

APPENDIX H

Wildlife Hazard Site Visit Report

**WILDLIFE HAZARD SITE VISIT
ORLANDO INTERNATIONAL AIRPORT
EAST AIRFIELD PROPERTY
Orlando, Florida
ERS Job No. 15001.TP**

PREPARED FOR:

**GREATER ORLANDO AVIATION AUTHORITY
1 JEFF FUQUA BOULEVARD
Orlando, Florida 32827**

PREPARED BY:



**ENVIRONMENTAL RESOURCE SOLUTIONS, INC.
8711 PERIMETER PARK BOULEVARD, SUITE 1
JACKSONVILLE, FLORIDA 32216**

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LIST OF PREPARERS

This Wildlife Hazard Site Visit was conducted by a “qualified airport wildlife biologist” per 14 CFR Part 139.337(c) and A/C 150/5200-36A “*Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports.*” A list of preparers is provided below:

Amy Johnson, Environmental Resource Solutions, Inc. – Project Manager and Qualified Airport Wildlife Biologist

While Amy has experience in several aspects of environmental consulting, she specializes in endeavors that involve wildlife hazards at airports such as wildlife hazard assessments (WHA), wildlife hazard management plans (WHMP), wildlife hazard management training, and annual WHMP audits. In 2007, she became certified as an Associate Wildlife Biologist with The Wildlife Society. She completed the FAA-approved Airport Wildlife Hazard Management Workshop course at Embry-Riddle Aeronautical University (ERAU) in May 2009 and is considered a Qualified Airport Wildlife Biologist per A/C 150/5200-36A. Amy has received SIDA training and security authorization for badges at several airports. For the past 7 years, she has been responsible for ensuring that the four Jacksonville Aviation Authority airports are compliant with FAA wildlife regulations. She has also been responsible for the continuing monitoring efforts at Orlando International Airport (MCO) since 2011. Since 2009, she has conducted WHAs, WHSVs, and WHMPs in Florida, Georgia, Texas, Missouri, Kansas, California, Ohio, and Arkansas. Amy was a speaker at the 2011 & 2014 Bird Strike North America Conferences and serves as Membership Chair on Bird Strike Committee USA. With a degree in wildlife ecology and a specialization in avian biology, she is qualified to handle and properly identify wildlife. For this effort, Amy led the team of biologists, conducted field surveys at MCO, and produced this document.

Additional biologists that participated in field surveys:

Sarah Brammell, Environmental Resource Solutions, Inc. – Qualified Airport Wildlife Biologist

D. Dale Dowling, Breedlove, Dennis, & Associates, Inc. – Senior Scientist

Jennifer L. Rosinski, Breedlove, Dennis, & Associates, Inc. – Senior Scientist

James M. Weber, Breedlove, Dennis, & Associates, Inc. – Environmental Specialist

Christopher J. Harrington, Breedlove, Dennis, & Associates, Inc. – Associate Scientist

Virginia K. Soumar, Breedlove, Dennis, & Associates, Inc. – Associate Scientist

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1.0 INTRODUCTION

Aircraft collisions with wildlife, also commonly referred to as wildlife strikes, cost the civil aviation industry a minimum of \$187 million dollars annually based on damage reported to the Federal Aviation Administration (FAA) Wildlife Strike Database. When taking into consideration that at least 60% of strikes are not reported, the cost could be as high as \$937 million dollars per year. Since 1988, there have been 243 aircraft either destroyed or damaged beyond repair. The economic costs of wildlife strikes can be extreme; however, the cost in human lives (255 fatalities globally since 1988) when aircraft crash because of a wildlife strike best expresses the need for a Wildlife Hazard Assessment (WHA) or Wildlife Hazard Site Visit (WHSV) and the development of a Wildlife Hazard Management Plan (WHMP).

A 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 (or WHSV) 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.

Orlando International Airport (MCO) is surrounded primarily by residential areas, industrial parks, major roadways, and commercial businesses. The east airfield property is approximately 1,300 acres of undeveloped land, consisting of large forested wetlands and mowed fields. It is owned and managed by the Greater Orlando Aviation Authority (GOAA), but not developed for aviation at this time. Therefore, it is not considered part of the air operations area (AOA).

MCO has dedicated a wildlife control specialist to manage the wildlife program at the airport since 1996. A full WHA was conducted by the U. S. Department of Agriculture (USDA) Wildlife Services in 1999. However, Runway 17L/35R was constructed in 2003 and a subsequent assessment has not been completed since that time. Standardized, continuous wildlife monitoring has been conducted within the AOA since September 2011; however, this effort does not include the surrounding areas, including the east airfield property. It has been noted throughout the continual monitoring and ongoing wildlife management activities at the airport that the east AOA (Runways 17R/35L and 17L/35R) is consistently more active with wildlife than the west AOA (Runways 18L/36R and 18R/36L). The hypothesis is that this may be caused by the undeveloped east airfield property, which is the only large, natural space adjacent to MCO. Therefore, in January 2015, Environmental Resource Solutions, Inc. (ERS) began a 3-day WHSV for wildlife hazards associated with the east airfield property at MCO. ERS was tasked with evaluating the specific wildlife hazards known to exist on, or near, this particular GOAA site.

WHSV methodology was established primarily for non-certificated airports to rapidly assess wildlife hazard attractants and develop initial recommendations. Although the parameters of a WHSV are not explicitly defined by the FAA at this time, Advisory Circular 150/5200-38 outlining WHSV

methodology is expected to be released in 2015. Through GOAA staff coordination with the FAA Orlando Airports District Office (ADO), it was determined that the WHSV methodology may be applicable to the east airfield at this time. GOAA staff ascertained that a WHSV will serve to better understand the wildlife hazards specifically associated with this property. Therefore, ERS and Breedlove, Dennis, and Associates, Inc. (BDA) biologists conducted 3 days of observations on and around the east airfield, including dawn, midday, dusk, and spotlight surveys.

MCO staff have reported wildlife strikes to the FAA Wildlife Strike Database since 1990. At the time of this WHSV, the database is current through 31 July 2014. For the purposes of this data analysis, only data from 2003 through 31 July 2014 was analyzed. This is because Runway 17L/35R (east runway) was complete and in use in 2003. A total of 1,299 strikes have been reported at MCO within this time period. Of the 1,299 strikes, a total of 1,168 strikes report a runway or runway pair. Utilizing that data and dividing the runways into “east” or “west”, the east AOA experienced 61% of the total strikes that designated a runway (Figure 1.1).

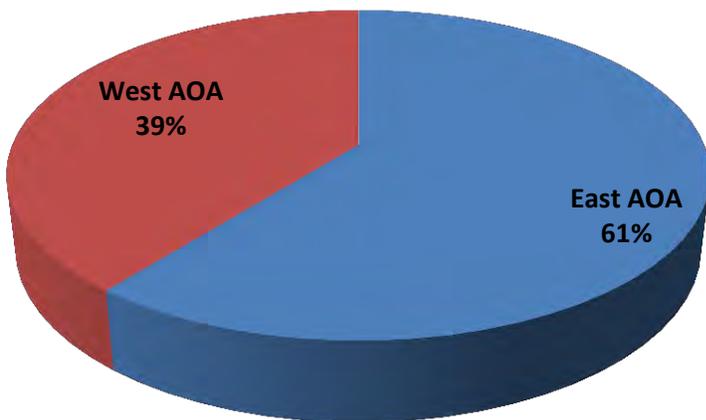


Figure 1.1. Percentage of strikes at MCO reported on the east airfield vs. the west airfield.

There are 92 total strikes with reported damage (either minor or substantial) at MCO since 2003. Out of the 92 strikes with reported damages, 74 of the reports specified on which runway the strike occurred. When comparing strikes with damage between the east and west AOAs, the east AOA has experienced 64% of the damaging strikes with a reported runway location (Figure 1.2).

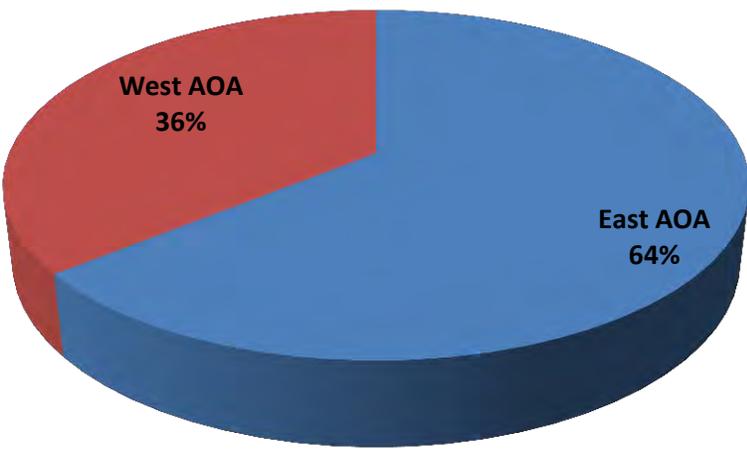


Figure 1.2. Percentage of strikes at MCO with reported damage on the east vs. west AOAs.

The objectives of conducting this WHSV at MCO are as follows (per Draft AC 150/5200-38):

1. Identify the wildlife species observed, and their numbers, locations and local movements
2. Identify and locate features on and near the airport that attract wildlife.
3. Provide a description of the wildlife hazards to aircraft operations.
4. Recommend actions for reducing identified wildlife hazards to aircraft operations.

This WHSV does not authorize impacts to jurisdictional wetlands or critical habitat for protected species. If wetland and/or habitat removal is deemed necessary, permits and National Environmental Policy Act (NEPA) approval will need to be obtained from the appropriate agencies.

3.0 METHODOLOGY

Prior to conducting the WHSV, ERS reviewed pertinent background information to gain familiarity with the natural surroundings that might imply the types of wildlife that may be expected to occur, including reviewing the previously collected wildlife data at MCO. True color aerial photography [sources: Esri, DigitalGlobe , GeoEye , i-cubed, Earth star Geographics, CNES /Airbus DS , USDA, USGS , AEX, Getmapping , Aerogrid, IGN, IGP, swisstopo, and the GIS User Community] aided in the assessment process. The current aerial photographs provided an overall view of the airport property in relation to its natural surroundings or manmade facilities (e.g. surface waters, residential development) that may pose as wildlife attractants. 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 Johnny Metcalf, MCO Wildlife Biologist, to determine previous wildlife observations or strike occurrences and to gain an understanding of current passive and/or active management techniques.

ERS/BDA determined the location of 28 monitoring stations which would be routinely inspected during the monitoring iterations (See Photo 3-1 and Exhibit 1). The stations were established in areas determined to be potential wildlife attractants such as wetlands, forested areas within and adjacent to the perimeter fence, perching/nesting structures, open water, and managed open fields.

The following subsections detail the methodology employed at MCO.

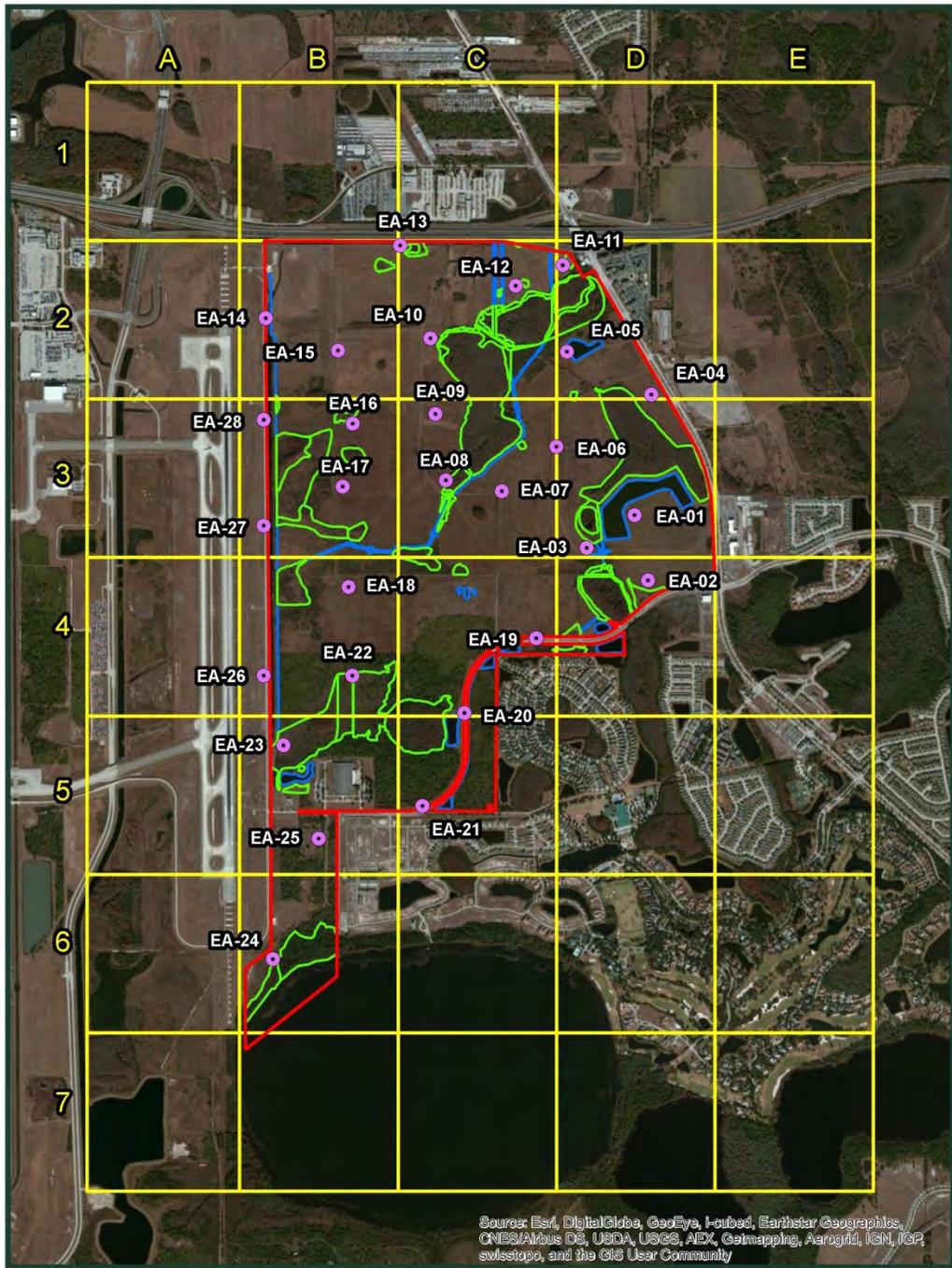


Photo 3-1. Monitoring stations and zone grid at Orlando International Airport's (MCO) East Airfield property

Wildlife Survey Methods

a) Fixed-Point Surveys: Amy Johnson, FAA Qualified Airport Wildlife Biologist, led a team of five (5) biologists that conducted fixed-point surveys over a 3-day period (15 January 2015 through 17 January 2015) at pre-determined "Monitoring Stations". The monitoring stations are located along a survey circuit throughout the MCO east airfield (Photo 3-1 or Exhibit 2). Six separate surveys (two each at dawn, midday, and dusk) were conducted over the 3-day period. Morning surveys began at dawn (approximately 15 minutes before sunrise) and dusk surveys started approximately 2 hours prior to sunset. Midday surveys took place between 11:00 am and 1:00 pm and lasted approximately 2 hours. Starting points along the circuit were always chosen randomly. Wildlife observations and bird counts during each survey iteration took approximately 2 hours to complete. The biologists recorded all species observations within a 10 minute interval at each observation station. All observations were recorded on an "Field Data Sheet" (Appendix A). 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 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.

c) Night Spotlight Surveys: Spotlight surveys were conducted approximately 1-2 hours after sunset on both nights. Biologists drove along trail roads on the east airfield property and recorded all wildlife observations. Two biologists with spotlights and binoculars surveyed from the truck bed while a third person navigated the roads.

Additional Data Collection

In addition to individual species, habitat types, and human activities, other environmental factors influence the occurrence of potentially hazardous wildlife at MCO. FAA AC No. 150/5200-33B *Hazardous Wildlife Attractants On or Near Airports* 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 photographs: ERS reviewed aerial photographs of MCO 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 is the Orange County Landfill which is located approximately 4 miles northeast of the approach to Runway 17L. This is a potential wildlife attractant that may promote the presence of wildlife and the movement of wildlife on or over the airfield.

b) Interviews with airport personnel: Amy Johnson and Sarah Brammell conducted brief meetings with MCO airport personnel to become more familiar with specific wildlife issues and obtain a general idea of any daily and/or seasonal patterns that airport 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, biologists took note of wetlands, ditches, overgrown vegetation, fencing, trees (also towers and signage) suitable for nesting or roosting on or near the airfield, and food sources (small mammals, aquatic vegetation, berries, etc.) that could potentially attract wildlife to the east airfield property. All of the observations were noted.

4.0 BACKGROUND

Existing wildlife hazard management techniques at MCO

As previously mentioned, MCO has a robust wildlife hazard management program. GOAA has had a dedicated wildlife control specialist since 1996 and have reported wildlife strikes to the FAA since 1990. The WHMP at MCO is current and was approved by the FAA on 17 March 2000. MCO currently has three dedicated wildlife professionals including one wildlife biologist and two control specialists. Since the construction of the east AOA, specifically Runway 17L/35R, most wildlife management efforts have been focused on the east side of the AOA (east of the terminal buildings) and primarily inside the perimeter fence. Passive management techniques utilized by MCO staff prior to this WHSV include regular mowing, perimeter fence inspections and maintenance, daily Foreign Object Debris (FOD) inspections, installing perching deterrents, proper disposal of carrion, and maintaining ditch/pond vegetation. MCO staff also utilized several active management techniques prior to starting this WHSV including harassing or dispersing hazardous wildlife away from the airfield with vehicles, using pyrotechnics, and taking lethal control when necessary. Lethal control activities are also conducted outside the perimeter fence on a periodic basis when it is noted that large mammals (i.e. deer and coyote) are observed near the fence line. MCO wildlife control specialists participate in annual culling of the deer populations outside the perimeter fence on adjacent airport property. MCO staff and hired consultants also conduct continual monitoring efforts on the AOA to ensure their WHMP remains relevant and accurate. The airport biologist possesses appropriate U.S. Fish and Wildlife Service (USFWS) depredation permits for protected migratory birds and bald eagles and renews them annually.

However, the east airfield property is seldom part of the current wildlife management program. Although the turf is occasionally maintained, little passive or active management activities take place on this undeveloped property. The east airfield property is not included in the continual monitoring efforts either, except to track the whereabouts of listed species. This is principally due to the lack of access. MCO maintenance and wildlife staff cannot navigate the property efficiently due to the lack of proper infrastructure and abundance of standing water. This lack of management defines the need for this WHSV to focus on the east airfield and what species/attractants exist within this impacted landscape.

5.0 RESULTS

During the WHSV, 68 species of birds and 5 species of mammals were observed and identified on or adjacent to the east airfield. Although data is limited, species observed appear to be representative of the hazardous wildlife struck at MCO. MCO wildlife control specialists consider the top 4 most hazardous species within the MCO AOA to be cattle egrets, turkey vultures, ring-billed gulls, and sandhill cranes. The most frequently struck (identified) species since 2003 per the FAA National Strike Database are listed below. These species account for 36% of all strikes at MCO since 2003 (43% of all strikes are listed as unknown species). An additional 76 species account for the remaining 21% of strikes.

Table 1: Reported wildlife strikes at MCO from January 2003 through July 2014 (according to the FAA National Wildlife Strike Database).

Species	Number of Strikes
Tree swallow	73
Cattle egret	61
Killdeer	59
Barn swallow	55
Mourning dove	41
Turkey vulture	36
Sandhill crane	30
Ring-billed gull	27
Bald eagle	24

5.1 Birds

See Table 2 for a complete list of bird species observed at MCO.

Table 2: Bird species observed at MCO during this WHSV (January 2015) including scientific name, alpha code, bird group, number of individuals, and average flock size.

Common Name	Scientific Name	Alpha Code*	Group	Number of Individuals	Average Flock Size
American crow	<i>Corvus brachyrhynchos</i>	AMCR	Corvids	8	2
American kestrel	<i>Falco sparverius</i>	AM KE	Raptors	20	1
American robin	<i>Turdus migratorius</i>	AMRO	Passerines	934	44
Anhinga	<i>Anhinga anhinga</i>	ANHI	Fish-eaters	35	1
Bald eagle	<i>Haliaeetus leucocephalus</i>	BAEA	Raptors	31	1
Belted kingfisher	<i>Megaceryle alcyon</i>	BEKI	Fish-eaters	1	1
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	BGGN	Passerines	7	1
Brown-headed nuthatch	<i>Sitta pusilla</i>	BHNU	Passerines	1	1

Common Name	Scientific Name	Alpha Code*	Group	Number of Individuals	Average Flock Size
Blue jay	<i>Cyanocitta cristata</i>	BLJA	Corvids	4	1
Black vulture	<i>Coragyps atratus</i>	BLVU	Raptors	41	2
Boat-tailed grackle	<i>Quiscalus major</i>	BTGR	Blackbirds	44	3
Blue-winged teal	<i>Anas discors</i>	BWTE	Waterfowl	3	3
Carolina wren	<i>Thryothorus ludovicianus</i>	CARW	Passerines	5	1
Common ground dove	<i>Columbina passerina</i>	COGD	Doves/Pigeons	1	1
Common grackle	<i>Quiscalus quiscula</i>	COGR	Blackbirds	80	8
Common moorhen	<i>Gallinula chloropus</i>	COMO	Waterfowl	7	1
Common yellowthroat	<i>Geothlypis trichas</i>	COYE	Passerines	2	1
Double-crested cormorant	<i>Phalacrocorax auritis</i>	DCCO	Fish-eaters	65	2
Downy woodpecker	<i>Dryobates pubescens</i>	DOWO	Woodpeckers	3	1
Eastern bluebird	<i>Sialia sialis</i>	EABL	Passerines	2	2
Eastern meadowlark	<i>Sturnella magna</i>	EAME	Passerines	86	1
Eastern phoebe	<i>Sayornis phoebe</i>	EAPH	Passerines	4	1
Eastern towhee	<i>Pipilo erythrophthalmus</i>	EATO	Passerines	3	1
European starling	<i>Sturnus vulgaris</i>	EUST	Blackbirds	264	44
Fish crow	<i>Corvus ossifragus</i>	FICR	Corvids	707	24
Great blue heron	<i>Ardea herodias</i>	GBHE	Wading Birds	11	1
Glossy ibis	<i>Plegadis falcinellus</i>	GLIB	Wading Birds	9	1
Gray catbird	<i>Dumetella carolinensis</i>	GRCA	Passerines	26	1
Great egret	<i>Ardea alba</i>	GREG	Wading Birds	61	1
Herring gull	<i>Larus argentatus</i>	HEGU	Gulls	1	1
Hooded merganser	<i>Lophodytes cucullatus</i>	HOME	Waterfowl	3	1
Killdeer	<i>Charadrius vociferus</i>	KILL	Shorebirds	100	4
Little blue heron	<i>Egretta caerulea</i>	LBHE	Wading Birds	16	1
Limpkin	<i>Aramus guarana</i>	LIMP	Wading Birds	2	1
Loggerhead shrike	<i>Lanius ludovicianus</i>	LOSH	Passerines	6	1
Mallard	<i>Anas platyrhynchos</i>	MALL	Waterfowl	5	2
Mourning dove	<i>Zenaida macroura</i>	MODO	Doves/Pigeons	212	5
Northern bobwhite	<i>Colinus virginianus</i>	NOBO	Game Birds	9	2
Northern cardinal	<i>Cardinalis cardinalis</i>	NOCA	Passerines	6	1
Northern harrier	<i>Circus cyaneus</i>	NOHA	Raptors	8	1
Northern mockingbird	<i>Mimus polyglottos</i>	NOMO	Passerines	10	1
Osprey	<i>Pandion haliaetus</i>	OSPR	Raptors	3	1
Palm warbler	<i>Setophaga palmarum</i>	PAWA	Passerines	13	1
Pied-billed grebe	<i>Podilymbus podiceps</i>	PBGR	Waterfowl	2	1
Pine warbler	<i>Setophaga pinus</i>	PIWA	Passerines	3	1
Pileated woodpecker	<i>Dryocopus pileatus</i>	PIWO	Woodpeckers	2	1
Ring-billed gull	<i>Larus delawarensis</i>	RBGU	Gulls	17	5

Common Name	Scientific Name	Alpha Code*	Group	Number of Individuals	Average Flock Size
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	RBWO	Woodpeckers	8	1
Ring-necked duck	<i>Aythya collaris</i>	RNDU	Waterfowl	98	14
Rock pigeon	<i>Columba livia</i>	ROPI	Doves/Pigeons	2	1
Red-shouldered hawk	<i>Buteo lineatus</i>	RSHA	Raptors	64	1
Red-tailed hawk	<i>Buteo jamaicensis</i>	RTHA	Raptors	19	1
Ruddy duck	<i>Oxyura jamaicensis</i>	RUDU	Waterfowl	12	12
Red-winged blackbird	<i>Agelaius phoeniceus</i>	RWBL	Blackbirds	336	13
Sandhill crane	<i>Grus canadensis</i>	SACR	Wading Birds	48	2
Snowy egret	<i>Egretta thula</i>	SNEG	Wading Birds	4	1
Song sparrow	<i>Melospiza melodia</i>	SOSP	Passerines	8	4
Sharp-shinned hawk	<i>Accipiter striatus</i>	SSHA	Raptors	1	1
Tricolored heron	<i>Egretta tricolor</i>	TCHE	Wading Birds	9	1
Tree swallow	<i>Tachycineta bicolor</i>	TRES	Aerial Foragers	656	50
Tufted Titmouse	<i>Baeolophus bicolor</i>	TUTI	Passerines	5	1
Turkey vulture	<i>Cathartes aura</i>	TUVU	Raptors	432	4
Unidentified blackbird	Icteridae	UNBL	Blackbirds	155	10
Unidentified duck	Anatidae	UNDU	Waterfowl	49	4
Unidentified gull	Laridae	UNGU	Gulls	544	11
Unidentified sparrow	Emberizidae	UNSP	Passerines	21	2
Unidentified warbler	Parulidae and their allies	UNWA	Passerines	23	2
Unidentified small bird		UNSM	Unidentified small bird	2294	52
Unidentified medium bird		UNMED	Unidentified medium bird	15	3
Unidentified large bird		UNLG	Unidentified large bird	6	2
White-eyed vireo	<i>Vireo griseus</i>	WEVI	Passerines	2	1
White ibis	<i>Eudocimus albus</i>	WHIB	Wading Birds	1149	30
Wilson's snipe	<i>Gallinago delicata</i>	WISN	Shorebirds	3	1
Wild turkey	<i>Meleagris gallopavo</i>	WITU	Game Birds	166	20
Wood stork	<i>Mycteria americana</i>	WOST	Wading Birds	24	1
Yellow-rumped warbler	<i>Setophaga coronata</i>	YRWA	Passerines	36	4

*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).

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, hawks and vultures were grouped together as “Raptors”. The “Passerines” group comprises meadowlarks, warblers, sparrows, etc. 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 or pose similar risks to aircraft. 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. Although the biologists attempted to identify all wildlife to the species level, this was not always possible.

The species diversity observed at MCO was typical for the region. Most of the species recorded are common residents of, or migrants to, Central Florida. The most commonly observed group of birds at MCO, identified to species, were wading birds, followed by passerines (small, perching birds), blackbirds, corvids, aerial foragers, raptors, gulls, doves/pigeons, waterfowl, game birds, shorebirds, and fish-eaters (Figure 5-1). Unknown medium bird, unknown large bird, and woodpeckers were not shown on the graph as they comprise less than 1% of total observations. The unknown small bird group comprised 25% of all observations. This is due to several very large flocks observed. These species were most likely American robins, red-winged blackbirds, and/or tree swallows. These three small species were observed forming large flocks on the property throughout the WHSV.

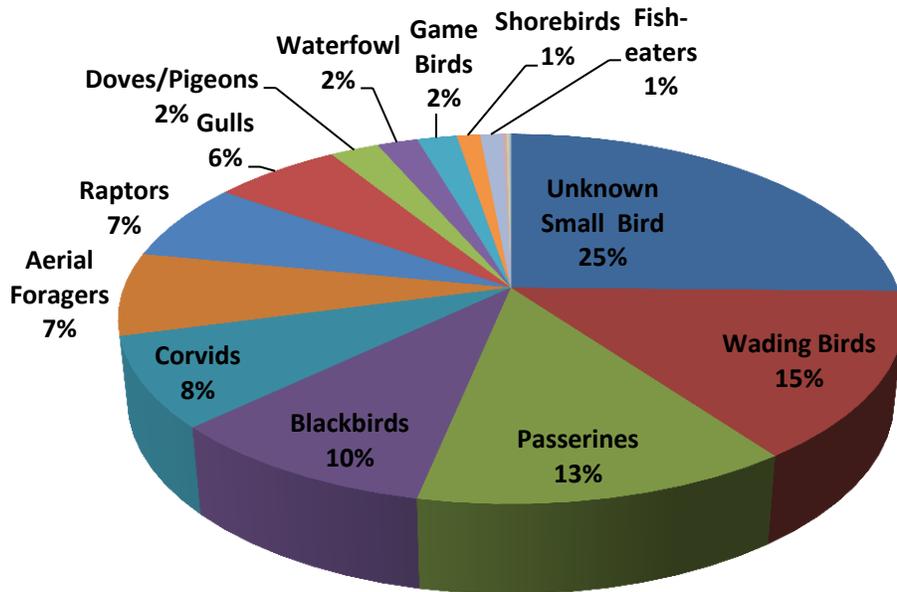


Figure 5-1. The percentage of individuals counted per each bird group at MCO in January 2015. Unidentified medium birds, unidentified large birds, and woodpeckers are not labeled as they each total less than 1% of all birds counted.

DeVault, et. al. (2011) ranked 77 bird and mammal species (1 being the most hazardous, 77 being the least hazardous) as to relative individual hazard to aircraft in airport environments (i.e. less than 500 feet AGL) and termed this as the composite rank. Composite rank was determined based on 3 variables: the percentage of total strikes for that species that caused damage, the percentage of total strikes that caused substantial damage and the percentage of strikes that caused an effect on flight for strikes that occurred in the United States from 1990 to 2009. From these ranks, a Relative Hazard Score (RHS) was calculated by summing the scores of the 3 hazard criteria (% of strikes with damage, % of strikes with substantial damage, and % of strikes with a negative effect on flight) for each species (or species-group) and scaling to a maximum of 100. Mule deer were determined the most hazardous wildlife species in the U.S. and therefore given the highest score, 100. All other wildlife are ranked in relation to the mule deer.

Table 3 provides a list of the top 12 species observed by ERS/BDA within the east airfield and the total number of individuals counted for each category in order of corresponding RHS. The top 12 species listed in this table accounted for 87% of all individuals counted at MCO.

Table 3. Species observed in the greatest number (Top 12) at the MCO east airfield organized by Relative Hazard Score (DeVault, et. al., 2011). A total of 77 species are scored from 0 to 100 with 100 being the most hazardous score.

Species	Alpha Code	Number of Individuals	Relative Hazard Score
Turkey vulture	TUVU	432	44
Wild turkey	WITU	166	40
Unidentified gull	UNGU	544	26*
Mourning dove	MODO	212	10
Red-winged blackbird	RWBL	336	9
European starling	EUST	264	9
Unidentified blackbird	UNBL	155	9
American robin	AMRO	934	5
Tree swallow	TRES	656	1
Unidentified small bird	UNSM	2294	Unknown**
White ibis	WHIB	1149	Not listed***
Fish crow	FICR	707	Not listed***

*The unidentified gull RHS was calculated by averaging the score for herring gulls (29) and ring-billed gulls (23) because they are the two species most commonly seen at MCO in the winter

**These unidentified small birds are most likely tree swallows, red-winged blackbirds, or American robins

***White ibis and fish crow do not have a RHS because they do not meet the criteria to be considered as one of the 77 species. To be considered, species had to have been involved with a minimum of 20 aircraft strikes (nationally) below 500 feet AGL.

The majority of birds were observed in Zones D2 and B3 (Figure 5-2). Zone D2 includes a large forested wetland system, open maintained pastures, and some urban land uses (Narcoossee Road and an apartment complex). Zone B3 is predominantly forested wetlands, dominated by cypress trees. There is some open pasture in Zone B3, however, it holds water above the surface and is rarely maintained. The grasses are significantly overgrown (greater than 6 feet in height).

Maintenance equipment cannot access the area due to the standing water. Zone B3 also directly abuts the MCO AOA. See Exhibit 1 (Photo 3-1) for these exact locations. The dominant land uses for each zone are listed in Table 4.

Table 4. Zones per dominant land use on the east airfield property and adjacent MCO AOA. Many zones contain multiple land uses, however, only the majority land use is categorized here.

Dominant Land Use	Zones
Forested Wetlands	B3, B4, C2, C3, D2, D3, D4
Mowed Pasture (seasonally flooded)	B2, C4
Uplands (pine and palmetto)	B5, B6,
Urban land use	A1, B1, C1, C5, D1, D5, E3, E4, E6
Aviation land use	A2, A3, A4, A5, A6
Lake Nona	C7

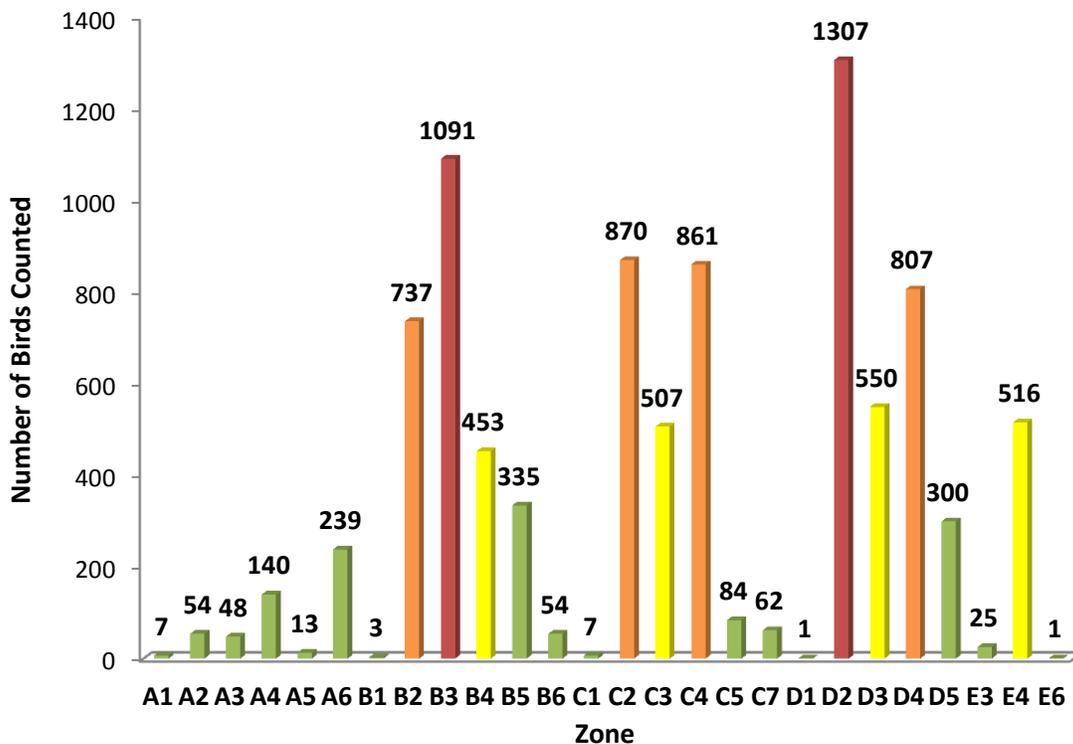


Figure 5-2. The number of birds counted per Monitoring Zone within the east airfield in January 2015. Zones in red are considered the most attractive to wildlife, while those in green are the least attractive. If a zone is not listed, there were no observations recorded in that zone due to a lack of wildlife or an obstructed view shed.

When birds were seen in flight, their direction of movement was recorded using the cardinal directions (N, S, E, or W). Direction was only noted when they were observed flying passed the monitoring stations or across the east airfield property/AOA. If birds were observed in local flight (e.g. from tree to tree or one side of a pond to the other side), their direction was not recorded. A total of 3,646 birds were recorded moving in a cardinal direction during the WHSV, with the majority of flight paths headed north (Figure 5-3).

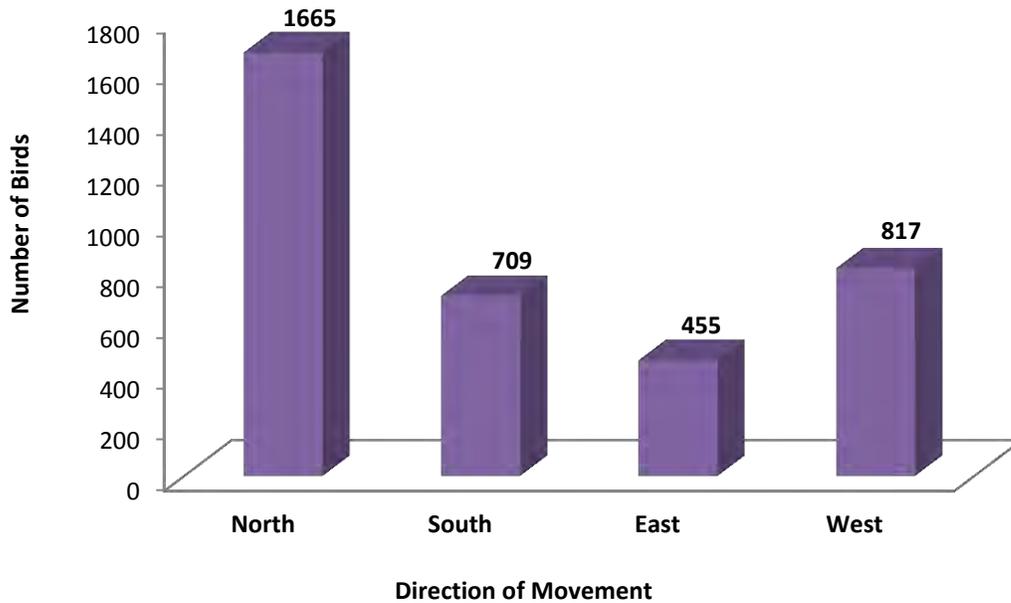


Figure 5-3. Number of birds recorded moving in the cardinal directions during the WHSV on the east airfield at MCO.

5.2 Mammals

Five (5) species of mammals were observed on the east airfield during the WHSV: armadillo, cottontails, opossum, raccoon, and deer (Table 5).

Table 5. Mammal species observed on the east airfield during this WHSV (January 2015) including scientific name, number of individuals, and Relative Hazard Score (DeVault, et. al., 2011). A total of 77 species are scored from 0 to 100 with 100 being the most hazardous score.

Common Name	Scientific Name	Number of Individuals Counted (N)	Relative Hazard Score (RHS)
Nine-banded armadillo	<i>Dasypus novemcinctus</i>	2	Not listed
Eastern cottontail	<i>Sylvilagus floridanus</i>	3	13
Opossum	<i>Didelphis virginiana</i>	4	0
Raccoon	<i>Procyon lotor</i>	2	20
White-tailed deer	<i>Odocoileus hemionus</i>	29	88

The majority of mammals were observed in Zone C2 (Figure 5-4). Zone C2 includes a large forested wetland and open, mowed pasture. Deer were commonly seen foraging and/or bedded down in the open pasture. See Exhibit 1 (Photo 3-1) for these features.

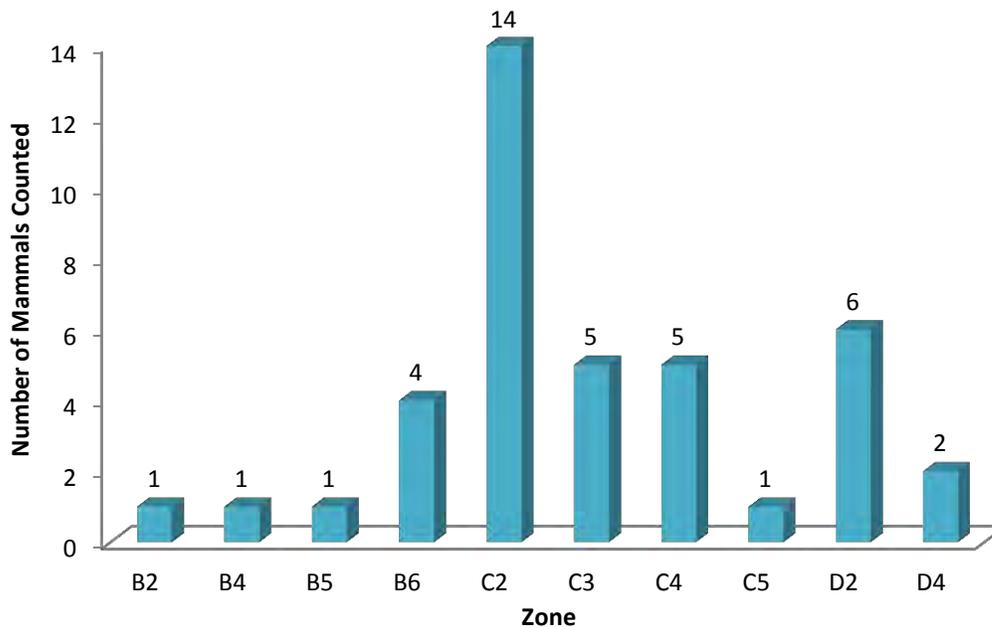


Figure 5-4. The number of mammals counted per Monitoring Zone within the east airfield in January 2015. If a zone is not listed, there were no observations recorded in that zone due to a lack of wildlife or an obstructed view shed.

5.3 Wildlife Attractants associated with the East Airfield Property

The attractants described in this section were identified during the WHSV on the east airfield property at MCO from January 15, 2015 through January 17, 2015. Both airports and wildlife are dynamic and attractants may change over time. This information is merely a snapshot of a much larger picture. Therefore, this should not be viewed as a permanent identification of the wildlife situation on the east airfield, but rather serve as a baseline for future studies. Any modifications to the property should take into consideration the effects that these changes may have on wildlife. The attractants are listed in no particular order.

5.3.1 On-site Attractants

Wetlands. Wetlands include natural forested and herbaceous wetlands, created wetland areas and natural bodies of water (e.g. lakes, rivers, etc.). There are contiguous forested wetlands inside and along the property that provide food sources, cover, perches, and roosting/nesting sites for wading birds, small mammals, raptors, blackbirds, deer, and turkey (Photo 5-1). These wetlands also provide an abrupt contrast to the surrounding open pastures, creating an ideal edge effect. Edge habitat is attractive to a wide variety of species, including many hazardous species like coyote, deer, and raptors. The mature forest provides safety, cover, and a perch while the open pasture is excellent hunting or foraging habitat. A majority of the species observed during the WHSV were utilizing the wetlands for forage or cover.

Photo 5-1. Sandhill cranes foraging in mowed pasture adjacent to a forested wetland (cypress dome). This illustrates the proximity of the runway approach (note descending aircraft over wetland).



Surface Waters & Ditches Surface waters include man-made stormwater treatment ponds and ditches or areas of standing water. These areas are attractive to many species of wildlife, including wading birds, waterfowl, alligators, and beavers, that depend on wetlands and surface waters for nesting, roosting, and foraging opportunities (Photo 5-2). Small mammals and mesomammals (e.g. raccoons and opossums) also use these areas for fresh water sources, thereby attracting larger predators, such as hawks and coyotes. Ditches and ponds can provide preferable conditions for nesting waterfowl, especially if the vegetation along the water source is allowed to grow and become dense. Vegetation in and along ditches/ponds 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 coyotes and raccoons. Ditches also provide corridors for beavers and alligators to navigate from pond to pond. In addition, this vegetation slows drainage of the site by blocking culverts and ditches. Slow drainage leads to flooded pastures, another wildlife attractant.

Photo 5-2. Wood stork that recently caught a fish in the ditch that borders the east airfield property on the western side.



Bare Areas. Bare areas include trail roads, 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. Killdeer, mourning doves, grackles, robins, and meadowlarks were commonly observed using bare areas and tire ruts to forage (Photos 5-3 and 5-4).



Photo 5-3, above. Ruts with standing water caused by maintenance equipment.

Photo 5-4, right. American robin foraging in the standing water collected in tire ruts.



Open Grass Fields/Pasture. The majority of east airfield is comprised of open grass fields or previously established cattle pasture. These fields provide good foraging habitat for many grassland species such as cattle egrets, sandhill cranes, starlings, ibis, deer, and meadowlarks. The FAA recommended height for grasses within 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 can 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. Reducing species diversity within the fields is preferable.

The current pastures are either overgrown (providing cover for wildlife) or short (providing foraging habitat). In addition, a majority of the pastures are flooded, holding water at or above the surface. Flooded pastures are attractive to wading birds as the wet soils easily allow them to forage for insects and grubs. White ibis and sandhill cranes were consistently observed foraging in this habitat throughout the WHSV (Photo 5-5). Flooded pastures also make it very difficult to provide maintenance activities or conduct wildlife management techniques. Driving any vehicle through the pastures causes substantial ruts, another wildlife attractant.



Photo 5-5. White ibis and sandhill cranes foraging in the flooded pastures within the east airfield. This picture was taken in Zone C2.

Small Mammals. Small mammals, including rats, mice, and rabbits, are not generally individual wildlife hazards, but rather are wildlife attractants. 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 likely to be in the area as well. Small mammals make up the majority of most predator birds’ diets. Although many small mammals were not observed during the WHSV, they are evidenced by the high number of raptors and by the few sightings during spotlight surveys. The vegetation on-site is too dense to see small mammals during routine surveys. A specific small mammal trapping event would be needed to specifically identify populations, species, and locations.

5.3.2 Off-site Attractants

Wildlife hazards at airports frequently are attributable to off-site attractants, such as wetlands, restaurants, golf courses, parks/recreational facilities, 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 (AC 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. 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 five (5) miles between any airports' AOA and the hazardous wildlife attractant if the attractant could cause wildlife movement into or across the approach space. AC 150/5200-33B outlines the following land uses as potential 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, crows, and gulls. For this reason, FAA issued an additional Advisory Circular on January 26, 2006 (AC 150/5200-34A Construction or Establishment of Landfills Near Public Airports) to provide guidance to airport operators, aviation planners, and local agencies on minimizing this specific wildlife attractant. In general, the AC states that persons considering construction or establishment of a landfill must first determine its proximity to public airports. The AC specifies a minimum separation distance of six (6) miles between a new landfill and a public airport. There are several potential off-site attractants located around MCO. Based on observations made during this WHSV, the primary off-site location found to attract wildlife that pose a threat to aviation safety at MCO, besides the east airfield property itself, was the Orange County Landfill which is approximately 4 miles northeast of the AOA. The majority of wildlife observed crossing the AOA were headed towards the east airfield property (wading birds) or flying north towards the landfill (gulls and crows). The majority of movements observed from the east airfield property were towards the north (Figure 5-3). It is assumed the landfill was the ultimate destination for these birds. Construction along the east side of Semoran Boulevard, north of Hazeltine National Drive also appears to be a temporary gull attractant; however, this attractant is expected to be eliminated once the construction is complete.

6.0 RECOMMENDATIONS

Summary

Passive Management Actions

- Remove and/or fill all open marsh wetlands or areas of standing water
- Provide routine maintenance to clear ditches and stormwater ponds
- Remove and fill all forested wetlands to reduce significant habitat
- Maintain a consistent grass height of 6 to 12 inches throughout the east airfield property
- Remove carrion promptly
- Stabilize roads throughout property to facilitate management activities

Active Management Actions

- Harass and/or shoot high priority species including, but not limited to, wild turkey, deer, vultures, ibis, ducks, gulls, cattle egrets, and sandhill cranes
- Remove nesting material, nests, nesting trees, and roosting sites whenever found

Administrative Recommendations

- Report all wildlife strikes and document all wildlife management actions
- Consult a qualified airport wildlife biologist when drafting new construction plans
- Continue to train personnel in wildlife identification and management procedures
- Continue to monitor wildlife behavior and abundance at MCO and the east airfield property
- An independent audit of the MCO wildlife hazard management program should be conducted every 5 years

6.1 Passive Management Actions

6.1.1 Remove and/or fill all open marsh wetlands or areas of standing water

Reducing the amount of open standing water and aquatic vegetation on the east airfield is of highest priority to reduce wildlife attractants. Large flocks of hazardous wildlife species (e.g. ibis, cranes, and egrets) were observed foraging in these areas throughout the day. They leave their roosts on the AOA at dawn, crossing the east AOA runways, to forage on the east airfield property. The birds return to their roosts at dusk, crossing the AOA again. This back and forth behavior increases the risk of a strike with one of these hazardous species, particularly on the east AOA. Eliminating all open standing water and/or marsh wetlands greatly reduces the available foraging habitat. Filling these wet areas may require permits from the local water management district and the U.S. Army Corp of Engineers as well as NEPA approval.

6.1.2 Provide routine maintenance to clear ditches and stormwater ponds

It is best to keep all vegetation from ponds, ditches, and culverts. No vegetation should be allowed to persist in the ditches as it provides feeding and nesting opportunities for waterfowl and wading birds. This vegetation also impedes drainage, creating areas of standing water, another wildlife attractant on the east airfield.

6.1.3 Remove and fill all forested wetlands to reduce significant habitat

The forested wetlands on the east airfield property provide significant habitat for a variety of wildlife. This habitat presents dual functions. The mature trees provide nesting and roosting habitat for raptors (especially red-tailed and red-shouldered hawks, vultures, and bald eagles) and wading birds (especially white ibis). Migratory flocks of robins, doves, and blackbirds were also observed roosting in these areas. All of these species are considered hazardous to aviation. In addition, the presence of these mature wetlands abutting open, mowed fields provides premium edge habitat. Edge habitat is preferred by a variety of species including white-tailed deer, coyotes, and wild turkey. These species utilize the forests for protection and cover while being able to forage in the nearby fields. Raptors are also known to use edge habitat to catch small mammals, a common prey source. Removing the forested wetlands will directly impact available habitat by removing the trees, and indirectly impact the attractiveness of the site by eliminating the edge habitat.

6.1.4 Maintain a consistent grass height of 6 to 12 inches throughout the east airfield property

It is recommended that the grass height always be kept between 6 and 12 inches. This is a key to a successful wildlife strike reduction program and most wildlife programs 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 and standing water from tractor tires. The recommended height is to be applied to the entire property,

except forested areas. Maintaining an intermediate grass height will be effective against ibis, cranes, cattle egrets, raptors, killdeer, starlings, and meadowlarks. It will also help to reduce the amount of carrion caused by mowing.

6.1.5 Remove carrion promptly

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

6.1.6 Stabilize roads throughout property to facilitate management activities

The current trail roads on the east airfield property are fairly degraded and difficult to navigate. They can be very wet and unpassable due to the amount of mud, muck, and tire ruts. To conduct effective wildlife hazard management activities as outlined in these recommendations, the trail roads should be elevated and stabilized with durable materials so as to allow easy access. In many wildlife emergencies, timing is critical and wildlife control officers need to be able to respond quickly.

6.2 Active Management Actions

6.2.1 Harass and/or shoot high priority species including, but not limited to, wild turkey, deer, vultures, ibis, ducks, gulls, cattle egrets, and sandhill cranes

Most wildlife is highly adaptable and will habituate to non-lethal harassment measures (e.g. 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 or a vehicle once again. Harassment and lethal control need to be used together and persistently. If possible, shooting and harassment should be conducted with more than one person so that there is ample staff available to move quickly around the property if necessary, especially when dispersing a large flock. Of course, harassment and shooting should be limited if air traffic is heavy and a member of the Wildlife Control team should be positioned on the AOA in the event it is necessary to disperse flocks back towards the east airfield property.

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. It is recommended that a bird field identification guide be kept in the operations vehicles. No lethal control should take place unless the required permits are current.

6.2.2 Remove nesting material, nests, nesting trees, and roosting sites whenever found

Mourning doves, cranes, hawks, wading birds, wild turkeys, and killdeer are likely nesting and roosting throughout the east airfield property. The property must be monitored for nesting/roosting and all nests should be removed and eggs destroyed. Specific nesting trees should be removed to prevent re-nesting whenever possible. No nest removal should take place unless the required permits are current.

6.3 Administrative Recommendations

6.3.1 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 the airport is an essential step to understanding the wildlife hazards that are specific to MCO. Pilots, airport operations personnel, aircraft maintenance personnel, and anyone else who has knowledge of a wildlife observation or strike should continue to report 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 east airfield inspections.

All wildlife management actions, especially lethal control, taking place on airport property should continue to be recorded in a "Wildlife Management Log". If wildlife are dispersed or taken from the east airfield it should be recorded in the log and reported to USFWS when renewing MCO's Depredation Permit. Significant wildlife sightings (e.g. coyotes, deer, large birds, large flocks, etc.), nest and egg removal, trappings, and filling of burrows should be recorded in the management log as well. Data sheets should be kept in operations vehicles.

This WHSV provides a brief snapshot into the species and numbers of wildlife utilizing the east airfield property. However, continual monitoring and data recording will provide a more in depth overview of the hazardous wildlife and attractants found within the undeveloped land.

6.3.2 Consult a qualified airport wildlife biologist when drafting new construction plans

If large projects or changes to the landscape are being considered at MCO, a qualified airport wildlife biologist should be contracted for input on the changes' impact on wildlife at the airport. Airport expansion projects can help to eliminate natural habitats viewed as wildlife attractants. However, it is important to not replace these natural habitats with man-made ones, e.g. open stormwater ponds, flat roofs, nesting structures, etc. A multi-disciplinary approach encourages pre-planning, which can prevent problems and lead to cost savings in the future.

6.3.3 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 a supervisor. MCO staff are annually trained in wildlife hazards.

6.3.4 Continue to monitor wildlife behavior and abundance at MCO and the east airfield property

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 WHSV will provide a baseline for comparison in the future. MCO should continue to perform these dawn and dusk surveys (perhaps seasonally) to help monitor the current wildlife situation on the east airfield. MCO should adopt a continual monitoring program that can be specified in a WHMP.

6.3.5 An independent audit of the MCO wildlife hazard management program should be conducted every 5 years

A wildlife hazard management program has been implemented at MCO for many years. Although the program is thorough, it is recommended that an independent entity audit the procedures and policies every 5 years. New information and research is constantly produced in relation to managing wildlife hazards and habitats. An independent audit will help ensure the MCO program continues to be updated and innovative. It may also help identify areas of improvement and produce additional recommendations for reducing the risk of a wildlife strike. The audit should be conducted by a Qualified Airport Wildlife Biologist per specifications outlined in AC 150/5200-36A.

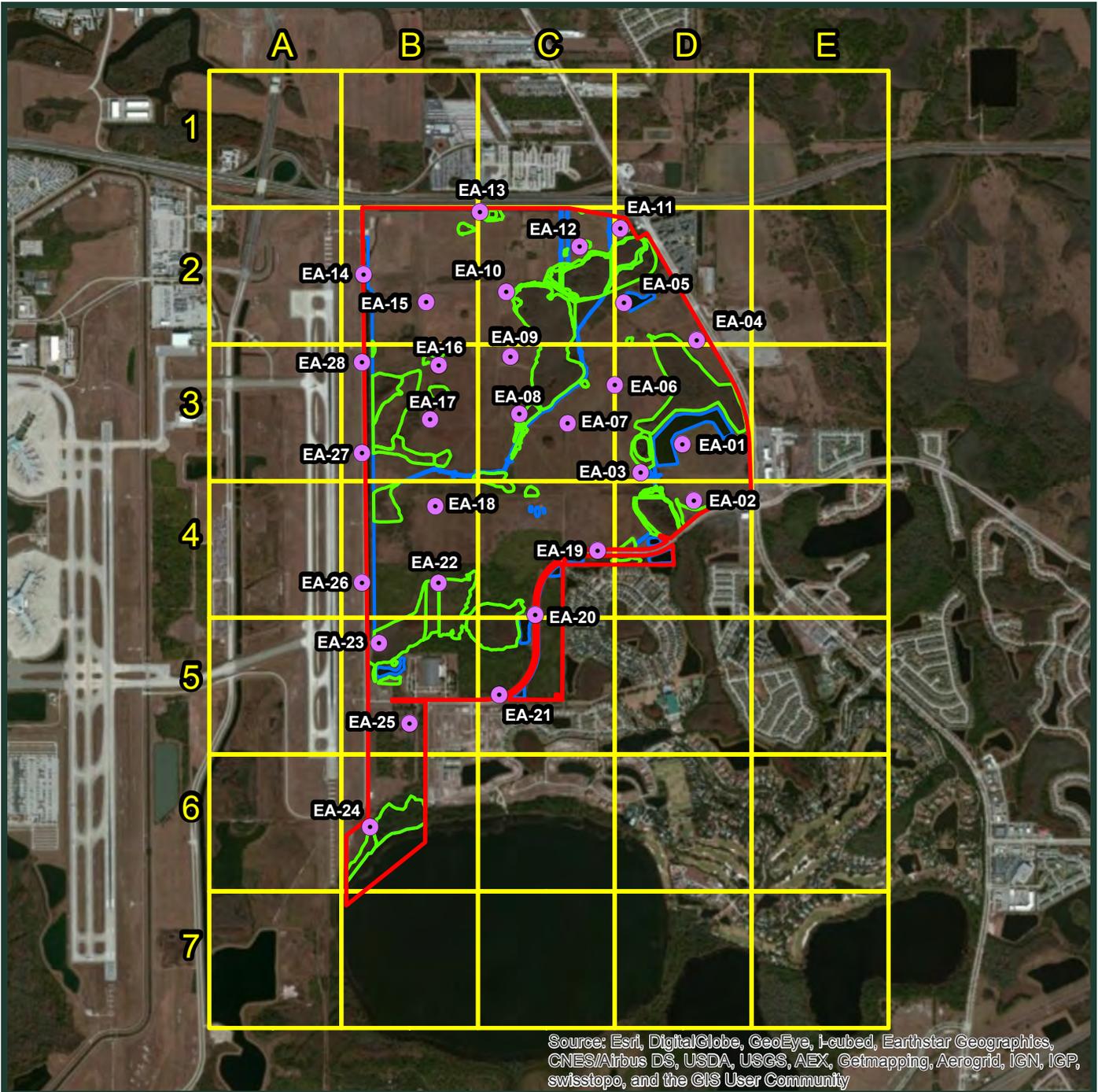
7.0 CONCLUSION

Managing wildlife hazards on and around airports is essential for maintaining safe and timely airport operations. The goal of this WHSV was to help MCO staff prevent wildlife strikes before they occur and provide baseline information on the wildlife present on the east airfield. Surveying was conducted for the purpose of determining which wildlife hazards/attractants exist on the east airfield, and what measures should be taken to improve current conditions as well as prevent potential future hazards. Surveys took place during dawn, midday, and dusk at several 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 MCO is currently utilizing a few of these techniques. Perching deterrents, vehicle dispersals, pyrotechnics, relocations, and lethal control can be 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 management techniques. Wildlife become accustomed to repeated control methods and are 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. Recommended techniques include an increase in turf management on the east airfield, removing nesting/roosting trees from the wetlands, limiting vegetation growth with routine ditch/pond maintenance, and improving access to the site. Wildlife control methods are most successful when used as preventative measures. Most importantly, wildlife hazard management should become a routine and ongoing effort on the east airfield to address new and continuing issues that have been identified in this report as being specific to airport property and its environs.

8.0 LITERATURE CITED

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Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- East Airfield Boundary
- Surface Waters
- Monitoring Grid
- Wetlands
- Monitoring Stations

Source: Breedlove, Dennis & Associates, Inc.

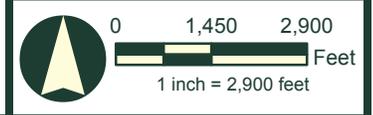
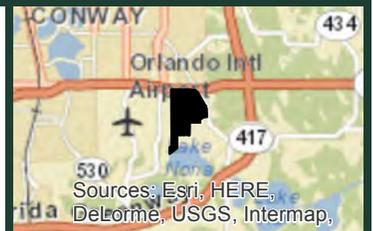


EXHIBIT 1 MCO EAST AIRFIELD WILDLIFE HAZARD SITE VISIT, ORANGE COUNTY, FLORIDA.

BDA BREEDLOVE, DENNIS & ASSOCIATES, INC.
Environmental Consultants
330 W. Canton Ave., Winter Park, FL 32789 • 407-677-1882

Appendix A
Field Data Sheet

