightings per month at OCF from Dec. 2009 to Nov. 2010.

Description Mourning doves, common ground doves, and rock doves a.k.a. pigeons were observed at OCF. Since common ground doves and rock doves (pigeons) were only observed on one occasion during this WHA, the focus in this section will be on mourning doves. Mourning doves are the most abundant dove in the United States and are common year-round in Florida. They are the most slender dove, with a long, pointed tail, narrow pointed wings and a gray-brown color overall. They are often mistaken for a falcon in flight, a game bird on the ground, and an owl by song. Their name comes from their mournful hooting "*ooAAH coo coo coo*" (Sibley, 2000). Mourning doves were observed most frequently throughout June and July (Figure 6-19) and in the greatest numbers in June and November (Figure 6-20). This is likely due to breeding and flocking patterns.

They can be observed nesting during any month; however, the breeding season peaks in late spring and early summer. During this time the birds will pair off and defend nesting territories. They can produce up to six broods per year and often new eggs are laid before the previous brood has fledged. During the colder months, individuals tend to form larger winter flocks. The largest flock observed at OCF was approximately 40 individuals perched along the northern perimeter fence in June.

Attractants Like most wildlife, mourning doves are attracted to food, water, and cover. They prefer open lands that provide easy access to their needs. Doves feed almost exclusively on seeds including, small grains, millet, wild peas, sedges, sunflower seeds, and pokeweed. Bare ground on which seeds are available is preferred over areas containing heavy, dense vegetation (allaboutbirds.org). Grasses and weeds growing throughout the AOA provide abundant food sources. Used and un-used movement areas and access roads provide the bare ground that they prefer to loaf, feed, and swallow grit (a digestion aid). Water sources are also used more frequently if found near bare ground. During Florida's wet season (June through September), detention ponds collect standing water and provide an available water source for mourning doves. Mourning doves nest approximately 10 to 30 feet above the ground and will build nests in a variety of places, including unused maintenance equipment, hangars, and aviation radar structures (e.g. VOR).

Risks Mourning doves are slightly larger and more dense-bodied than the average perching bird found on the airfield. Overall, they are still a small bird weighing approximately 4.2 oz (120g) and having a wingspan of 18 inches (Sibley, 2000). Individually, they do not pose a large threat to aircraft; however, they may flock whenever nesting is not occurring. The greatest risk with mourning doves comes from their preference for open habitat and bare areas. Thus, not only do they form larger flocks, but the flocks prefer to feed, roost, and loaf on or near the movement areas. This puts them at a greater risk of an aircraft collision. Also, they are the only reported struck species at OCF (FAA Strike Database). Additionally, there is ample evidence to suggest the doves are residents at OCF (not migratory) and that they are potentially breeding. With such rapid breeding rates, the population of doves at OCF is likely to remain steady throughout the seasons and years. It is imperative to prevent nesting on the airfield.

Legal Status Mourning doves and common ground doves are protected under MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. They are not protected by state law. Rock doves (pigeons) are not protected by any federal or state laws.

Location Mourning doves were most commonly seen at Observation Stations 2 and 4 (Figure 6-21). This is likely because they prefer to loaf and feed on open, bare ground with and abundance of available grit. As previously mentioned, mourning doves become a greater hazard because they commonly loaf throughout the movement areas. Additonally, they were also seen perched along the northern perimeter fence line (Photo 6-5).

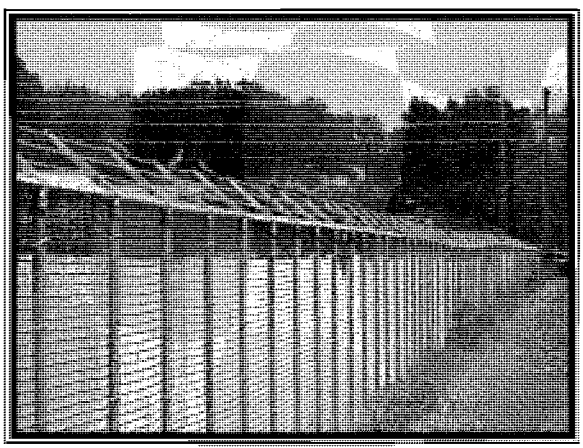


Photo 6-5. Mourning doves perched along the northern perimeter fence at OCF.

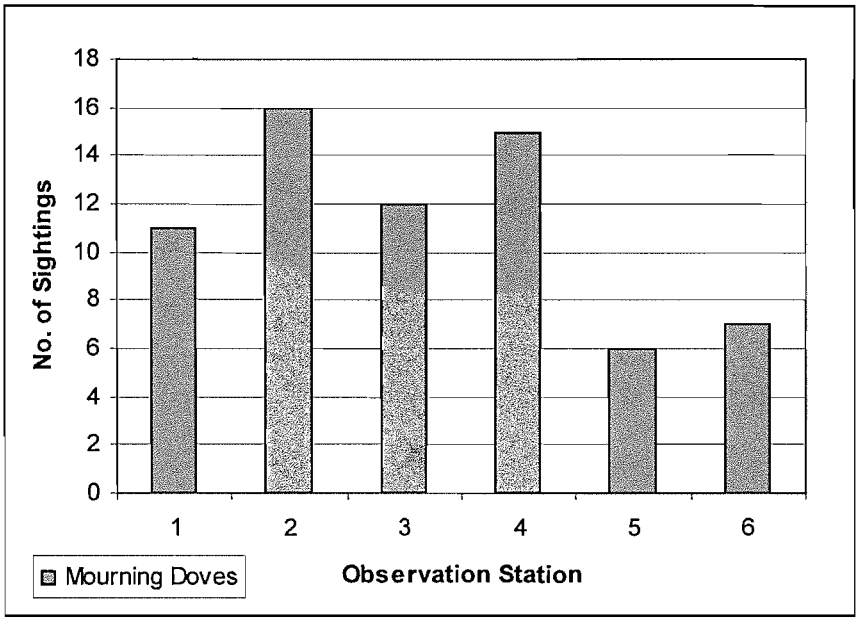


Figure 6-21. The number of mourning doves sightings recorded at each observation station at OCF from December 2009 to November 2010.

Control Measures Habitat management is the best long term solution. Habitat management techniques to control mourning doves include maintaining a consistent grass height greater than 6 inches throughout the airfield, creating a dense monoculture of grass to outcompete the weedy, seed-producing vegetation, and eliminating nesting opportunities. Excluding doves from buildings and hangars by keeping doors closed or installing strip doors of vinyl plastic is an effective way to keep them from roosting and nesting in these areas (Hygynstrom et. al., 1994). Removing any excess or unused equipment and supplies from the airfield will also eliminate nesting and roosting sites. Installing perching deterrents (e.g. bird spikes or bird spiders) will eliminate perching opportunities on taxiway and runway signs and lights throughout the AOA.

Visual and auditory frightening devices are usually not effective over time for doves and pigeons. They typically thrive in very urban environments and quickly adapt to any loud noises, bright lights, etc. During the WHA, the doves were not observed dispersing when planes were leaving or approaching. Some auditory devices (e.g. pyrotechnics and cannons) may be more effective when occasionally coupled with lethal control (shooting) to maintain a level of fear in the birds and prevent habituation.

Strike History Nationally, doves and pigeons account for approximately 14.5% of all known species bird strike reports. Strikes with doves or pigeons have caused as much as $11,250,886 (3.6%) in damage from 1990 through 2008 (Dolbeer et. al., 2009). The majority of those costs (94%) came from strikes involving either rock doves (pigeons) or mourning doves. Rock doves are ranked 13th and mourning doves are ranked 18th on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005). Mourning doves are the only reported species struck at OCF, accounting for 100% of all reported strikes.

6.1.6 Shorebirds

Description The only shorebird found at OCF was killdeer. Killdeer are upland plovers, which are commonly found far from water on airports, farmland, city parks, etc. They do not share the same habitat preferences as their "shorebird" relatives and are not typically found on beaches. They are tall for plovers (10.5 in), have slender wings, a long tail with an orange rump, and a distinctive double breast band (most plovers have a single breast band). They are often heard, but not seen, and are identifiable by their high-pitched, drawn out call (*teeeee di di di*, repeated). The call can sound like they are saying their own name, "*kill deeer, kill deeeer*" (Sibley, 2000). Killdeer were observed frequently during the colder months at OCF (Figure 6-22) with the largest flocks recorded in December.

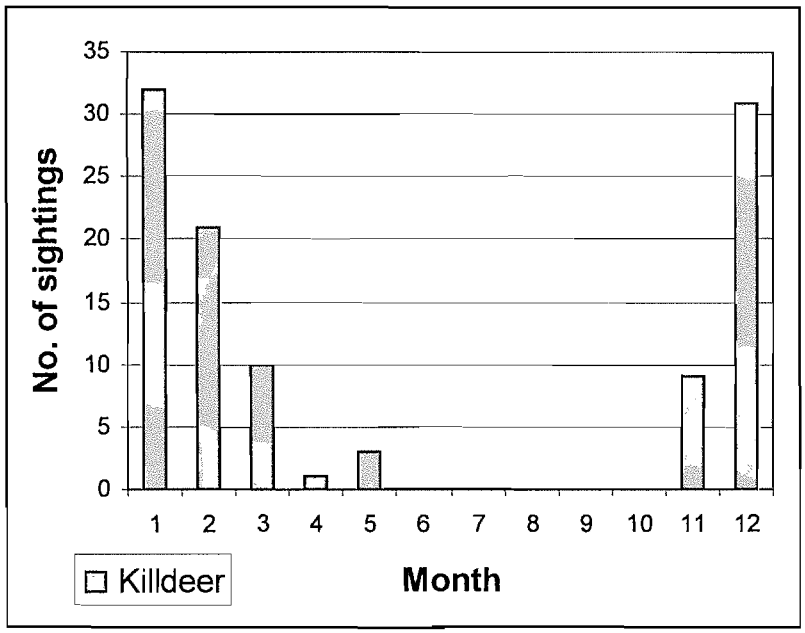


Figure 6-22. The number of killdeer sightings per month at OCF observed from November 2009 to November 2010.

Attractants Killdeer are particularly attracted to open areas with short grass and bare ground. They can be found in mudflats or near water, but are more commonly found in dry, urban areas, such as golf courses, airports, grazed fields, and athletic complexes. Killdeer prefer the bare ground for nesting, where they simply make a few scrapes in the substrate and lay their eggs. After the clutch (4 to 6 eggs) is laid, pieces of rock, gravel, asphalt, and/or shells may be added to the nest (Photo 6-6). They eat mostly invertebrates including

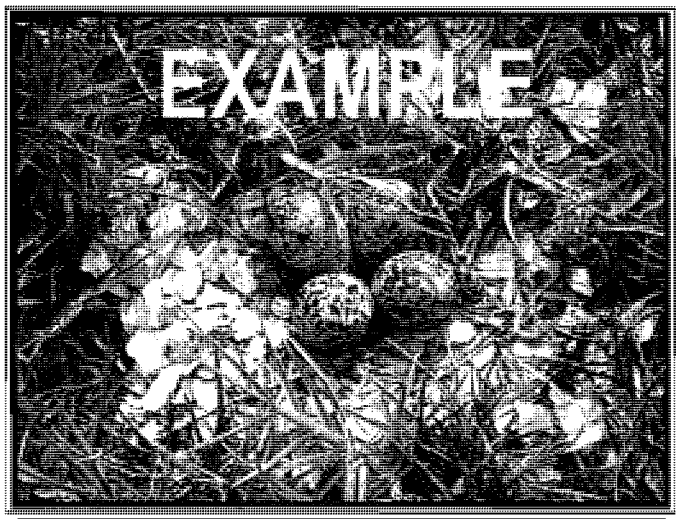


Photo 6-6. Typical killdeer nest in short grass with added gravel, rocks, and shells. This nest was found on an airport, but not OCF.

earthworms, crayfish, snails, and insects, however, they are opportunistic and will eat seeds, amphibians, and fish as well (allaboutbirds.org). They commonly follow the tractor when mowing to catch any earthworms or insects that may have been disturbed.

Risks Killdeer are medium-sized birds weighing an average of 3.3 oz (95 g) and having a wingspan of approximately 24 inches. Singly, they are not a significant threat to aircraft; however, they can form larger flocks (more than 20 individuals) during the winter months (Sibley, 2000). Unfortunately, their tendency to prefer open habitats with bare ground make them a prime culprit for being found on the movement areas at airports. Loafing and nesting on or near movement areas makes them a greater risk for aircraft collisions. However, a behavioral benefit of the killdeer is that they do not fly often or for long distances. Overall, this "ground loving" species is a relatively low risk to aircraft at OCF, but should be dispersed if large flocks are observed loafing on the movement areas throughout the winter.

Legal Status Killdeer are protected under MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. There is no additional level of state protection for this species.

Location Killdeer were most commonly observed from stations 1, 2, 3 and 5 (Figure 6-23). These stations include the bare areas west of Runway 8-26, the service roads north of Runway 18-26, and the occasional temporary standing water near the detention ponds. Surprisingly, they were observed infrequently on the ramp area (station 6).

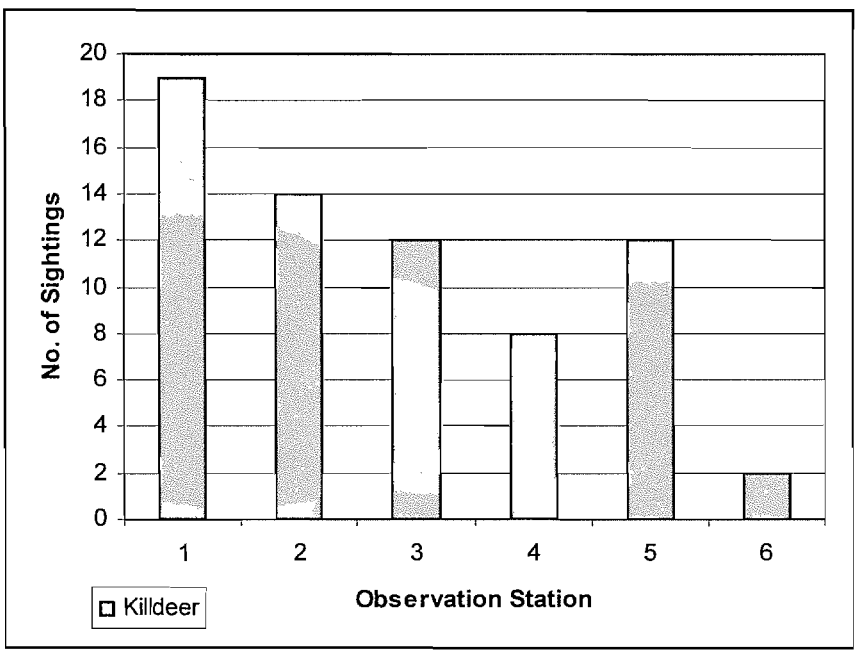


Figure 6-23. The number of killdeer sightings at each station during the WHA at OCF from December 2009 through November 2010.

Control Measures The best way to control killdeer is habitat modification. Eliminating all bare areas will reduce potential nesting habitat. Keeping all grass at a minimum height of 6 or 8 inches and maintaining a dense monoculture of grass will reduce available foraging habitat. This is especially important around the runways and taxiways. Killdeer will only forage in short grass. If a killdeer nest is found, it should be destroyed. It is best to destroy the nest as soon as eggs are laid. Shaking the eggs and placing them back in the nest can also be beneficial. Egg "shaking" will cause them to be infertile, but reduce the chances of a re-nesting attempt. As birds tend to nest in the same location every year, previous nesting sites should be checked throughout the nesting season (spring and summer) every year to ensure new nests are not being constructed (Hygynstrom et. al., 1994). Killdeer pairs will commonly raise two broods per year (allaboutbirds.org). Scare tactics (pyrotechnics, cannons, etc.) are not proven effective on killdeer as they habituate quickly and are comfortable in noisy, urban environments.

Strike History Nationally, killdeer account for approximately 3.7% of all known species bird strike reports. Strikes with killdeer have caused as much as $2,386,113 (0.7%) in damage (Dolbeer et. al., 2009). Killdeer are not specifically ranked, however, "shorebirds" are ranked 19 out of 25 on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005). Killdeer make up over half (55%) of all reported "shorebird" strikes.

6.1.7 Blackbirds

Description Red-winged blackbirds, European starlings, common grackles, boat-tailed grackles, and bobolinks comprise the "blackbirds" group observed at OCF. Red-winged blackbirds are small birds with rounded wings and a fairly short tail. The male is black with bright red and yellow shoulder patches, while the female is brownish and looks like a large sparrow. European starlings are small, dark birds with light speckles on their feathers. At times, their feathers appear iridescent. The bill is yellow during mating season and dark in the winter. Their bodies are chunky, tail is very short, and wings are triangular shaped in flight. Both males and females look the same. Common grackles are the smallest of the grackles, but larger than red-winged blackbirds. They have a long, keeled tail and a heavy bill. All adults are a glossy black with some multicolored iridescence. Boat-tailed grackles are similar to common grackles, but much larger. Males have an exceptionally long tail. Female boat-tailed grackles are not dark or black, but actually a rufous-brown color. Both sexes have long, slender bills. Bobolinks are unique birds that resemble large sparrows during the non-breeding season, but with pointed wings. During the breeding season, males are black with a white rump and blonde colored nape. Their size and behavior is very similar to that of a red-winged blackbird. All of these species, except the bobolink, are found year-round in Florida. Bobolinks are seen in Florida only during migration (Sibley, 2000).

In the winter, all species of blackbirds will form mixed flocks and congregate in large roosts containing up to several million birds at nighttime. Blackbirds were seen most frequently during the spring and early summer when they have established breeding territories and were nesting (Figure 6-24). They are commonly seen throughout the AOA at this time. However, they were seen in the greatest numbers (i.e. number of individual birds) during the late fall and winter (Figure 6-25). This is when the blackbirds are forming their large mixed flocks. For example, in April blackbirds were recorded approximately 20 times. That is an average of 3 blackbird sightings per survey. However, less than 200 individuals were counted in the month of April (an average of 10 blackbirds/sighting).

In December, blackbirds were recorded approximately 7 times. That is an average of less than 1 blackbird sighting per survey. However, almost 1800 individuals were counted in the month of December (an average of over 250 blackbirds/sighting).

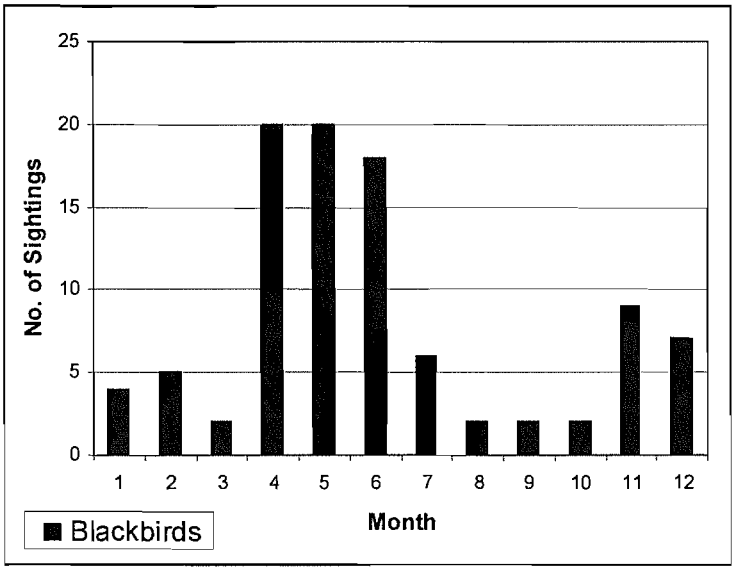


Figure 6-24. Number of Sightings of Blackbirds per month at OCF from Nov. 2009 to Nov. 2010

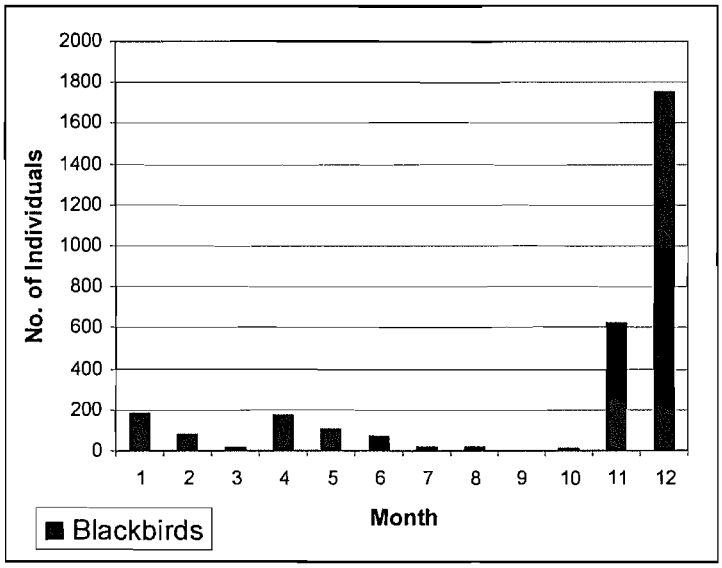


Figure 6-25. Number of Individual Blackbirds Observed per month at OCF from Nov. 2009 to Nov. 2010

Attractants Blackbirds eat a wide variety of different items. Most eat insects during the breeding season and fruit, grass seeds, grain, and weed seeds in late summer and throughout the winter. Grackles are more predatory and occasionally eat small fish, field mice, songbird nestlings, and eggs. Their larger bills also help them to eat acorns and other tree fruits. Both starlings and grackles have been known to eat human waste out of dumpsters as well. Red-winged blackbirds nest in every wet, brushy or marshy area throughout most of North America. They are especially attracted to cattails and ditches for nesting. Females may nest more than once in a single breeding season. Starlings are attracted to a wide variety of habitats throughout North America including cities, towns, farms, woodlands, fields, and lawns. Their ideal habitat includes structures that have cavities available for nesting (e.g. hangars) and short grass for foraging. In the winter, they prefer structures for daytime loafing (e.g. light posts) and nighttime roosting, e.g. oak trees (Hygynstrom et. al., 1994). Grackles are found in a variety of habitats from open fields to woodlands to urban parks and parking lots. They are attracted to airports due to the availability of open foraging habitat and possible human waste. There was no evidence of grackles nesting at OCF. Bobolinks are attracted to grassy or weedy meadows and ditches. They do not nest in Florida (allaboutbirds.org).

Risks All blackbirds are relatively small birds ranging from the bobolink (1.5oz or 43g) to the male boat-tailed grackle (8oz or 215g), and therefore do not pose a major threat to aircraft as individuals. The risk comes from their flocking behaviors. All blackbirds are comfortable in large winter flocks, the largest of which at OCF was approximately 1000 individuals observed in December crossing the AOA towards the east. A bird strike involving a flock of that size could have serious

consequences. When ranking the bird species observed at OCF from largest to smallest average flock size, 3 out of the top 10 species are in the blackbird group (red-winged blackbirds, unidentified blackbirds, and European starlings). Clearly, they are a group that prefers to be in flocks throughout the colder months.

Legal Status All of the species discussed above, except the European starling, is protected by MBTA and requires a USFWS depredation permit to remove, take, kill, or possess. Starlings were introduced by humans to New York City in the 1890s from Europe (Hygynstrom et. al., 1994). As they are not a native species, they are afforded no protection. There is no additional state protection for any of these species.

Location The majority of blackbirds were found at observation stations 2, 4, and 5 (Figure 6-26). Stations 2 and 5 are located near patches of woodlands inside the fence. Blackbirds were noted flying locally around these wooded areas. Station 4 is in an open field with seasonally tall vegetation that is desirable for perching. Blackbirds, especially grackles, also prefer urban areas and were commonly observed around the ramp area. There was no evidence of blackbirds nesting on the AOA.

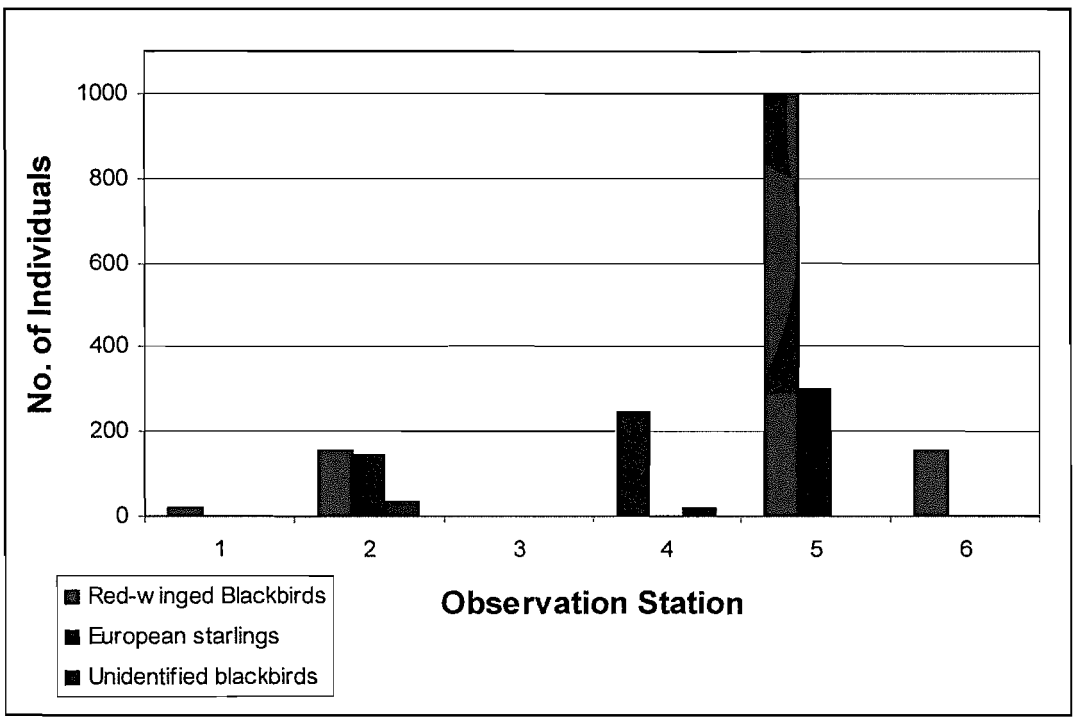


Figure 6-26. Number of blackbird and starling sightings at each observation station throughout OCF from December 2009 to November 2010.

Control Measures To reduce the numbers of blackbirds loafing on the AOA, eliminate all weedy, overgrown vegetation from ditches, detention ponds, and along the perimeter fence. Also, removing all wooded areas from inside the perimeter fence will help reduce the amount of roosting habitat and eliminate corridors that the birds use to travel from one side of the airport to the other. A majority of the blackbirds were seen flying over the AOA, not stopping to loaf, feed, or nest on

the AOA itself. This can be a more difficult problem to mitigate, however, if blackbirds are observed crossing the airspace in large flocks they should be dispersed with pyrotechnics as quickly as possible. Repeatedly using this scare tactic will eventually discourage the birds from traveling over the airport when flying to and from their roosting site. Finally, thinning the interior branches of landscaping trees, especially oaks, will eliminate available thermal cover and roosting habitat for blackbirds. Starlings are cavity nesters and therefore attracted to any small openings in various structures. Excluding starlings from hangars and other buildings may help reduce their presence on the AOA. Close all openings larger than 1 inch (2.5cm) to exclude starlings. Perching deterrents such as bird spikes and bird spiders or soft, sticky repellents consisting of polybutenes can help reduce the number of starlings and grackles loafing or roosting on airport structures (e.g. ramp light poles) throughout the day. Using a variety of different frightening tactics and persistence is the key for this to be effective. Shooting is also an effective dispersal technique and can reinforce other scare tactics. However, shooting may be difficult and is not recommended as a method to reduce population size (Hygynstrom et. al., 1994).

Starlicide is a registered toxicant for blackbirds and starlings. It is pelletized bait containing the active ingredient, 3-chloro-p-toluidine hydrochloride. It is a slow-acting toxicant that kills the birds 1 to 3 days after ingestion. This method usually requires a period of observation and prebaiting to ensure no protected birds are present to feed on the toxic bait. That is, you must first attract the birds to the airport before distributing the poison. This toxicant is typically used to keep blackbirds away from agricultural land uses and is not commonly used at airports, but is an available method. Trapping can be a successful method for controlling local populations; however, it can be very labor intensive. Large decoy traps made of poultry wire and containing 10 to 20 decoy birds (other blackbirds), food, and water, are typically used (Hygynstrom et. al., 1994). Building and checking these traps may not be a cost effective method to control blackbirds at OCF.

Strike History Nationally, blackbirds and starlings account for approximately 9.2% of all known species bird strike reports. They have caused as much as $5,373,335 (2%) in damage since 1990 (Dolbeer et. al., 2009). In 1960, an aircraft leaving Boston collided with a flock of starlings, resulting in a crash landing and 62 fatalities. This was the first bird strike to get national recognition. Blackbirds and starlings are ranked 20 on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005).

6.1.8 Vultures

Description Only turkey vultures were observed at OCF. Turkey vultures are all brown birds with a small red head, long tail, and silvery flight feathers (underneath wing). They soar in a pronounced "V" shape with clumsy, slow wingbeats. Turkey vultures are commonly solitary and typically silent. It is important to note that vultures are commonly referred to as "buzzards" in the United States, whereas in Europe, a "buzzard" is a common name for a hawk (Sibley, 2000). When referring to one of these birds, it is best to use the term vulture, to avoid any confusion. Although turkey vultures can be found in Florida year-round, they were rarely seen at OCF during the warmer months (Figure 6-27).

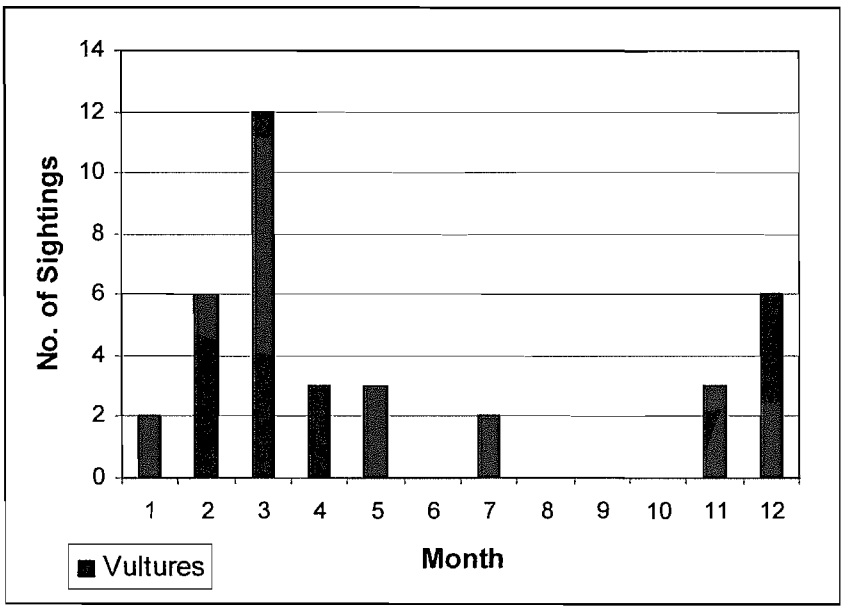


Figure 6-27. Number of vulture observations recorded each month at OCF from December 2009 to November 2010.

Attractants Vultures are carrion-feeders and are especially attracted to roadkill. Turkey vultures are one of the few birds that possess a keen sense of smell. They use this heightened sense to find carcasses in the area. Vultures will follow other vultures to find food, so they are somewhat attracted to one another. Besides carrion, they are also highly attracted to thermal columns or "thermals" (allaboutbirds.org). Thermals are columns of rising air created by the uneven heating of earth's surface. The sun warms the ground, which heats the air directly above it. This warmer air expands (becoming less dense) and rises, creating a column of rising air. Birds (and glider pilots) use these thermals to soar with little to no effort. Dark earth, urban areas, and asphalt are good sources of thermals. Large asphalt-paved runways and taxiways surrounded by open fields are ideal conditions for "riding thermals" (Wikipedia, 2010).

Risks Vultures are very large birds, weighing 4-5 lbs and having a wingspan of 5-6 feet (Sibley, 2000). They are most commonly seen slowly soaring close to the earth searching for carrion. Their size and behavior make them a high risk for an aircraft collision with significant damage. Large flocks of vultures pose a greater risk than one or two individuals. Large flocks were observed "riding thermals" at OCF during midday throughout this WHA. Vultures create the highest risk for a bird strike at OCF. They should not be allowed to loaf on the airfield or soar in and around flight paths.

Legal Status Vultures are protected by MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. There is no additional state protection for these species.

Location Turkey vultures were most commonly observed soaring over the Michael A. Finn Water Reclamation Facility #3, located southwest of the airport in an approach path for Runway 36. They spend hours during the middle of the day "riding thermals" over the treatment ponds and

surrounding areas. The treatment ponds are lined with black tarps that heat quickly in the sun and create a good source for thermals to arise. Flocks of up to 100 individuals have been observed circling throughout this area (Photos 6-7 and 6-8). Although there was no detectable odor during numerous surveys, turkey vultures have one of the most developed sense of smell of all birds. Therefore, they may be able to detect an odor that a human nose may not notice. The USDA made note of this potential hazard in April 2008 (Appendix O).

Photo 6-7. Large flock of turkey vultures circling southwest of OCF in November.

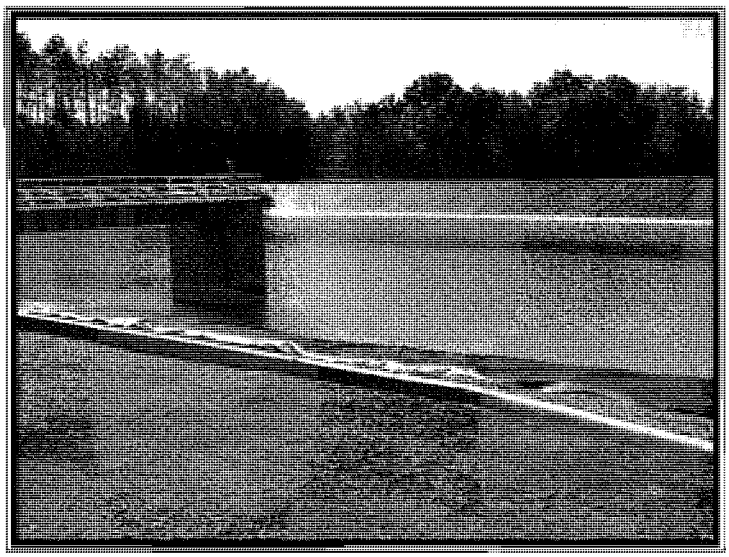


Photo 6-8. Water treatment pond at the water reclamation facility located southwest of OCF.

Control Measures Because vultures are the highest wildlife-caused risk to aviation safety at OCF, there should be a "no tolerance" policy for these birds. No carrion should be allowed to remain on airport property. OCF should perform daily checks for carrion on all grounds inside the perimeter fence. Any carcasses found should be removed and buried. If the birds are present, an aggressive and persistent program must be implemented to continuously frighten the birds away from the AOA. OCF staff will not be able to keep thermals from forming over the water reclamation facility, but when vultures are observed soaring in flight paths, they must be immediately dispersed with pyrotechnics or shooting. For best results, pyrotechnics should be fired in intervals, several minutes apart, until the vultures are out of sight. Vultures are not likely to habituate quickly to pyrotechnics, however, occasional shooting is recommended as reinforcement (Hygynstrom et. al., 1994).

For a more permanent solution, OCF staff should hang an effigy at the reclamation facility. Vultures are one

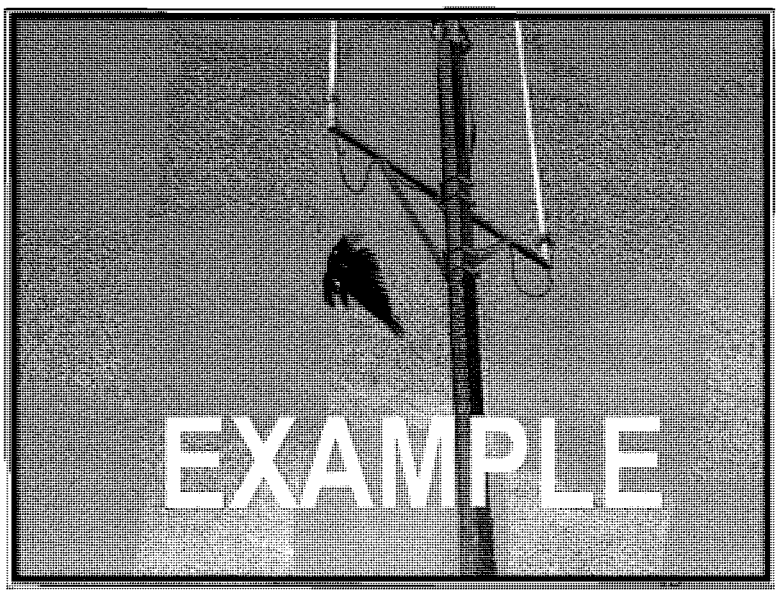


Photo 6-9 (left). An example of a turkey vulture effigy hung in the death pose from a VOR (not OCF).

of the few species that are frightened by a dead bird effigy. That is, a dead vulture (preferably from a taxidermist) is hung upside down with its wings spread open ("death pose") from a very conspicuous location. This has been proven to effectively deter vultures from a specific area (Photo 6-9).

Strike History Nationally, vultures account for 1.6% of all bird strike reports. Strikes with vultures have caused as much as $15,196,411 in damages (Dolbeer et al., 2009). This is 5% of all reported damages. Vultures are ranked second on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005).

6.1.9 Aerial Foragers

Description The aerial foragers found at OCF are barn swallows, tree swallows, common nighthawks, chuck-will's-widows, and chimney swifts. These species have erratic flight patterns and feed and drink almost exclusively while in flight. Swallows were the most common aerial foragers observed at OCF. They have small, slender bodies with long, pointed wings. Barn swallows have a long, deeply forked tail, blue plumage on the wings and back, and a rust colored breast. Tree swallows have a shorter, notched tail with a blue-green to gray back and an all white underside. Common nighthawks are larger and have longer wings than other nighthawks. All nighthawks have a distinguishing white bar near the base of their primaries. Common nighthawks make a characteristic rasping, nasal call that sounds like the word "*beans*". Chuck-will's widows are the largest species in the *Caprimulgus* genus ("nightjars"). They have long, pointed wings and are typically rufous all over. They are often identified by sound, with their characteristic loud, repeated whistle that sounds as if they are saying their own name "*Chip wido wido*". While most nighthawks and nightjars prefer to rest on the ground in the open, Chuck-will's widows usually roost in trees. Chimney swifts are small, short-tailed brown birds that are often described as "cigars with wings". They roost and nest in cavities such as hollow trees or chimneys (Sibley, 2000). Aerial foragers were most common from spring to late summer, with few occurrences during the winter months. The nighthawks were seen during every dusk survey in June and July. Barn swallows were common throughout the spring and summer and tree swallows became more common throughout late summer and into the fall. Tree swallows were observed only once in January. No aerial foragers were observed during November, December, and February (Figure 6-28).

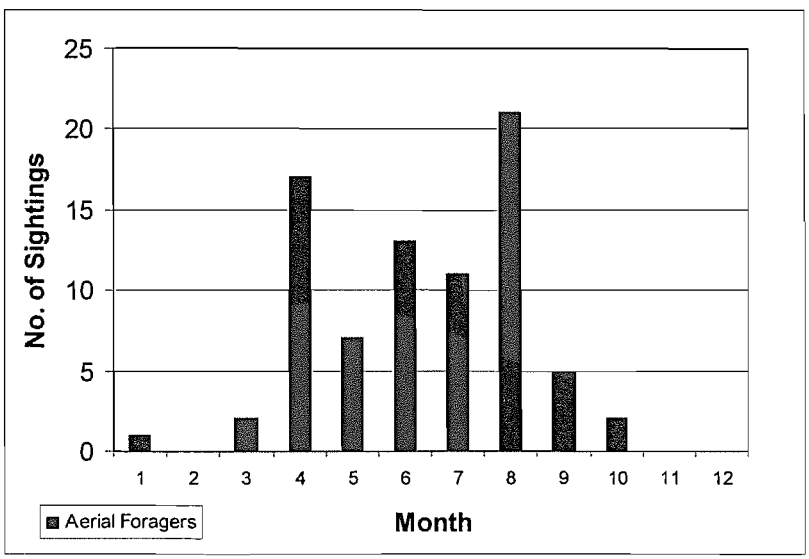


Figure 6-28. Number of Sightings of Aerial Foragers per month at OCF from December 2009 to November 2010.

Attractants Swallows, nighthawks, nightjars, and swifts are almost exclusively insectivores. Therefore, they are attracted to any area containing open space to hunt and insects to eat. A barn swallow's diet is made up mostly of insects from the Order Diptera (flies). All aerial foragers feed on small flying insects, not larger grasshoppers, etc. When the weather is agreeable, swifts and nighthawks will forage at high elevations, possibly creating a greater risk to aircraft. Tree swallows will eat berries in addition to insects. Barn swallows are attracted to nesting sites that have four basic conditions: an open habitat for foraging, a good nesting location under an overhang or ledge, a supply of mud for nest building, and water for drinking. For this reason, open buildings (e.g. hangars) and water bodies (e.g. ponds and ditches), will also attract swallows (Hygynstrom et. al., 1994).

Risks Swallows commonly occur in strike reports because they spend a large portion of their time in flight. They also tend to hunt close to the ground, which makes them susceptible to strikes during the take-off and landing phases of flight. However, they are small birds (approximately 0.7 oz or 20 g) and were not observed in large flocks at OCF (the largest flock recorded was 10 individuals), and therefore, are not likely to cause substantial damage. The biggest risk occurs when barn swallows begin forming nesting colonies on or near the airport. This could cause a significant population increase and raise concern; however, the results of this WHA do not indicate they are a critical hazard at OCF. Nighthawks (2.2 oz or 62 g and a 24" wingspan) are considerably larger than swallows and are commonly found in pairs. During mating rituals and feeding, several pairs may fly together at one time. As many as 4 individuals were seen flocking together at dusk around the west end of Runway 8-26 during this WHA. An aircraft strike involving more than one individual could cause significant damage to aircraft. Chuck-will's-widows stay close to the woodlands and are more nocturnal than swallows and nighthawks. Chimney swifts are small (0.81 oz or 23 g) and elusive. They were infrequently seen and pose a minimal risk to aircraft.

Legal Status All of the aerial foragers observed at OCF are protected by the MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. There is no additional state protection for any of these species.

Control Measures Most control measures for swallows focus on eliminating nesting and roosting sites. However, scare tactics, chemical repellents, toxicants, trapping, and shooting have proven ineffective at removing entire nesting colonies. The best methods for eliminating nests are exclusion (keeping hangars and buildings completely secured) and nest removal (washing nests down with a water hose). No breeding activity was documented on the airport property during this WHA, but it was undetermined if the swallows are breeding in the area. Nests should be removed at the first sign of building. OCF staff should be aware of the increased populations of aerial foragers during the summer months. Using pyrotechnics to discourage foraging behavior on the airfield, and especially over the runways, may help to reduce their occurrence.

Strike History Nationally, aerial foragers account for approximately 6% of all known species bird strike reports. However, strikes with swallows have only caused $37,522 (less than 1%) in damage (Dolbeer et al. 2009). This illustrates that although these species are commonly struck, they are not likely to cause significant damage. The vast majority of the strikes in this group were barn swallows, common nighthawks, and chimney swifts. Swallows are ranked 23 and nighthawks are ranked 25 on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005).

6.1.10 Waterfowl

Description Waterfowl are typically defined as ducks, geese, and swans, however for the purposes of this study, "wading birds" have been grouped into this category too. The waterfowl species observed at OCF include: great blue heron, sandhill crane, great egret, little blue heron, white ibis, wood stork, anhinga, double crested cormorant, Canada geese, and various unidentified ducks (Figure 6-29). It is best to consult a field guide for the specifics on these species, however, in general, herons, cranes, and egrets have long legs, long necks, and long, pointed bills. Ibises have curved bills, and the others have specialized bill shapes corresponding to their foraging methods (Sibley, 2000). Canada geese are large birds with all black necks, brownish breasts, and white cheeks. They can weigh up to 20 pounds and have a wingspan of 4 to 6 feet (allaboutbirds.org). Waterfowl were observed during every month of the year at OCF, except November. They were most frequently seen in December (Figure 6-30). Waterfowl were recorded in the largest numbers (and largest flock sizes) in August and December (Figure 6-31). This is due to the large migration of white ibis and Canada geese that passed over the airport throughout those months. Sandhill cranes, white ibis, and Canada geese pose the largest threat to aviation safety at OCF, therefore this discussion will highlight those species.

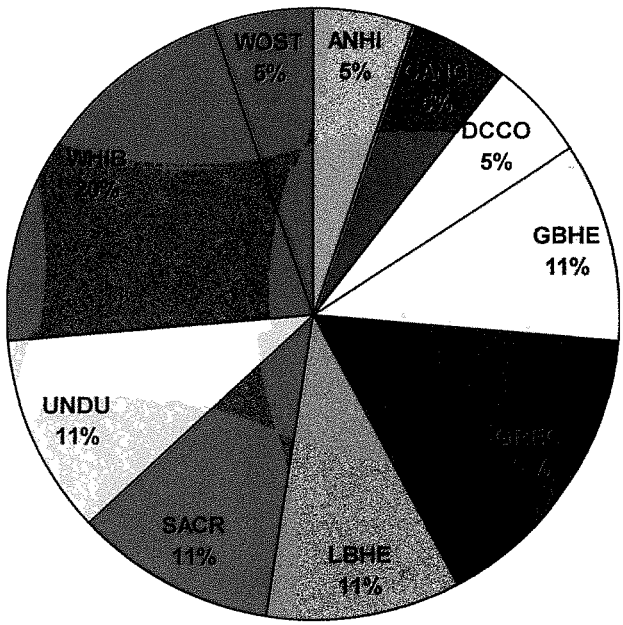


Figure 6-29. Proportion of species comprising the waterfowl group at OCF during this WHA.

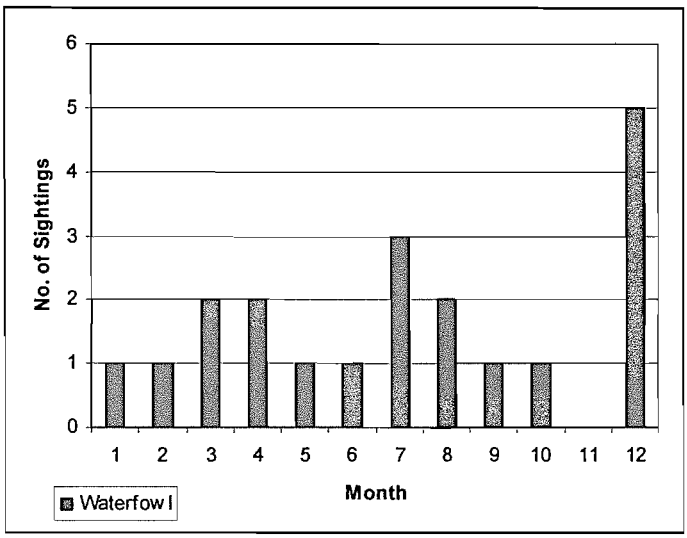


Figure 6-30. The number of waterfowl sightings per month at OCF from December 2009 to November 2010.

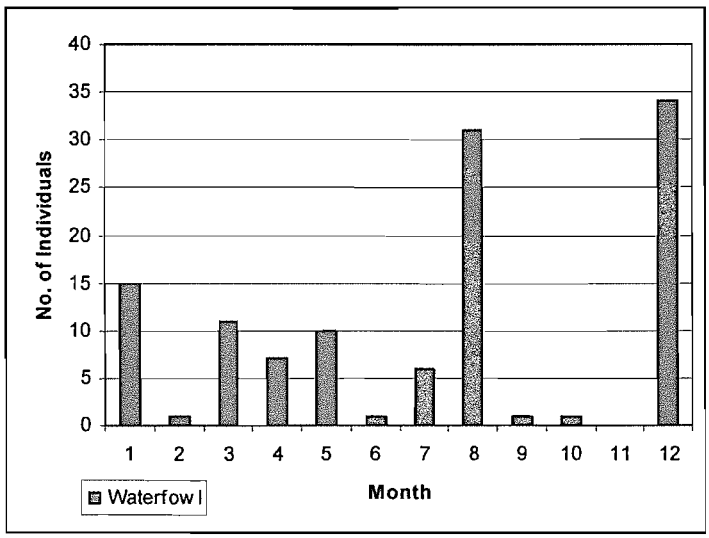


Figure 6-31. The number of waterfowl counted per month at OCF from December 2009 to November 2010.

Attractants Waterfowl, as their group title suggests, are most attracted to water. Most of these species feed on fish, aquatic vegetation, or aquatic invertebrates (insects, insect larvae, etc.). They prefer to nest near or along the waters edge. Sandhill cranes and prefer open fields and meadows; however, they do prefer to be close to a water source. Sandhill cranes were not observed loafing or feeding on the airport property, but only passing over, headed west. Ocala does have a population of non-migratory, resident cranes, however the flocks observed over OCF are assumed to be migratory. Canada geese are attracted to short, mowed grass in open fields adjacent to standing water (e.g. airport infields, golf courses, etc.). Grass is indigestible to most species, except geese. Geese eat primarily grasses, or other weedy or aquatic vegetation, and agricultural wastes (grains, corn, etc.). They also prefer open areas where they can easily see potential predators from a distance. White ibis prefer mudflats for feeding and loafing. They are commonly seen in groups walking slowly through mudflats and wetlands, probing the mud for their prey (allaboutbirds.org). Ibis were also not observed loafing or feeding on the airport property, but only passing over during the summer months on their way north. Although Ocala has a resident population of white ibis, the large flocks were only seen in the spring/summer, and are likely migratory birds.

Risks Canada geese can weigh up to 20 lbs with a wingspan of 4 to 6 feet. Unfortunately, these large birds are also commonly found in flocks, making them a double threat to aviation safety. For this reason, they are considered one of the greatest risks to aircraft and can cause significant damage, including the loss of all engines. OCF should adopt a zero-tolerance policy towards geese on the AOA and they should be immediately removed or dispersed when sighted. They are of greatest risk to OCF during times of migration (September through April). Sandhill cranes are very large birds weighing over 10 lbs and having a wingspan of 6 to 7 feet. In Florida, resident cranes are found in pairs or in family groups (4 individuals) and spend significant time foraging on the ground (Sibley, 2000). However, during migration, sandhill cranes will form large flocks uniting thousands of birds to make the trip north or south. A few small flocks (1-15 individuals) were observed flying over OCF in December and January. Striking just one of these birds would cause significant damage to aircraft, but striking a flock of these birds could lead to a fatal accident. They are a high risk to aircraft at OCF only during migration periods (September through April). White ibis are larger and heavier than other ibises weighing approximately 2 lbs and having a 38 inch wingspan. They are commonly found in small flocks throughout the Gulf States. During migration, they will form large flocks (over 200 individuals) and fly in lines travelling between their breeding and wintering grounds (Sibley, 2000). Although there are resident populations of white ibis throughout Florida, the migratory birds are the greatest risk to aircraft safety at OCF. Flocks of up to 30 ibis were observed crossing the airspace in the spring/summer. Like the cranes and geese, they are of the highest risk to aircraft during migration. In the summer, Florida becomes the breeding grounds for many ibis flocks that spend the winters in Central and South America. Therefore, spring migration (February through April) is the season of greatest concern for ibis flying over OCF. Herons and egrets can be of high risk to aircraft due to their large size and slow, low flying behaviors. When a wading bird roosting colony (rookery) occurs near an airport, these birds become a greater risk. No evidence of a wading bird rookery was found on or adjacent to OCF. Also, herons and egrets were not seen at OCF in numbers large enough to warrant concern.

Legal Status All waterfowl observed at OCF are federally protected by MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. Resident (non-migratory) Canada geese are not protected under MBTA, however it is impossible to distinguish between the migratory and resident populations by appearance alone. Only a DNA test

can reveal a resident bird from a migratory bird. In addition to MBTA, the wood stork is listed as a federally endangered species and is afforded an additional layer of protection by the ESA. Wood storks may not be taken at airports under any circumstance. Many waterfowl are also protected by the state and listed on FWC's "Florida's Endangered and Threatened Species" (November 2010). The Florida sandhill crane (*Grus Canadensis tabida*) is listed as threatened in Florida and white ibis are listed as a SSC by FWC. Please see Section 4.0 of this WHA for more information regarding state listed species.

Location The majority of the waterfowl were only observed flying over OCF, most commonly in the east/west directions. Due to the lack of standing water, waterfowl were rarely observed loafing on OCF property.

Control Measures Since none of the sandhill cranes, Canada geese, or the white ibis was observed loafing or feeding on the AOA, habitat modification would not be an effective control measure in these areas. It is advised to use pyrotechnics to frighten the birds when they are flying over the airfield during times of migration. After persistent scaring, the birds may take an alternate route around the airport. At a minimum, it is essential to make everyone aware (ATC, pilots, operations staff, etc.) that flocks of large birds could potentially be crossing the flight paths in the late winter through the summer. OCF staff should continue to document these migration patterns every year to pinpoint when migration is most likely.

Strike History Nationally, waterfowl (ducks, geese, and swans) account for approximately 8% of all known species bird strike reports. Strikes identifying Canada geese alone account for approximately 3% of all known species bird strike reports. Strikes with waterfowl have caused as much as $101,332,546 in damage (33% of the total damages). The vast majority of the reported damages in this group were caused by Canada geese. Great blue herons account for approximately 59% of all "heron" strikes and caused 98% of all reported "heron" damages. Great egrets account for approximately 8% of all "egret" strikes and caused 35% of all reported "egret" damages. Herons, egrets, storks, and ibises combined account for 2% of all known species bird strike reports and approximately 3.3% of all total damages. Geese are ranked number 3 on the list of the top 25 most hazardous species groups to aircraft. Cranes, ducks, and herons are ranked numbers 5, 7, and 10, respectively, on the list (Cleary and Dolbeer, 2005).

6.1.11 Game Birds

Description Upland game birds are chicken-like, ground dwelling birds that commonly feed on plant material and occasionally insects. Only one species in this group was found at OCF: Northern bobwhites. The Northern bobwhite is small and round bodied, with a short tail and neck. It is the only quail species found in Florida. Their feathers are reddish and gray and the males have obvious white eye-stripes and white throats. They are more commonly heard than seen, and their call is a very distinct "*bob WHITE*". It sounds as if they are calling their own name (Sibley, 2000). Bobwhites were observed most frequently at OCF in June (Figure 6-32). They were observed in the greatest numbers in June, October, and November (Figure 6-33).

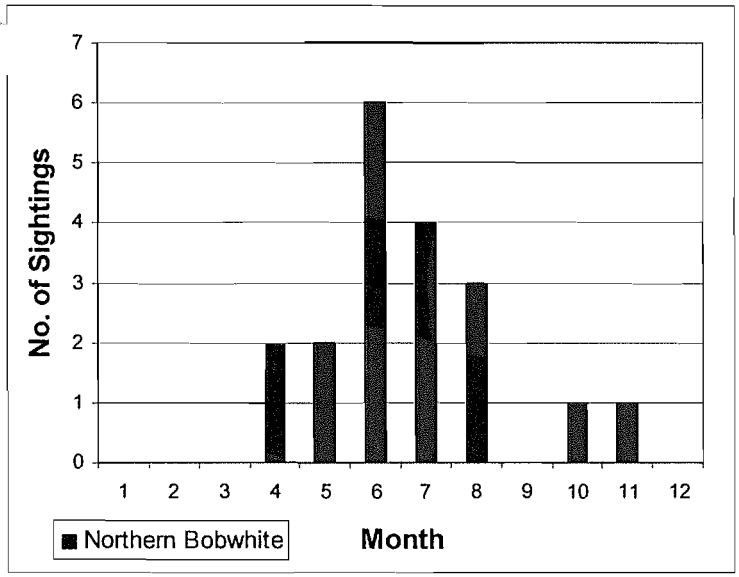


Figure 6-32. The number of bobwhite sightings each month at OCF during the WHA (December 2009 to November 2010)

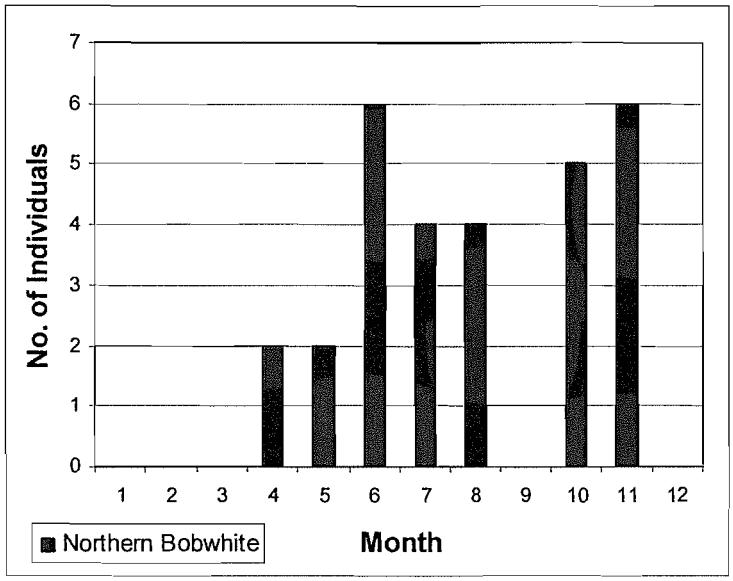


Figure 6-33. The number of individual bobwhites counted each month at OCF during the WHA (December 2009 to November 2010)

Attractants Bobwhites are ground foragers that prefer open grassland habitat with taller grasses so that they can hide from predators (Photo 6-10). They build their nests on the ground in or under a variety of herbaceous materials. Bobwhites will eat a variety of plants and plant materials (seeds, fruits, etc.).

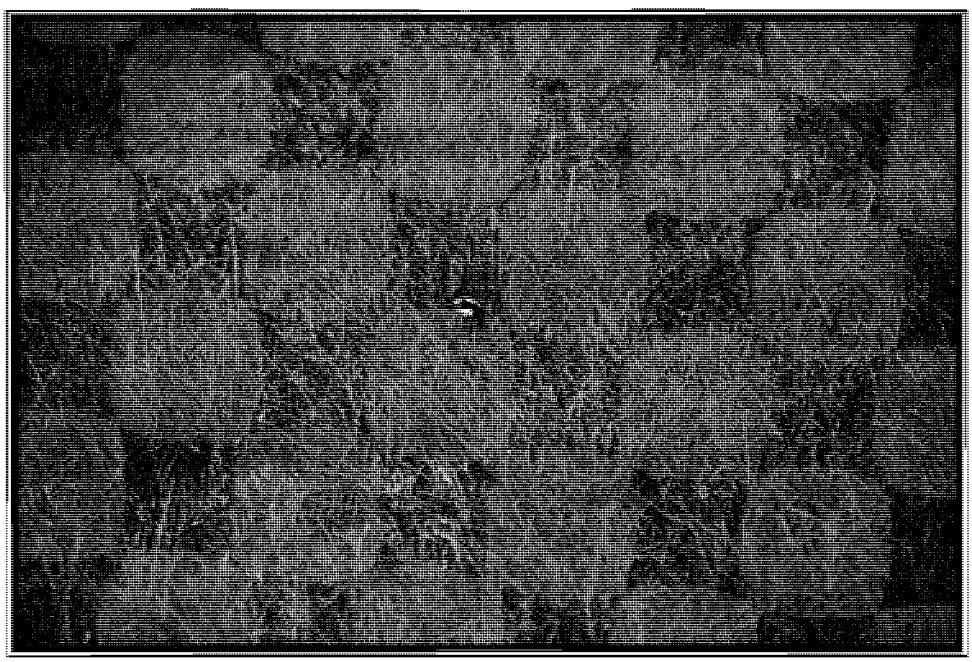


Photo 6-10. Northern bobwhite hiding in the grass, north of Runway 18-36 at OCF.

Risks Northern bobwhites are small quails weighing approximately 6 oz (170 g) and having a wingspan of 16 inches. They will form flocks of up to 20 birds (Sibley, 2000). The largest group seen together at OCF was 6 individuals. They are secretive ground dwellers that are rarely seen and fly only when flushed. Although the bobwhites themselves do not pose a significant threat to aircraft, they are an attractant for larger mammals (fox, coyotes, etc.) which are a potential hazard.

Legal Status Bobwhites are not protected under MBTA or ESA. They are also awarded no state protection.

Location Bobwhites were most commonly observed at observation station 1, in the longer grass north of Runway 18-36.

Control Measures As bobwhites do not fly often, exclusion of these birds is easier than excluding others. Ensuring that the perimeter fence is secure with no open gaps or breaches is an effective way to make it less inviting for bobwhites to enter the AOA. Keeping the grass at an intermediate height of 6 to 12 inches will eliminate some of the taller grasses and shrubby species that provide food and protection for the bobwhites.

Strike History Nationally, game birds ("Gallinaceous Birds") account for less than 1% of all known species bird strike reports. Strikes with game birds have caused as much as $612,287 in damage (Dolbeer et al., 2009). Northern bobwhites only account for 4% of the total strikes involving game birds and less than 1% in total damages.

6.1.12 Gulls

Description Gulls are extremely difficult to identify to the species level. Most species are similar looking, medium to large-sized birds, that have some combination of white and gray on them (Sibley, 2000). The individuals observed during the WHA were not identified to species level, however, it is likely that they were ring-billed gulls or laughing gulls. These are two of the most commonly observed gull species in Florida. A field guide must always be consulted when identifying gulls. Gulls were observed only during the colder months at OCF; however, they can be found in Florida year-round (Figure 6-34). The largest number of gulls was observed in December and January.

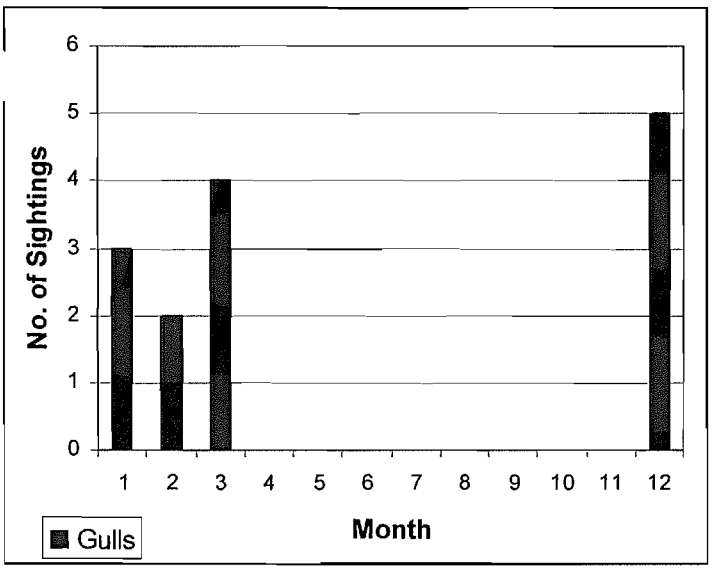


Figure 6-34. The number of gull sightings observed each month during the WHA at OCF (December 2009 to November 2010).

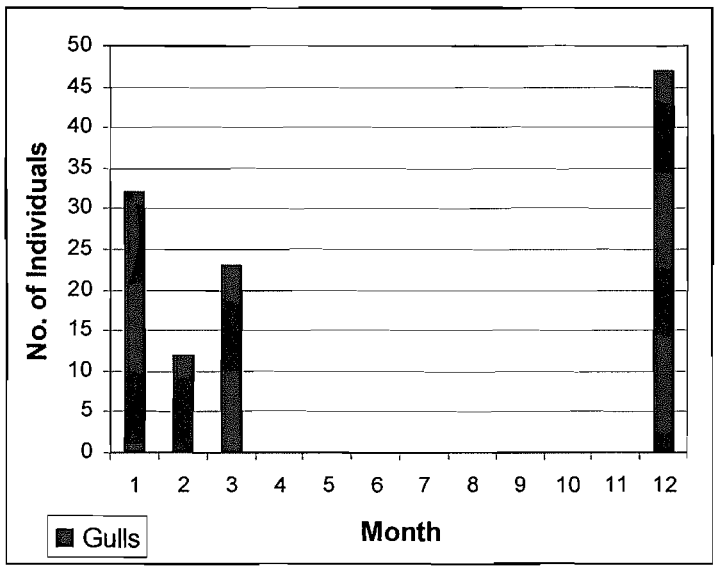


Figure 6-35. The number of individual gulls counted each month during the WHA at OCF (December 2009 to November 2010).

Attractants Although, gulls prefer open areas near water, such as beaches and ponds, they are also attracted to landfills, dams, restaurants, and other man-made structures where there could be potential food sources. They are omnivorous and will form large mixed flocks where food is present. Most species nest in close association on the ground in a depression in sand, or a nest made of seaweed or sea grasses. There is no evidence of gulls nesting on or near OCF. During coastal storms, gulls are often attracted to the safety of higher inland grounds. Large, open spaces (e.g. airports) allow them to see potential predators and weather the storms. Gulls view this as protection during inclement weather. They commonly loaf on airport movement areas throughout the country during heavy rain events.

Risks Gulls are fairly large (weighing approximately 1 lb and having a 3-5 feet wingspan), flocking birds that can cause severe damage to aircraft (Sibley, 2000). Given that, they were seen so infrequently during this WHA and Ocala is centrally located within the state, they may not be an immediate threat to aircraft at OCF. However, please note that a one-year study may not be representative of every year at an airport and precaution should still be taken towards these species.

Legal Status Gulls are protected by the MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. There is no additional state protection for any of these species.

Location All gulls were observed flying over the AOA headed in east-west directions. No gulls were observed loafing, nesting, or feeding on airport property during these surveys.

Control Measures The most effective way to deter gulls from the airport is to eliminate all food sources. This can easily be done by keeping trash contained, removing all animal and insect carcasses from the AOA, and reducing the amount of standing water on the airfield. Pyrotechnics

should be used to disperse gulls when they are observed loafing on or around or flying over OCF. Shooting one or two individuals can help to reinforce the pyrotechnics. Gulls have also been known to respond to dead gull effigies suspended in the "death pose" (see Section 6.1.8 "Vultures" Control Measures for further explanation of effigies).

Strike History Gulls are the most frequently struck species reported to the FAA Strike Database. Nationally, gulls and jaegars (gull-like seabirds) account for approximately 19% of all known species bird strike reports. Strikes with gulls have caused as much as $35,839,010 (11.6%) in damage (Dolbeer et. al., 2009). The vast majority (72%) of the strikes in this group were reported just as "gulls", followed by ring-billed gulls (11%) and herring gulls (9.5%). Gulls are ranked twelfth on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005).

6.2 Mammals

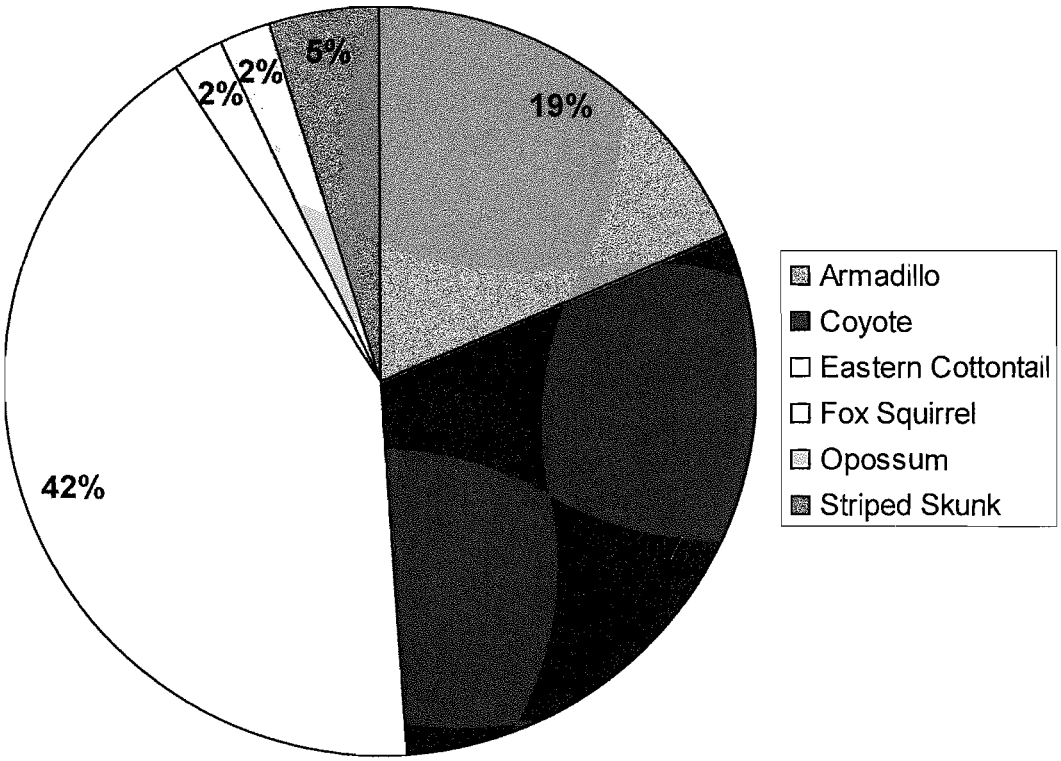


Figure 6-36. Abundance of mammals observed at OCF from December 2009 to November 2010.

6.2.1 Mesomammals: Armadillos, Opossum, and Skunks

Description Mesomammals account for 26% of the mammal species observed at OCF during this WHA (Figure 6-36). The nine-banded armadillo (*Dasypus novemcinctus*) is commonly seen throughout the warm southern states. They weigh between 6-16 lbs and have a gray, scaly body with 8-9 moveable, overlapping bands on their backs Virginia opossums (*Didelphis virginiana*) weigh 2-15 lbs and have long, scruffy hair with a naked nose, ears, and rat-like tail. The striped skunk (*Mephitis mephitis*) weighs 2-11 lbs and is marked with a variable black and white pattern (Reid, 2006). Armadillos were seen throughout the year, but opossums and skunks were more common during the warmer months (August and September). There were not enough sightings to note significant mesomammal trends.

Attractants Armadillos are found in woodlands, fields, scrub, and brushy areas. They prefer edge habitat where there are often exposed roots. Armadillos feed primarily on invertebrates, but will eat small vertebrates, fruits, and carrion. They can be seen rooting through the dirt for grubs (Reid, 2006). Opossums are found in a variety of habitats from agricultural fields to urban areas. They are omnivorous and will eat almost anything remotely edible, including eggs, garbage, plant materials, carrion, etc. They prefer to den in hollow logs, rocks, or burrows made by other animals (such as gopher tortoises). Striped skunks eat mostly insects, but also small mammals, birds and birds'

eggs, fruit, carrion, plant matter, etc. They prefer to den in hollow logs, burrows (such as gopher tortoise burrows), under buildings, or in brush piles.

Risks Mesomammals are a minimal wildlife strike risk at OCF. Opossums, armadillos, and skunks are typically solitary, nocturnal animals. They are not likely to loaf on the movement areas, but are more commonly seen around the perimeter fence. However, they can be an attractant risk as large raptors (hawks and owls) and larger mammals (coyotes) may prey on these species. Also, it is important to monitor the AOA for potential mesomammal carcasses, as they can become a vulture attractant risk. In addition, armadillos, opossums, and skunks can create burrows and cause continuous breaches under the perimeter fence. These burrows may create holes in the safety area and fence breaches allowing other animals to easily pass under the fence and onto the AOA.

Legal Status Armadillos, opossums, and skunks are not protected by any federal or state laws.

Location Mesomammals were commonly seen in the grass near station 3. This area is far from the movement areas and adjacent to wooded areas (outside the perimeter fence). Open grass fields provide foraging and burrowing habitat for these species (Photo 6-11).

Photo 6-11. Armadillo foraging on south end of AOA at OCF.

Control Measures The most effective way to keep these animals off of the airfield is by exclusion. It is critical that the perimeter fence be checked for breaches daily and that all known breaches are repaired. Ideally, an apron of fencing material (chain-link, chicken wire, hog wire, etc) should be attached around the bottom of the fence, bent out at an angle and then buried wherever breaches persist. Also, ensure that tree branches along the outside of the fence do not drape over the fence onto the airfield. Opossums can easily use these branches to climb over the fence. If the fence is secure and mesomammals are still observed on the AOA, it is best to trap and euthanize or relocate these individuals. Carbon monoxide (CO) cartridges can be placed in burrows to poison the inhabitants and then the burrow can be filled, burying the carcass. CO cartridges should only be placed in mammal burrows. It is illegal to place them in gopher tortoise burrows.

Strike History Strikes with armadillos or opossums are not listed in the national database. Nationally, skunks account for 6% of known species mammal strikes. Costs associated with skunk strikes were not reported. No mesomammals were listed in strike reports at OCF.

6.2.2 Coyotes

Description Coyotes (*Canis latrans*) weigh between 20 and 50 pounds and have pale tawny fur with long legs, large ears, and a narrow muzzle. They run with their tails held down, which can help distinguish them from domestic dogs at a distance (Reid, 2006). Coyotes or their sign were observed throughout the year, but there is too little data to establish significant trends. They are likely present at OCF year-round.

Attractants Coyotes live in a wide range of habitats throughout North America, but prefer an area with mixed or edge habitat. They are less likely to be found in large tracks of unbroken forest. They require hollow logs or burrows to build dens for their young and will often modify an existing gopher tortoise burrow rather than excavate a new one. They eat a wide variety of foods including small mammals, birds, snakes, insects, fruits, berries, and vegetable matter (Reid, 2006). Small mammals (including rabbits) woodland areas for cover, and water sources (detention ponds and exposed water treatment lines) are likely attracting coyotes to OCF.

Risks Coyotes are medium-sized animals that are usually solitary or in pairs. They can cause significant damage to aircraft, especially when a large population is present inside the perimeter fence and individuals regularly cross the movement areas. However, there is only a small population (a few individuals) inside the perimeter fence at OCF. This population does not pose a great hazard to aircraft. Coyotes are fast, smart, and typically elusive. It is likely they will stay clear of the movement areas. Regardless, the presence of coyotes should be continuously monitored and all coyotes found within the perimeter fence should be removed.

Legal Status Coyote populations are vast and expanding. They are not protected by federal or state laws.

Location Coyotes were observed on a few occasions near the woodlands southwest of Runway 8-26, inside the perimeter fence (Photo 6-12). They were also observed in the wooded areas near station 3, outside the perimeter fence. Coyote scat was observed throughout the AOA. Coyote tracks (Photo 6-13) were observed in the detention ponds near station 5 (east of Runway 18-36). OCF staff reported coyote sightings during this WHA.

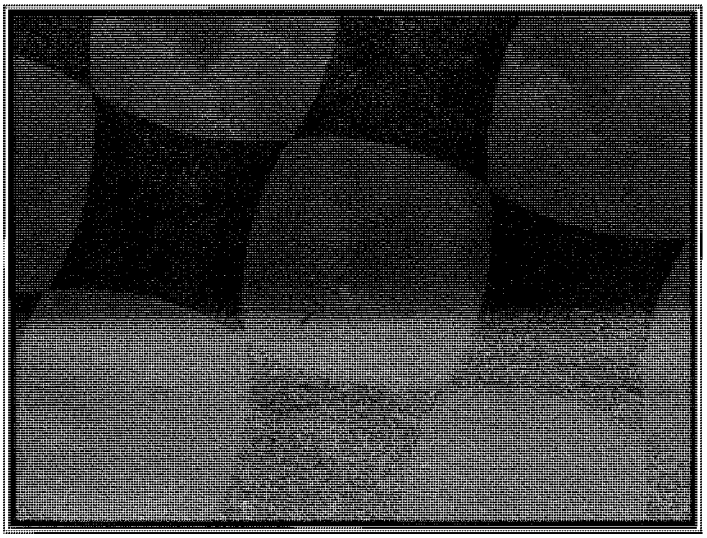


Photo 6-12 (above). Coyote along woodlands southwest of Runway 8-36, inside the perimeter fence.
Photo 6-13 (right). Coyote tracks found in detention pond, east of Runway 18-36, inside the perimeter fence.

Control Measures The most effective way to control coyotes is exclusion. A secure perimeter fence, with no breaches or gaps, will eliminate a coyote problem. Also, reducing available food (small mammals), water, and cover from the airfield will make the airport appear less attractive to coyotes. Removing woodland and brushy areas, which provide potential hunting and denning sites, will reduce coyote and small mammal habitat. If adjacent water treatment facility lines running under the AOA become exposed and leak water onto the airfield, the leaks should be stopped and the lines re-buried immediately. If coyotes are seen inside the perimeter fence, they should be taken whenever possible.

Strike History Nationally, coyotes account for approximately 15% of all terrestrial mammal strike reports. Strikes with coyotes have caused as much as $2,776,040 (7%) in damages (Dolbeer et. al., 2009). They are ranked 17th on the list of the top 25 most hazardous species groups to aircraft (Cleary and Dolbeer, 2005). There are no reported coyote strikes at OCF.

6.2.3 Small Mammals: Mice, Rats, Squirrels, and Rabbits

Description Cotton mice (*Peromyscus gossypinus*), cotton rats (*Sigmodon hispidus*), a Sherman's fox squirrel (*Sciurus niger shermani*), and Eastern cottontails (*Sylvilagus floridanus*) were observed at OCF. Cotton mice weigh approximately 1 oz, have a dark brown back and a gray-white belly (Photo 6-14). Cotton rats are much larger than cotton mice, weighing approximately 3.5 oz. It's upperparts are grizzled dark brown and buff (almost black in the southeast) with a grayish white belly. A cotton rat's tail is shorter than its body. One Sherman's fox squirrel was observed during a dawn survey in April. They are large squirrels, weighing 1-3 lbs, and are grizzled grayish buff above, with white or pale orange bellies. Their heads and napes are black with contrasting white nose and ears. Sometimes, they are seen in all black (melanistic morph). Cottontails weigh

approximately 2.5 lbs, have an orange and black grizzled back, a white belly and a cottony white tail below (Reid, 2006). Cottontails were seen throughout the year. Several cotton mice and one cotton rat were trapped during each small mammal trapping event (spring and fall). Mice were captured at every small mammal trapping transect at OCF (Exhibit 4).

Photo 6-14. Cotton mouse trapped at OCF along Transect 4 in November 2010.

Attractants Small mammals are attracted to any habitat that provides plenty of safe cover e.g. dense grass, burrows, brush piles, thickets, edges of woodlands, logs, abandoned buildings, etc. They often utilize fallen trees, "weedy" fence lines, and tree roots as corridors to travel unnoticed between one location and the next. Their goal is to avoid predators; therefore, they are predominantly nocturnal. Small mammals rely on thick cover to create nests and raise young as well. In Florida, small mammals breed year-round. Their diet is mostly plant materials (seeds, fruits, nuts, grains, grasses, etc.), but they will also feed on human waste and animal foods (Reid, 2006).

Risks Small mammals are an extremely low risk for damaging aircraft. However, they are a high predator attractant risk. Eliminating small mammals from the AOA will greatly reduce the presence of hawks, eagles, owls, falcons, kites, vultures, gulls, crows, and coyotes. The population of small mammals at OCF appears to be healthy as evidenced by moderate trapping success (11 small mammals trapped total) and predators (coyotes and birds of prey) commonly observed loafing or feeding on the airfield. Cottontails (adults and juveniles) are common on the airfield and were observed during the majority of night-time spotlight surveys.

Legal Status Most small mammals observed at OCF are not protected by federal or state laws, however, the Sherman's fox squirrel is listed as SSC by FWC and USFWS. In addition, the Florida mouse (*Podomys floridanus*), which was not observed at OCF, is also listed as SSC by the state (FWC). Florida mice occur in dry upland areas with sandy soils and prefer to live in gopher tortoise burrows. Although they were not trapped during this WHA, OCF contains an abundance of suitable Florida mouse habitat. The Florida mouse has bright orange sides, a gray back, and a white belly.

Please see section 4.0 Legal Status of Wildlife and Required Permits for more information regarded protected species.

Location Cotton mice were captured in traps along every transect (Exhibit 4). The cotton rat was trapped only at Transect 1. Traps set at transects along the woodland areas yielded the greatest number of small mammals. Cottontails were most commonly seen in dense vegetation along the northern perimeter fence near observation station 1. It is likely that they live outside the perimeter fence in the dense grasses north of the AOA and come onto the airfield at night to feed on the short, maintained grasses.

Control Measures Securing the breaches in the perimeter fence will help to reduce the number of cottontails. Burying the fence will help to prevent them from repeatedly digging under the fence. Eliminating all areas of potential cover will also help decrease the small mammal population. Examples include, removing all forested areas from inside the perimeter fence, keeping the fence line and right of way clear of vegetation, removing brush piles and/or "junk" piles, and removing any unused materials being stored on the AOA.

Strike History Nationally, rabbits and cottontails account for approximately 7% of all terrestrial mammal strike reports; however, strikes with rabbits and cottontails have caused less than 1% in total damages caused by terrestrial mammals (Dolbeer et. al., 2009). There are no reported small mammal strikes at OCF.

6.3 Other: Gopher Tortoises

Description The gopher tortoise is a 6-10 inch land tortoise with stumpy, elephant-like feet. Its shell is brown or tan above and yellowish below. Gopher tortoises are excellent burrowers and it is more likely to see their characteristic half-moon shaped burrow entrance with clean sandy apron before seeing the tortoise itself (Conant and Collins, 1998). See photos 6-15 and 6-16.

Photo 6-15. Gopher tortoise burrow at OCF. Note the half moon shape and clean, sandy apron around the mouth of the burrow. There are also fresh gopher tortoise tracks, which confirms that this burrow is active.

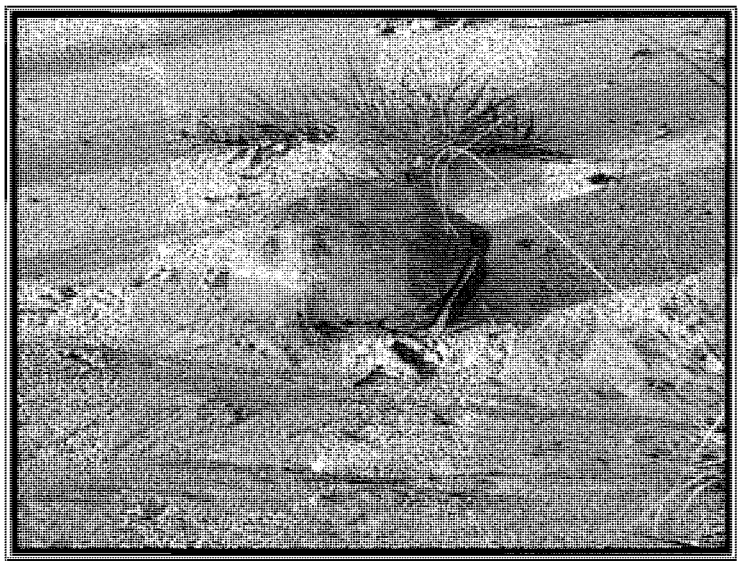


Photo 6-16. Gopher tortoise at OCF.

Attractants Most herps (frogs, turtles, and snakes) are attracted to wetlands, swamps, lakes, marshes, bogs, etc. However, the gopher tortoise prefers dry, upland habitats with deep, sandy soils for burrowing. Gopher tortoises are vegetarians and eat prickly pear cactus (*Opuntia humifusa*), wiregrass (*Aristida stricta*), and other scrubby broadleaf grasses (Photo 6-17).

Photo 6-17. Prickly pear cactus found inside the perimeter fence at OCF (near observation station 4).

Risks Gopher tortoises on the movement areas could damage aircraft, especially landing gear, if struck as they are quite large and slow moving. Additionally, gopher tortoise burrows in the safety area could cause concern if an aircraft was to veer off of the runway and hit the burrow. Finally, tortoises are expert excavators and will consistently create fence breaches that other animals may utilize unless the perimeter fence is buried.

Legal Status Gopher tortoises are listed as threatened by FWC and are not to be harmed (taken, burrow filled, etc) under any circumstances. Airport staff can move tortoises off of movement areas and/or relocate them on their own property. Gopher tortoises can be relocated off-site with appropriate permits from FWC.

Location Gopher tortoises were observed throughout the AOA at OCF. There are several active burrows near observation stations 1 through 5. Many of the burrows occur along the perimeter fence and continuously cause large breaches for other wildlife (cottontails, coyotes, etc.) to freely access the airfield.

Photo 6-18. Gopher tortoise burrow along perimeter fence. Tortoise activity causes a permanent breach in the perimeter fence, allowing other wildlife to freely pass through.

Control Measures Relocating gopher tortoises to an off-site mitigation area (with the proper FWC permits) would eliminate the potential for burrows in the safety area and stop reoccurring fence breaches caused by tortoise digging. Burying the bottom portion of the perimeter fence (8-24 inches deep) would ensure that tortoises could not return to the AOA. Also eliminating any edible vegetation from inside the perimeter fence may discourage the tortoises from continuously digging burrows on the AOA. Prickly pear is best removed by digging each individual cactus up by the roots. Mowing cactus just helps it to spread. An herbicide may be applied to the roots to prevent re-growth.

Strike History Nationally, reptiles (including alligators and iguanas) account for less than 1% of all wildlife strike reports. There is no reported total damage amount for reptiles. There are no reported gopher tortoise strikes at OCF.

6.4 Wildlife Attractants at OCF

The attractants described in this section were identified during the WHA at OCF from December 2009 to November 2010. Both airports and wildlife are dynamic and the attractants may change over time. Therefore, this should not be viewed as a permanent identification of the wildlife situation at OCF. Any modifications to OCF property should take into consideration the effects that these changes may have on wildlife.

6.4.1 On-site Attractants

Large areas of very short or very tall grass mixed with weedy vegetation. There are large areas of very short grass in the infields between movement areas and around the hangars/ramp. These areas are highly attractive to birds, especially meadowlarks, cattle egrets, starlings, killdeer, and mourning doves. There are large areas of very tall grass north and south of Runway 18-36. This tall grass attracts small mammals such as mice and rabbits and various bird species such as meadowlarks, sparrows, crows, and bobwhites. These prey species in turn attract predators such as, coyotes, fox, and hawks. The grassy fields are mixed with "weedy" species that produce seeds and flowers (Photo 6-19). This attracts a variety of seed and fruit eating birds (such as blackbirds) as well. The weedy vegetation can hide important aviation signals, such as signs or lights that may disrupt safe flight operations (Photo 6-20). The mix of short and tall grass also creates an edge habitat that is attractive to numerous wildlife including small mammals, cottontails, meadowlarks, crows, and coyotes. The tall grass provides cover and a corridor that allows the predators to hunt undiscovered while searching for prey in the shorter fields. Meanwhile, the prey species use the tall grass as a nearby cover for hiding when feeding in the short grass.

Photo 6-19. Overgrown grass field filled with weedy vegetation, south of Runway 18-36 at OCF.

Photo 6-20. Overgrown weedy vegetation obstructing the view of a STOP sign, north of Runway 18-36 at OCF.

Abundance of available perching and nesting structures. Many birds are attracted to perching and nesting in and around the airport facilities. Grackles and starlings are especially attracted to the light posts around the ramp and hangar area for perching. Meadowlarks, crows, hawks, and kestrels utilize runway/taxiway signs, antennas, the VOR, and miscellaneous structures throughout the airfield for perching and establishing territories (Photo 6-21).

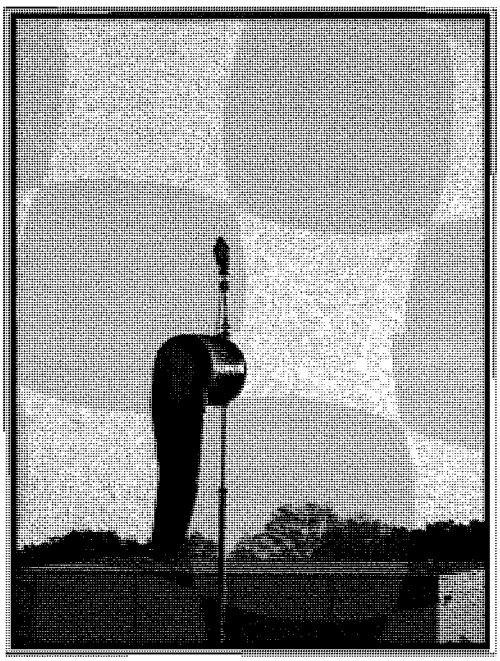
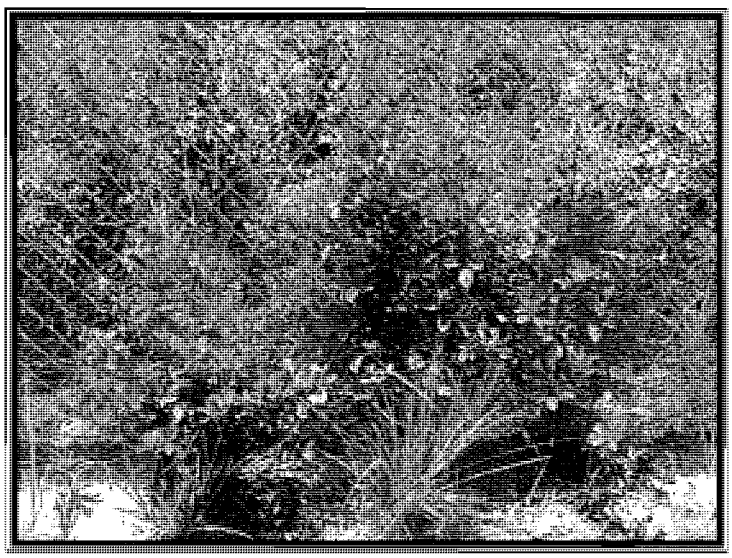


Photo 6-21. Red-tailed hawk perched on windsock at OCF.

Areas of brush and dense vegetation. Shrubby vegetation or "brush" provides excellent cover for small mammals and nesting/perching opportunities for birds. The brush along the fences allows wildlife, especially small mammals, to travel throughout the airfield undetected (Photo 6-22). In addition, there are various shrubs and brush scattered throughout the airfield that produce fruits edible to wildlife (Photo 6-23).



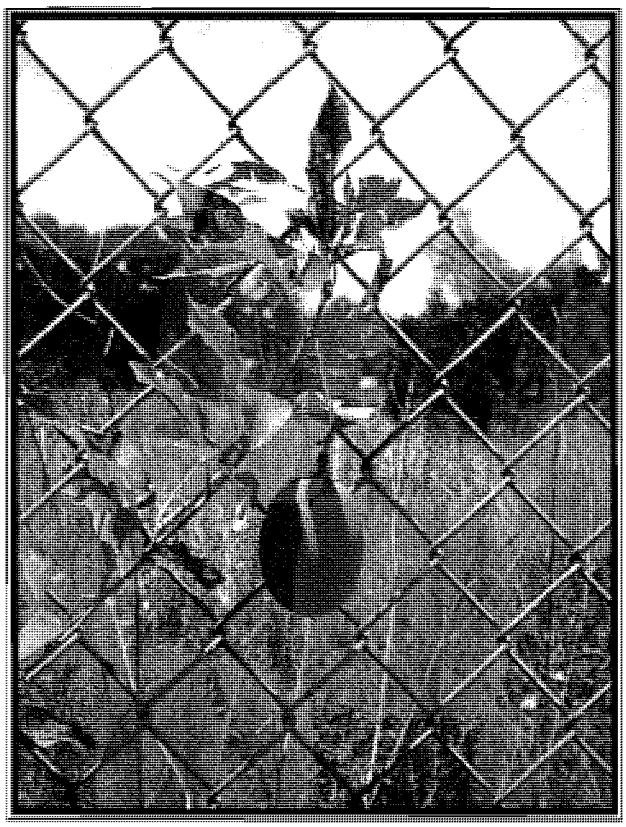


Photo 6-22 (above). Brush area southwest of Runway 8-26.

Photo 6-23 (right). Passion flower vine (*Passiflora incarnata*) with passion fruit growing along perimeter fence at OCF.

Woodland areas inside the perimeter fence. There are two main wooded areas inside the perimeter fence that provide food sources (acorns, etc.), cover, perches, and roosting sites for crows, coyote, small mammals, hawks, blackbirds, etc. The wooded area along the eastern perimeter fence, south of the hangars (Photo 6-24), is most attractive to crows, small mammals, and gopher tortoises. Coyotes have been seen around the wooded area southwest of Runway 8-26. A dead gray fox (presumably) was also found adjacent to this wooded area by airport staff.

Photo 6-24. Woodlands inside the perimeter fence at OCF, east of Runway 18-36, south of the hangars.

Exposed water treatment facility discharge lines throughout the airfield. The adjacent water reclamation facility has discharge lines that run under the airport. Occasionally, these lines will become exposed by wildlife that uncovers the lines to access the water. The lines are then broken, exposed, and pooling water throughout the airfield (Photo 6-25). This water is an attractant to all forms of wildlife, especially birds and coyotes.

Photo 6-25. Exposed water reclamation facility discharge lines creating areas of standing water on the airfield at OCF (south of Runway 18-36).

Collection of unused materials mixed with overgrown vegetation. There is one area of the airfield where unused materials are being stored. In addition, this area has become overgrown with dense vegetation and shrubs (Photo 6-26a). This vegetation provides excellent cover and hunting opportunities for small mammals, coyotes, and birds of prey. It also prevents proper vegetative maintenance, as the mowers can not easily navigate around the materials.

Photo 6-26a. Brush pile with unused materials located southwest of Runway 8-26 at OCF.

Update: As of July 2011, the above brush pile was removed (Photo 6-26b).

Photo 6-26b. Brush pile after unused materials were removed.

Open trash containers. Human waste attracts raccoons, feral cats, crows, etc. Although wildlife was not commonly seen around the dumpsters at OCF, the dumpsters were commonly seen left open with trash exposed (Photo 6-27).

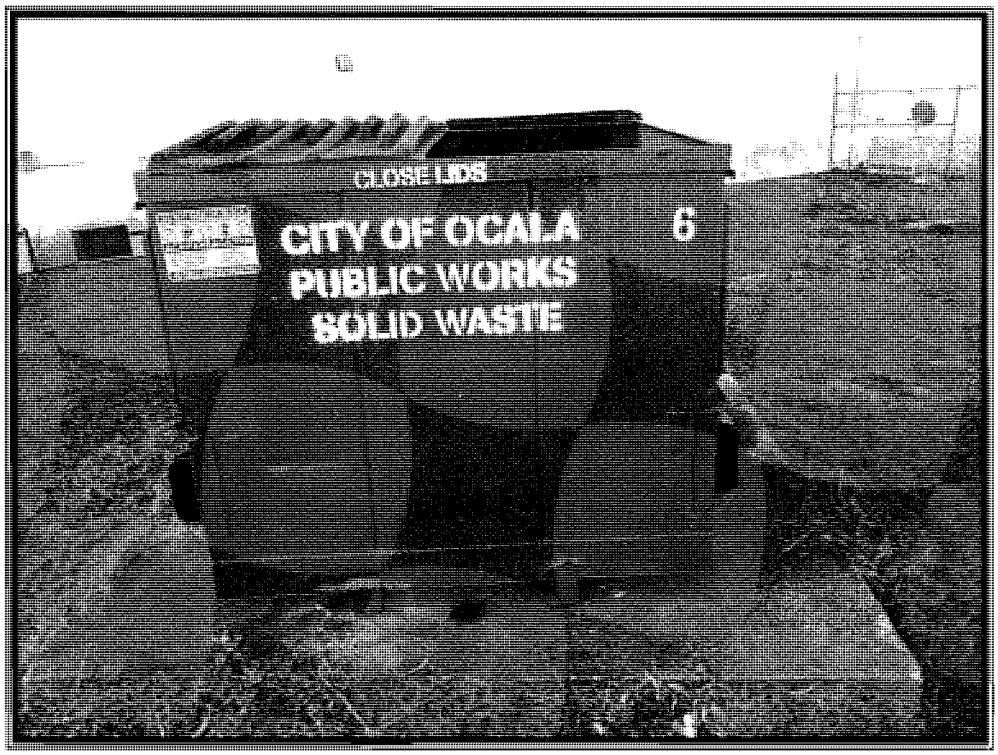


Photo 6-27. Open trash container located directly outside of the perimeter fence at OCF.

6.4.2 Off-site Attractants

There are several potential off site attractants located around OCF including Michael A. Finn water reclamation facility, the old Martel landfill, Ocala regional sportsplex, and Ocala Breeders' Sales (OBS). Based on monthly observations made during this WHA at these potential attractants, only the water reclamation facility and OBS were found to attract wildlife in size and numbers that pose a threat to aviation safety at OCF.

Michael A. Finn Water Reclamation Facility #3. The water reclamation facility is located directly southwest of the airport. This facility is a major turkey vulture attractant, especially during the cooler months. During this time of year, the midday sun will heat the black tarps used to line the treatment ponds creating thermals that attract the vultures to the area (Photo 6-28). Also, vultures are one of the only birds with a sense of smell, so spraying or treating sludge may be attracting the birds as well. The absolute cause for the attractant is unknown, however, it was observed that many vultures flock in this area during midday and interfere with an approach path for Runway 36.

Photo 6-28. Turkey vultures circling over water reclamation facility located southwest of OCF.

Ocala Breeders' Sales. Ocala Breeders' Sales (OBS) is located east of OCF, just across SW 60th Avenue. OBS has a long row of mature live oaks (*Quercus virginiana*) as part of the landscaping at the entrance to the facilities (Photo 6-29). These oaks provide a roosting site for crows and blackbirds throughout the night. During our observations, blackbirds and crows were seen coming to and from the oak trees, occasionally crossing the AOA on their way elsewhere.

Photo 6-29. Row of live oaks located at the entrance to OBS' facilities, across from OCF.

7.0 RECOMMENDATIONS

Summary

Passive Management Actions

- Maintain a consistent grass height of 6 to 12 inches throughout the airport property year-round
- Ensure mowing blades are raised to 6 inches or above
- Remove wooded areas from inside the perimeter fence
- Bury the perimeter fence
- Ensure reclaimed water drainage lines under the AOA remain buried.
- Install perching barriers on signs, lights, rooftops, etc.
- Remove unnecessary perching and nesting structures
- Regularly inspect perimeter fence/gates for breaches
- Keep perimeter fence clear of vegetation
- Prune parking lot/landscaping trees so they are not used for roosting by blackbirds and crows
- Remove carrion promptly
- Keep trash contained

Active Management Actions

- Aggressively harass and/or shoot vultures, cattle egrets, coyotes, blackbirds and other hazardous wildlife from the AOA
- Relocate gopher tortoises
- Remove nesting material and nests from hangars, buildings, etc.
- Display vulture effigy
- Consider using chemical insect control when insect populations are highest

Administrative Recommendations

- Adopt a Zero-Tolerance Policy towards hazardous wildlife
- Report all wildlife strikes and document all wildlife management actions
- Continue to obtain necessary permits to control wildlife
- Consult a wildlife biologist when drafting new construction plans
- Develop a Wildlife Hazard Management Plan (WHMP)
- Continue to train personnel in wildlife identification and management procedures
- Continue monitoring wildlife behavior and abundance at OCF

7.1 Passive Management Actions

7.1.1 Maintain a consistent grass height of 6 to 12 inches throughout the airport property year round

It is imperative that the grass height always be kept between 6 and 12 inches. This is the key to a successful wildlife strike reduction program and all programs should start with grass management as the baseline. There are several benefits to maintaining an intermediate grass height: it disrupts visual inter-flock communication, obscures insect food sources, limits predator protection, impedes the ease at which wildlife can move, and taller grass out-competes edible, weedy vegetation and it has a slower growth rate, which in turn requires less frequent mowing. True grasses (without seed heads) are indigestible to most birds. Birds are only attracted to "weedy" and seed-producing vegetation. When mowing, it is recommended to mow in several directions and only when the ground is dry. This will help to avoid ruts or cause bare areas from tractor tires. During the summer months when the cattle egrets are most frequent, all mowing should be completed before noon if possible. This will help eliminate the incentive they need (insects) to return to the same site the next day. The recommended height is to be applied to the entire AOA, including areas around any hangars or lights and signs, to avoid causing edge effects or bare areas. If necessary, concrete pads should be used around the base of lights and signs so as not to obstruct their view.

7.1.2 Ensure mowing blades are raised to 6 inches or above

On the AOA, grass should never be shorter than 6 inches (Photo 7-1). While taller grass can house more insects and small mammals, birds have a difficult time seeing their prey and walking through such tall grass. If an increase in raptors hunting on the airfield is observed, grass height may need to be reassessed.

Photo 7-1. Grass at OCF cut shorter than the recommended 6 inch height minimum. Pen in photograph is approximately 6 inches in height.

7.1.3 Remove wooded areas from inside the perimeter fence

All forested areas within the perimeter fence should be removed. These areas provide habitat for a variety of wildlife species and obstruct the view of the perimeter fence. Eliminating these two woodland stands (one east of Runway 18-36 and one southwest of Runway 8-26) will reduce the amount of ongoing wildlife management required at OCF.

7.1.4 Bury the perimeter fence

OCF has a large population of gopher tortoises, both inside and outside the perimeter fence. These gopher tortoises continuously pass back and forth under the fence, creating large breaches that allow other wildlife (cottontails, skunks, armadillos, coyote, etc.) to pass under the fence as well. Burying the perimeter fence a minimum of 8 inches below ground will help prevent the gopher tortoises (and other wildlife) from creating breaches along the fence line. Additionally, a buried fence will prevent any migrant or relocated tortoises from returning to the AOA and digging burrows.

7.1.5 Ensure reclaimed water drainage lines under AOA remain buried.

As previously discussed, the adjacent water reclamation facility has irrigation lines that run under the AOA. Occasionally, these lines will be uncovered by wildlife, mowing equipment, etc. The exposed lines act like sprinklers and provide a constant water source for wildlife that come onto the AOA to drink. These lines must be re-buried immediately upon discovery of exposure, stopping the flow of water.

7.1.6 Install perching barriers on signs, lights, rooftops, etc.

Anti-perching devices are used to discourage loafing and roosting around facilities and are recommended for all of the lights around the FBO and ramp area, and on the windsock, AWOS, VOR, various electrical equipment sheds, and flat rooftops (hangars) where birds are commonly seen. "Bird spiders" and "bird spikes" are the most effective, but non-drying sticky gel repellents can be applied to these surfaces as well.

7.1.7 Remove unnecessary perching and nesting structures

To deter birds such as kestrels, meadowlarks, mockingbirds, crows, starlings, and doves from loafing, nesting, and hunting on the airfield, it is recommended that OCF staff remove all unnecessary structures that birds use as perches, such as needless posts, unused equipment, and taller, solitary shrubs (Photo 7-2).

Photo 7-2. Pokeweed (*Phytolacca americana*) found on the AOA at OCF. This shrub and adjacent posts provide perching and nesting habitat for birds, as well as providing a food source (berries).

7.1.8 Regularly inspect perimeter fence and gates for breaches

Proper fencing is the best and most effective way to exclude coyote, and other mammals, from airport property. In CertAlert 04-16, "the FAA recommends a 10-12 foot chain link fence with 3-strand barbed wire outriggers. A 4-foot skirt of chain-link fence material attached to the bottom of the fence and buried at a 45° angle on the outside of the fence will prevent animals from digging under the fence and reduce the chance of washouts. This type of fencing also greatly increases airport security and safety." The guidance continues, "All fencing must be properly installed and maintained" with the "fence line right-of-way kept free of excess vegetation". FAA recommends daily fence patrols and any breaches be repaired as soon as they are discovered. This includes any spaces in gates, which should close with less than 6-inch gaps. Concrete "speed bumps" are recommended as a permanent solution to fill any spaces under gates.

7.1.9 Keep perimeter fence clear of vegetation

OCF staff should perform daily inspections of the perimeter fence to identify and repair new breaches. If there is extensive vegetation along the base of the fence, these breaches can easily be disguised. Dense vegetation along the base of the fence can also serve as a covered corridor for small mammals to travel around the airfield. There are disguised breaches along the northern fence line and the portion of the fence south of the approach end for Runway 8 (Photo 7-3). These sections of fence have dense grass along both sides. Both cottontails and coyotes have been observed using these breaches.

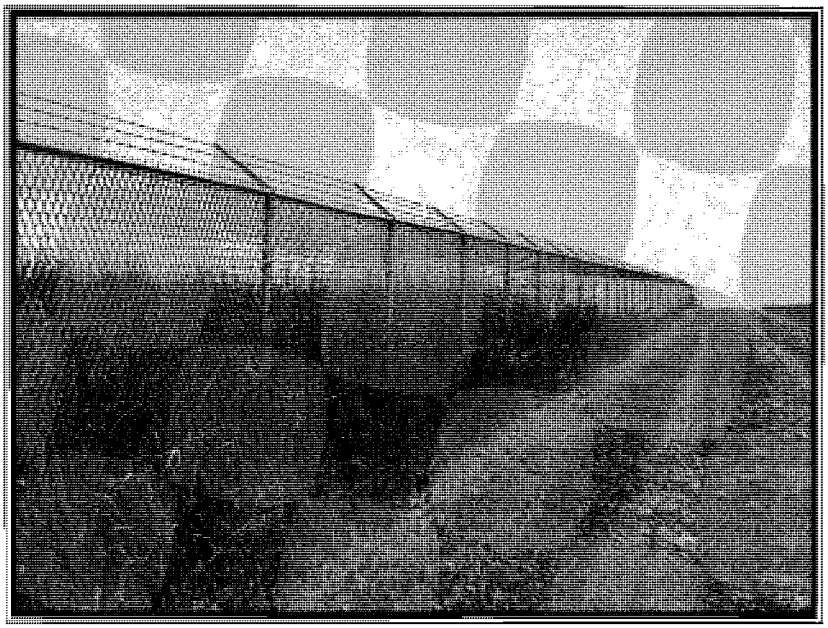


Photo 7-3. Northern perimeter fence at OCF lined with dense vegetation on both sides.

7.1.10 Prune parking lot/landscaping trees so they are not used for roosting by blackbirds and crows

Current observations do not indicate that OCF landscaping attracts excessive wildlife. However, it is recommended that any mature oak trees in the parking lots and hangar landscaping be thinned of interior branches. This eliminates the opportunity for blackbirds and crows to roost in these trees at night, but does not detract from the aesthetics of the trees. When roosting, blackbirds form large mixed flocks that will leave and return to the same roosting site each night. This could cause disastrously large flocks of blackbirds to cross the AOA at least twice daily. OCF staff should coordinate with OBS to trim the interior branches of their oak trees as well. For future projects, it is recommended that no food producing trees be planted (i.e. trees that produce berries, nuts, fruits, etc). Also, any water features (e.g. fountains, ponds) should be kept to a minimum. If such features are necessary, they should be designed with steep sides and lined with concrete.

7.1.11 Remove carrion promptly

Many potentially hazardous wildlife species, including vultures, crows, gulls, and eagles, depend on carrion as a primary food source. Any carcass found on the AOA (small or large) should be removed immediately and disposed of properly (buried). Daily inspections for carrion are recommended.

7.1.12 Keep trash contained

It is imperative to keep all waste in a closed container. Garbage is a primary attractant to many types of wildlife species, including birds and mammals. Keep this attractant to a minimum by closing all dumpsters and trash cans. Communicate with tenants to ensure that they keep their dumpsters closed as well. Signage can be posted to remind airport employees, tenants, and patrons to properly dispose of all waste to avoid litter.

7.2 Active Management Actions

7.2.1 Aggressively harass and/or shoot vultures, cattle egrets, coyotes, blackbirds and other hazardous wildlife from the AOA

Most wildlife is highly adaptable and will habituate to non-lethal harassment measures (e.g. effigies, pyrotechnics, etc.) over time. However, lethal control can help to reinforce these non-lethal methods. Often following lethal control, wildlife responds favorably to harassment with pyrotechnics once again. Harassment and lethal control need to be used together and persistently, especially from August through December, when bird populations are at their highest. If possible, shooting and harassment should be conducted with more than one person so that there is staff available to move quickly around the airfield if necessary. Of course, harassment and shooting should be limited if air traffic is heavy.

Shooting can be labor intensive and is a sensitive activity to the public. However, the benefits achieved from this type of control generally outweigh the negative impacts. When performed by staff with bird identification skills, shooting should be target specific. Therefore, endangered species or other non-target species are not placed at risk. ERS has provided and (if requested) will continue to provide bird identification training to airport personnel.

7.2.2 Relocate gopher tortoises.

As previously discussed, gopher tortoises are expert excavators and dig burrows throughout the airport safety area and under the perimeter fence. Gopher tortoise relocation permits must be obtained from FWC and it is recommended to relocate the gopher tortoises to an off-property recipient site. On-site relocation is less costly; however, tortoises are likely to return to their original burrows, as they have strong homing senses. Relocate the tortoises within the safety area first, so that their burrows can be filled, then begin relocating the tortoises throughout the remaining AOA and along the perimeter fence. Unfortunately, unless the perimeter fence is secured, tortoises from surrounding areas will continue to migrate onto the airfield. Therefore, to ensure successful and efficient relocation, it is imperative to bury the perimeter fence.

7.2.3 Remove nesting material and nests from hangars, buildings, etc.

Although nesting was not directly observed throughout this WHA, starlings and blackbirds are likely nesting throughout the ramp and hangar areas, crows appear to be nesting in the woodland areas, killdeer are potentially nesting in the bare areas, and a kestrel appears to be nesting in the VOR. The AOA must be monitored for nesting and all nests should be removed and eggs destroyed.

7.2.4 Display vulture effigy

It is recommended that a dead vulture effigy, preferably an actual dead bird, obtained from a taxidermist, be suspended upside-down from a high location near the water reclamation facility. This is to discourage other vultures from circling or loafing in this area. This method has proven effective at other airports in the past. The effigy, in conjunction with pyrotechnics and lethal control, should eliminate this hazard. If this proves unsuccessful, another method may need to be

employed. This will require coordination with the City of Ocala and the facility's staff to display the bird where it will be most effective.

7.2.5 Consider using chemical insect control when populations are highest

During the summer months, insect abundance increases. This typically leads to an increase in the population of insectivorous birds, especially cattle egrets. These birds would look elsewhere for food sources if insects were not available on the airfield. All pesticides must be a registered, legal chemical in the state of Florida and applied according to label directions.

7.3 Administrative Recommendations

7.3.1 Adopt a Zero-tolerance Policy towards hazardous wildlife

A zero-tolerance policy should be adopted towards all hazardous wildlife on the airfield, including, but not limited to, birds of prey, vultures, coyotes, blackbirds, geese, and cattle egrets. This strict approach establishes a position for operations personnel and helps to prioritize events as they occur.

7.3.2 Report all wildlife strikes and document all wildlife management actions

Before a problem can be solved, it must be understood. The collection and analysis of accurate and detailed data from each of the airports is an essential step to understanding the wildlife hazards that are specific to OCF. The FAA has a standard form (FAA Form 5200-7 Bird/Other Wildlife Strike Report) for the voluntary reporting of bird and other wildlife strikes with aircraft that can be completed and mailed (Appendix P) or submitted electronically on their website (http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx). Pilots, air traffic control, airport operations personnel, aircraft maintenance personnel, and anyone else who has knowledge of a wildlife observation or strike should record it. It is important to include as much information as possible such as species, location of observation, the time of day, the date, and what, if any, action was taken. The identification of the species is particularly important and identification guides should be available to assist personnel with this task. It is recommended to carry pocket field guides with the pictures and names of commonly observed species during all perimeter fence and AOA inspections. Regular carcass searches should be performed throughout the movement areas and any found carcasses (within 200' of the movement area) should be reported as a strike. It is recommended to send carcasses to the Bird Identification Lab at the Smithsonian Institute in Washington, D.C. for proper identification. This service is free to all airports. Please see Appendix N for guidelines for submitting bird remains.

All wildlife management actions, especially lethal control, taking place at OCF should be recorded in a "Wildlife Management Log". See Appendix Q for an example of a log data sheet. If wildlife are dispersed or taken from the AOA it should be recorded in the log and reported to USFWS when renewing OCF's Depredation Permit. Significant wildlife sightings (e.g. coyotes, large flocks, etc.), nest and egg removal, and filling of burrows should be recorded in the management log as well.

7.3.3 Continue to obtain necessary permits to control wildlife

OCF currently possess the necessary permits to control wildlife. However, their USFWS Depredation Permit expires annually in March. It is important to renew this permit every year as it is impossible to conduct effective wildlife management without this permit.

7.3.4 Consult a wildlife biologist when drafting new construction plans

If large projects or changes to the landscape are being considered at OCF, ERS should be contracted for input on the changes' impact on wildlife at the airport. A multi-disciplinary approach encourages pre-planning, which can prevent problems and lead to cost savings in the future.

7.3.5 Develop a Wildlife Hazard Management Plan (WHMP)

As defined in 14 CFR Part 139.337 (d), the WHA must be submitted to the FAA Safety Certification Inspector or "Administrator" for approval and determination of the need for a WHMP. It is the opinion of ERS biologists that a plan is necessary at OCF. The plan provides the framework for an active habitat management and bird dispersal program. The plan will outline the regular wildlife patrols that must be implemented to manage any current wildlife hazards that may occur on the AOA. Because airports are dynamic environments, the plan should be revisited at least annually to determine if changes are necessary and to evaluate the success of the wildlife deterrent program. ERS is available to assist with the development of a plan and to conduct annual audits of the plan.

7.3.6 Continue to train personnel in wildlife identification and management procedures

Staff should be trained to recognize and respond to potential wildlife hazards in an appropriate manner. They should be familiar with the damage caused by wildlife and how to respond to potentially hazardous situations. Responding may require active harassment or shooting, or simply that the employee documents the attractant or hazard and notifies the operations supervisor. ERS can assist with annual wildlife hazard management training.

7.3.7 Continue monitoring wildlife behavior and abundance at OCF

It is important to recognize that the presence and behavior of wildlife on airports is influenced by many variables that may change from one year to the next. Conclusions based on wildlife populations during this study are meant to be a guide. Data from this WHA will provide a baseline for comparison in the future. OCF should continue to perform these dawn and dusk surveys (with less frequency, perhaps quarterly) to help monitor the current wildlife situation. OCF should adopt a continual monitoring program that can be specified in the WHMP.

8.0 CONCLUSION

Managing wildlife hazards on and around airports is essential for maintaining safe and timely airport operations. The goal of this WHA is to help OCF stop wildlife strikes before they occur. Surveying was conducted for the purpose of determining which wildlife hazards/attractants exist at OCF, and what measures should be taken to improve current conditions as well as prevent potential future hazards. Surveys took place during dawn and dusk at six established monitoring stations. Wildlife, signs of wildlife activity, and potential attractants of wildlife were observed and documented.

There are many techniques available for managing wildlife hazards and OCF is currently utilizing a few of these techniques. Vehicle patrols, pyrotechnics, shooting, and secure fencing are proven effective methods; however, they are not the only options available. When aiming to discourage wildlife from occupying airport properties, it is best to use a combination of deterrents. Wildlife become accustomed to repeated control methods and is likely to become unresponsive over time. Since the control methods vary in cost, a cost/ benefit analysis should be conducted before adding a new technique to the wildlife management strategy. Inexpensive techniques include introducing dead bird effigies, installing perching deterrents, and limiting vegetation growth with routine mowing/grass height maintenance. Wildlife control methods are most successful when used as preventative measures. Most importantly, wildlife hazard management should become a routine and ongoing effort undertaken by OCF to identify and address new and continuing issues that have been identified in this report as being specific to airport property and its environs.

Cattle egrets flying over the AOA at OCF, headed northeast at dusk.

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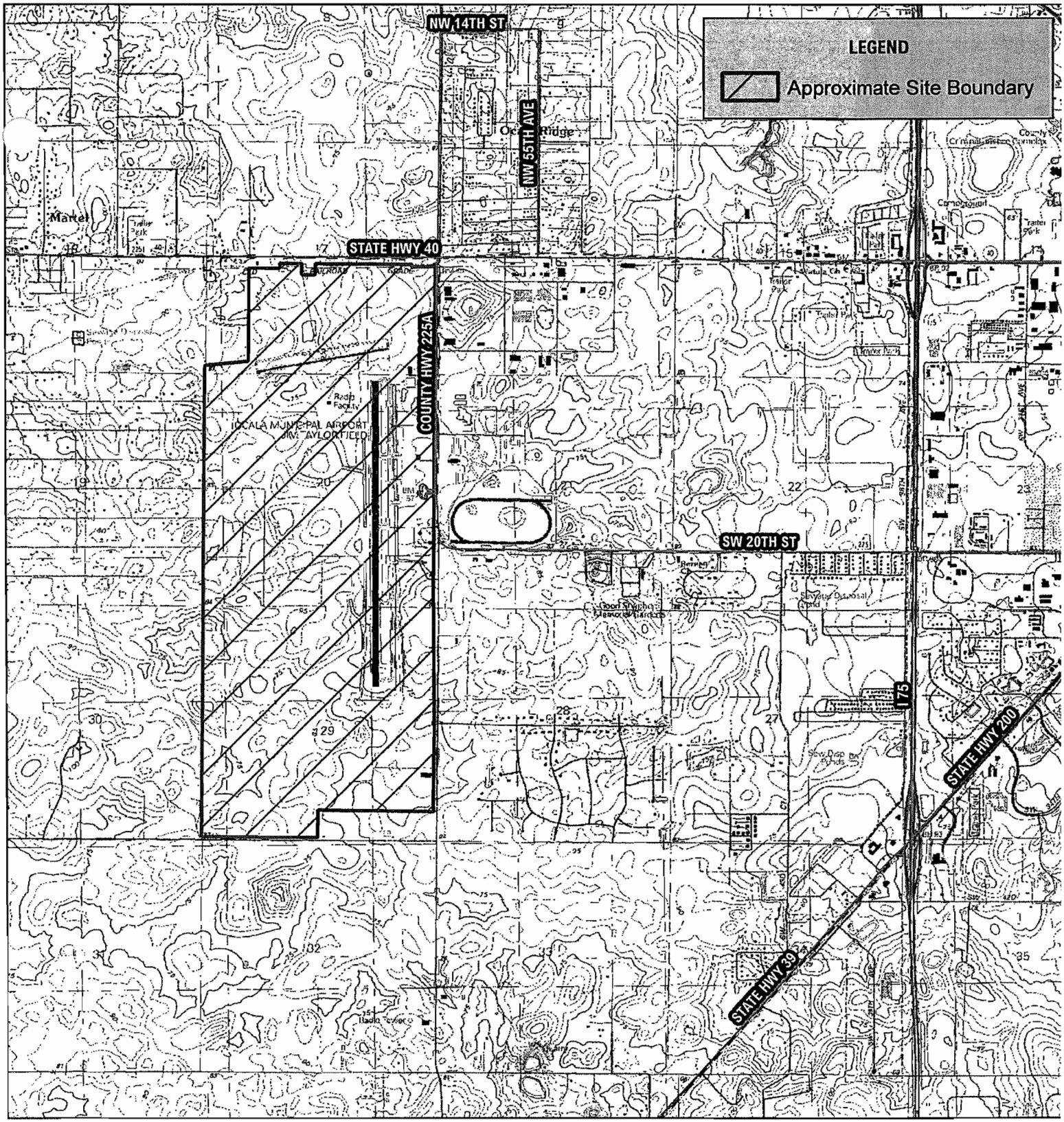

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Township: 15 South
Range: 21 East

Lat: 29° 10' 21.72" N
Long: 82° 13' 32.87" W

0 1,500 3,000 '

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Jacksonville Beach, FL 32250

Ocala International Airport
Location Map

Source: USGS 7.5' Cotton Plant and Ocala West, FL Topographic Quadrangles

By: JKN

Project No.:	09071
Exhibit No.:	1
Date:	2-14-11
Rev. Date:	7-21-11

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Ocala International Airport
Adjacent Land Uses & Offsite Observation Areas

Aerial Source: LABINS (2010 aerials)

By: JKN

Project No.:	09071
Exhibit No.:	2
Date:	2-28-11
Rev. Date:	7-21-11

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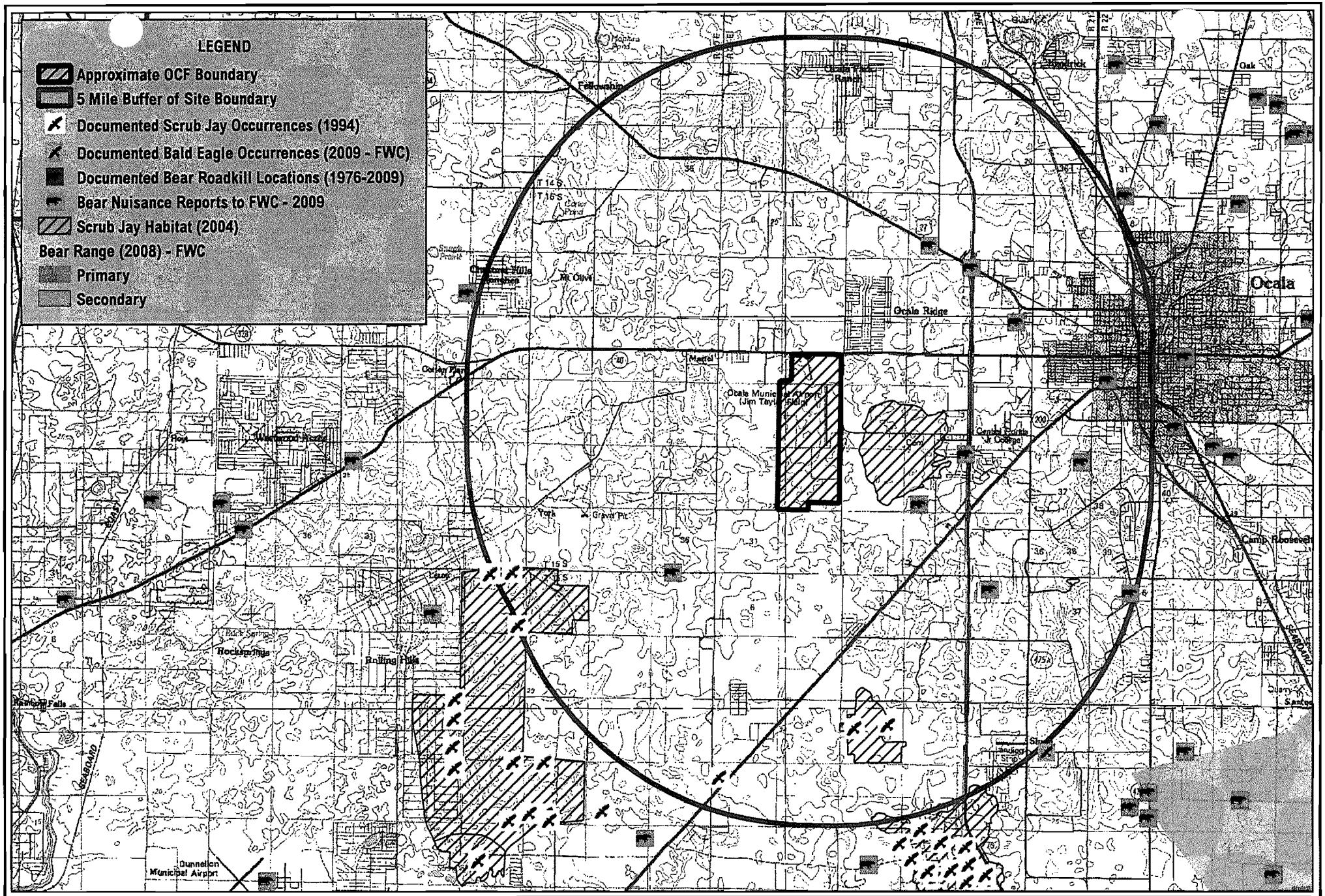

0 2 Miles

NOTE: The entire 5-mile radius area is designated as a scrub jay consultation area by FWC.

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Ocala International Airport Documented Occurrences of Protected Flora/Fauna

Project No.:	09071
Exhibit No.:	3
Date:	2-14-11
Rev. Date:	7-21-11

Source: USFWS, FNAI, FWC, USGS

By: JKN

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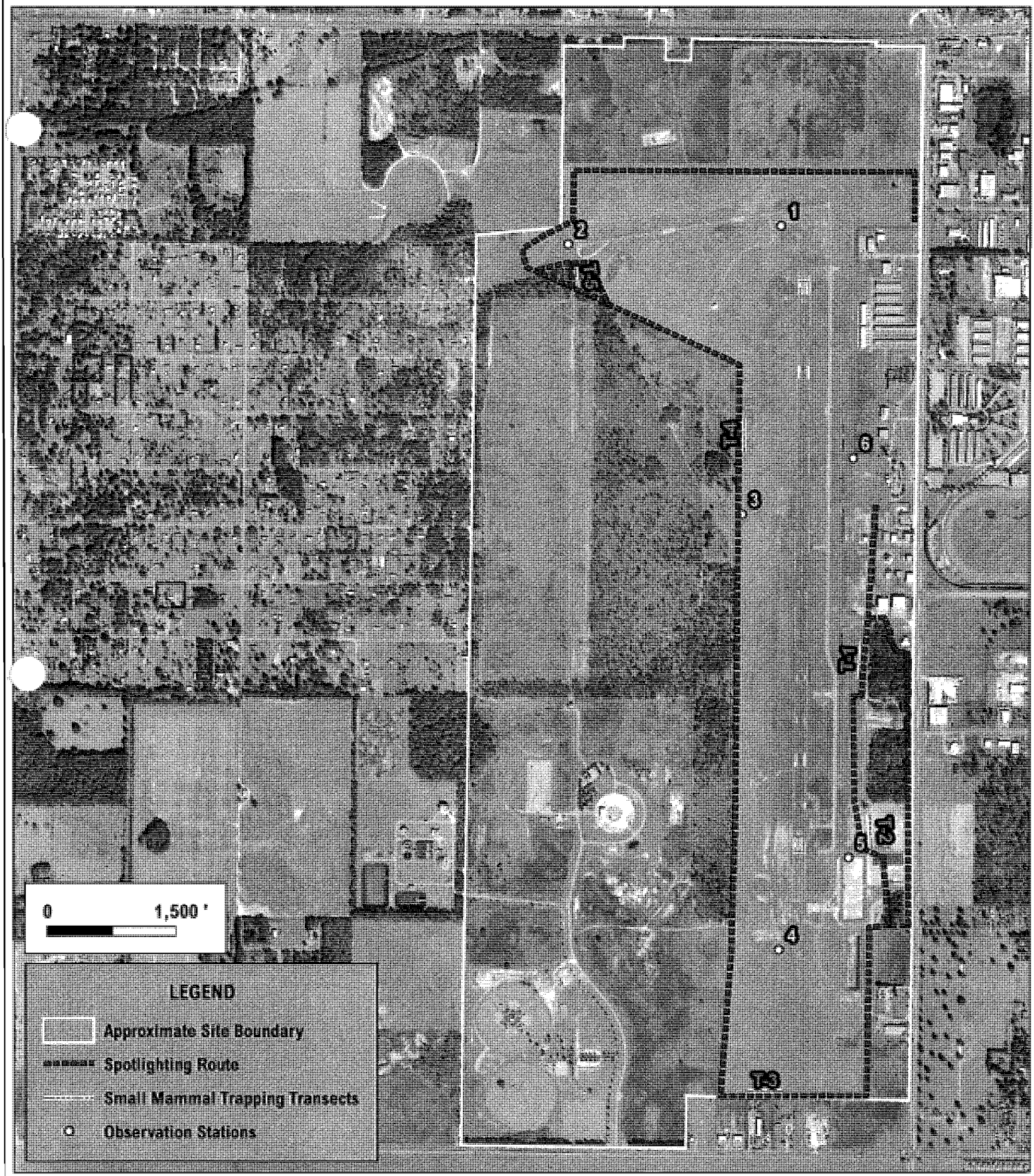

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Ocala International Airport Wildlife Survey Locations

Source: LABINS (2010 aerials)

By: JKN

Project No.:	09071
Exhibit No.:	4
Date:	2-14-11
Rev. Date:	7-21-11

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