Wildlife Hazard Assessment
Pompano Airpark
City of Pompano Beach, FL

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Executive Summary

Pompano Airpark (PMP) has conducted a Wildlife Hazard Assessment (WHA) to meet the Federal Aviation Administration (FAA) requirements outlined in 14 CFR Part 139.337. PMP initiated the WHA because they were encouraged to do so by the FAA, not because of a specific event or incident that triggered the study. PMP followed protocol outlined in 14 CFR Part 139.337 because there is currently no wildlife guidance specifically catered to general aviation airports provided by the FAA.

The WHA consisted of background data collection, wildlife observations and data analysis, identification of on and off-airport wildlife hazard attractants, review and analysis of strike data, and the development of recommendations to reduce wildlife hazards at PMP. The WHA data collection began in May 2016 and continued for 12 consecutive months, ending in May 2017. Upon initiation of the project, a kick-off meeting was held and an initial site inspection of the Air Operations Area (AOA) was conducted. Potential attractants were identified at that time and the airport was provided with preliminary recommendations to reduce wildlife attractants prior to completion of the assessment.

Bi-monthly fixed-point observations, once monthly nighttime spotlight surveys, and two small mammal trapping events were conducted during the 12 month data collection period. The data was recorded on an observation data sheets. Following each monthly monitoring event the data was entered in an Excel spreadsheet for analysis. Through wildlife observation data, information gathered from PMP staff, and analysis of the FAA Wildlife Strike Database records, on-site and off-site wildlife hazard attractants were identified. On-site attractants included airfield turf, wooded areas, an existing pond, and landscape areas on and off the airport.

The primary off-site attractant was an adjacent golf course pond at the approach to Runway 6-24. This pond provides foraging, loafing and roosting habitat for wading birds and waterfowl. Specific bird and mammal species or species groups that pose a wildlife hazard at PMP are described in the WHA. Species that are described include wading birds, waterfowl, shorebirds blackbirds, doves/pigeons, raptors, and coyote.

Blackbirds, wading birds, doves and pigeons, raptors (vultures), corvids and shorebirds were identified as the most hazardous species at PMP. Airfield turf and bare areas and adjacent golf course and landscaped areas at the adjacent park were most attractive to the blackbirds and wading birds, while the availability of food, perches, and thermals were attractive to the raptors. The adjacent pond provided ample forage and loafing opportunities for wading birds and waterfowl. The WHA lists recommendations to decrease potential strike risk for the attractants and species identified.

The next step in the wildlife hazard management program at PMP is to develop a Wildlife Hazard Management Plan. A plan will help identify key personnel to assist in management, implement the recommendations in the WHA, and reduce identified wildlife hazards to aircraft operations at PMP in the long-term.

List of Preparers

This Wildlife Hazard Assessment 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 Reed, Environmental Resource Solutions, Inc. – 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. With a B.S. from the University of Florida in Wildlife Ecology and Conservation, she is routinely responsible for conducting wildlife surveys and specializes in avian biology. She completed Embry-Riddle Aeronautical University's (ERAU) Airport Wildlife Hazard Management Workshop in May 2009 and is listed as a Qualified Airport Wildlife Biologist on ERAU's website (http://wildlifecenter.pr.erau.edu/biologists.php). She conducts the wildlife hazard management audits annually at Jacksonville International Airport (JAX), Jacksonville Executive at Craig Airport (CRG), Cecil Airport (VQQ), and Herlong Recreational Airport (HEG) and have worked closely with these airports for over 8 years to evaluate potential attractants and recommend mitigation measures to reduce the risk associated with attractants. In addition, she has consulted with civilian airports throughout the United States to evaluate potential wildlife attractants, and make recommendations for mitigating and/or eliminating these attractants. ERS also currently serves as the lead consultant for the Air National Guard (ANG) Bird/Wildlife Air Strike Hazard (BASH) team, which requires a site visit to every ANG installation in the United States and abroad. In Florida, she has conducted WHAs at Gainesville Regional Airport (GNV), Ocala International Airport (OCF), Northeast Florida Regional Airport (SGJ), Deland Municipal Airport (DED), Pompano Airpark (PMP), CRG, VQQ, and, since 2011, has been responsible for ongoing wildlife monitoring (monthly) at Orlando International Airport (MCO). Currently, she is initiating a WHA for Kona International Airport (KOA) on the Big Island, Hawaii. She is recognized by The Wildlife Society (as a TWS Associate Wildlife Biologist), ERAU, and the Florida Fish and Wildlife Conservation Commission (FWC) as qualified to handle and properly identify wildlife. Ms. Reed currently serves as the Membership Chair for Bird Strike Committee USA, the leading industry organization for managing wildlife on airports. She conducted multiple surveys at PMP throughout the WHA and served as the lead biologist/mentor for this project. She also assisted with the development of the WHA document.

David Yow, Environmental Resource Solutions, Inc. – Certified Wildlife Biologist and Qualified Airport Wildlife Biologist

David has over 15 years of experience in the environmental consulting field. He is a certified Wildlife Biologist with The Wildlife Society. He completed the FAA-approved Airport Wildlife Hazard Management Workshop course at Embry-Riddle Aeronautical University (ERAU) in June 2010 and completed his first Wildlife Hazard Assessment at Brunswick Golden Isles Airport (BQK) in 2012. David has received SIDA training and security authorization for badges at several

airports. He has assisted Amy Reed on several WHAs including: Ocala International Airport (OCF), Cecil Airport (VQQ), Jacksonville Executive at Craig Airport (CRG), and Malcolm McKinnon Airport (SSI). He is recognized by The Wildlife Society, Embry-Riddle Aeronautical University, and the Florida Fish and Wildlife Conservation Commission as qualified to handle and properly identify wildlife. David conducted multiple surveys at PMP throughout the WHA and served as another Qualified Airport Wildlife Biologist for this project.

Lynn Kiefer, Kimley-Horn and Associates, Inc. – Senior Environmental Scientist

Lynn is a senior environmental scientist with over 25 years of experience conducting wildlife studies as well as other environmental studies including wetland delineation, mitigation and permitting, environmental data collection and analysis for various NEPA studies and Master Planning at airports and listed species surveys, coordination, documentation and permitting. Lynn has worked on projects at PMP for over 7 years. Lynn served as the lead biologist for this WHA and conducted multiple surveys at PMP throughout the WHA. He completed the FAA-approved Airport Wildlife Hazard Management Workshop course at Embry-Riddle Aeronautical University (ERAU) in June 2010.

Section 1.0 Airport Setting

1.1 General Airport Description

Pompano Airpark (PMP) is a public use, general aviation airport owned and operated by the City of Pompano Beach, Florida. PMP is located within the City limits of Pompano Beach (See **Figure 1**). The airport comprises approximately 650 acres and is generally surrounded by urban development including primarily municipal, commercial and park uses (see **Figure 2**). The airport property itself is predominately flat grassland with scattered wooded areas consisting of overgrown scrub and exotic/nuisance vegetation along with aviation infrastructure.

PMP operates with three paved (asphalt) runways: Runway 15-33 (main), Runway 10-28 (primary) and Runway 6-24 (crosswind) (See **Figure 3)**. Runway 15-33 is 4,918 ft. x 150 ft. with medium intensity lighting and medium intensity approach lighting system (MALS). Runway 10-28 is 3,502 ft. X 100 ft. and Runway 6-24 is 4,001 ft. x 150 ft., both with medium intensity lighting. There is a contracted air traffic control (ATC) tower at PMP and airport users communicate via a Common Traffic Advisory Frequency (CTAF) when the tower is closed.

PMP has approximately 151,434 operations annually.[1] **Table 1** provides the percentage of operations by type at PMP. There are approximately 134 based aircraft at PMP, with the majority (96) comprised of single engine airplanes. In addition, there are 22 multi-engine aircraft, 2 jet airplanes, and 11 helicopters based at PMP[2]. There are also additional transient jet airplanes periodically in for service (number varies). Currently, there are several Fixed Based Operators (FBOs) and specialized aviation service operators (SASOs) operating at PMP including:

Table 1 Annual Operations by Use Type

Type of Operation	Percent
Itinerant General Aviation Operations	36
Itinerant Military Operations	0.1
Itinerant Air Taxi & Commuter Operations	0.2
Local Civil Operations	63.7
Local Military Operations	0.02

Source: FAA Terminal Area Forecast 2017

- American Flyers,
- SheltAir Aviation Services,
- South Florida Aircraft Maintenance,
- Jet Sales, Inc.,
- Pompano Aviation
- Daher-Socata
- Florida Aviation Academy
- Florida Coast to Coast Helicopter
- Aviation Center of Pompano
- Learn to Fly Center, Inc.
- Pro Aircraft Interiors, Inc.
- Dare to Dream Flight Academy
- Paul Kraemer's Learn to fly center
- Florida Helicopters

[1] Estimated annual operations based on the FAA Terminal Area Forecast (TAF) Detail Report, Forecast issued January 2017. Operations based on the 2017 TAF. https://taf.faa.gov/ accessed July 5, 2017

[2] Data obtained from AirNav.com. http://www.airnav.com/airport/PMP accessed July 5, 2017

Goodyear leases approximately 32.5 acres from PMP as a blimp base. The blimp hangar is the largest building on the airport. There are also non-aeronautical leases to Sand & Spurs (an equestrian riding and boarding facility) and the municipal golf course.

From a regional climatic setting[3], the airport is approximately 1.2 miles west of the Atlantic Ocean. Pompano Beach is generally characterized as a tropical climate with hot, humid summers and mild winters. Rather than four distinct seasons influenced by temperature, Pompano experiences two seasons influenced by precipitation. The wet season generally extends from May – November with the dry season extending from December - April. Average high temperatures range from 76°F in January to 92°F in July. Average annual precipitation for Pompano Beach is 57.33 inches, with the highest rainfall occurring in June through September.

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[3] Climate data obtained from www.usclimatedata.com accessed July 5, 2017

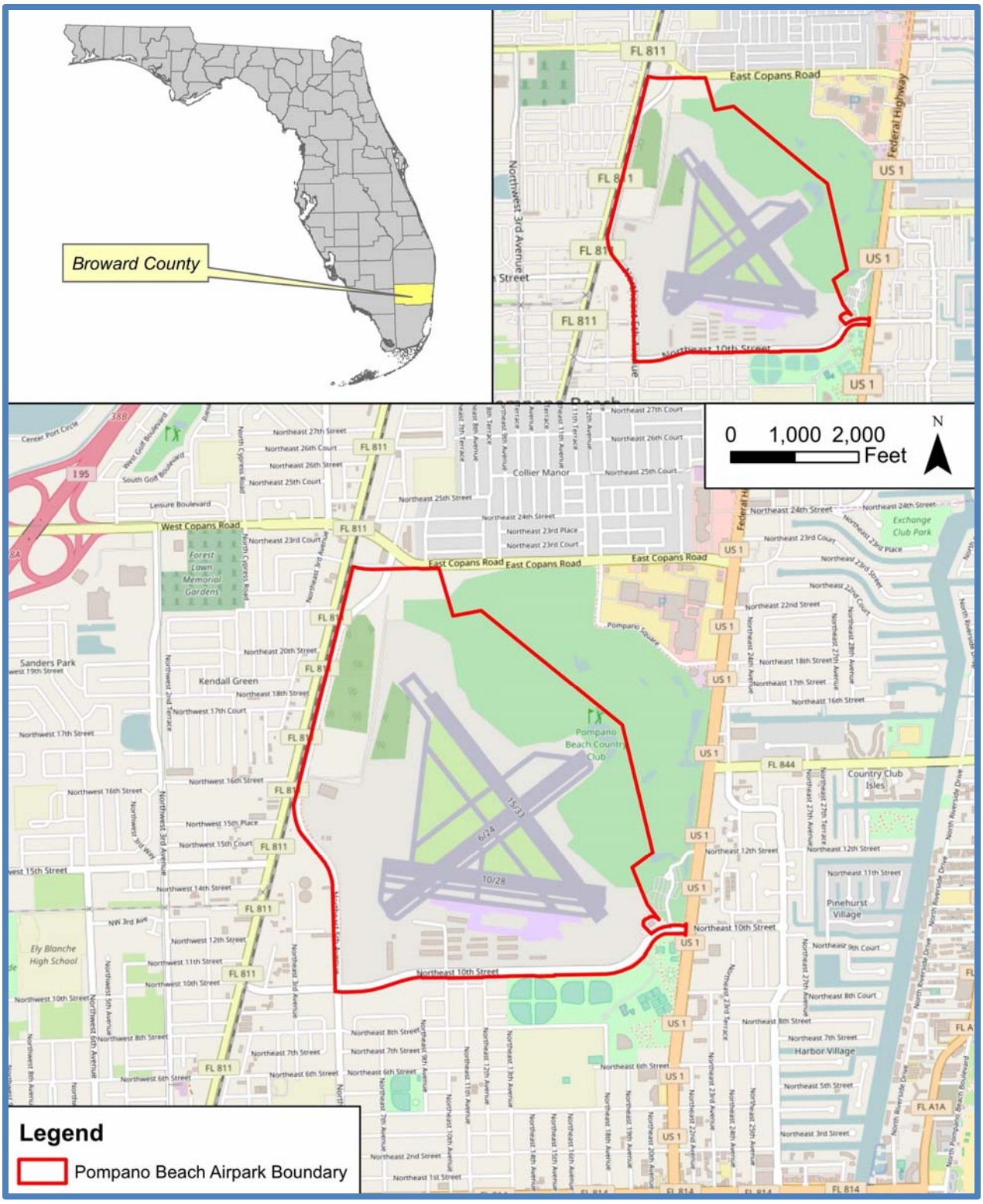


Figure 1 Location Map

Figure 2 Florida Land Use, Cover and Forms Classification (FLUCFCS) Map

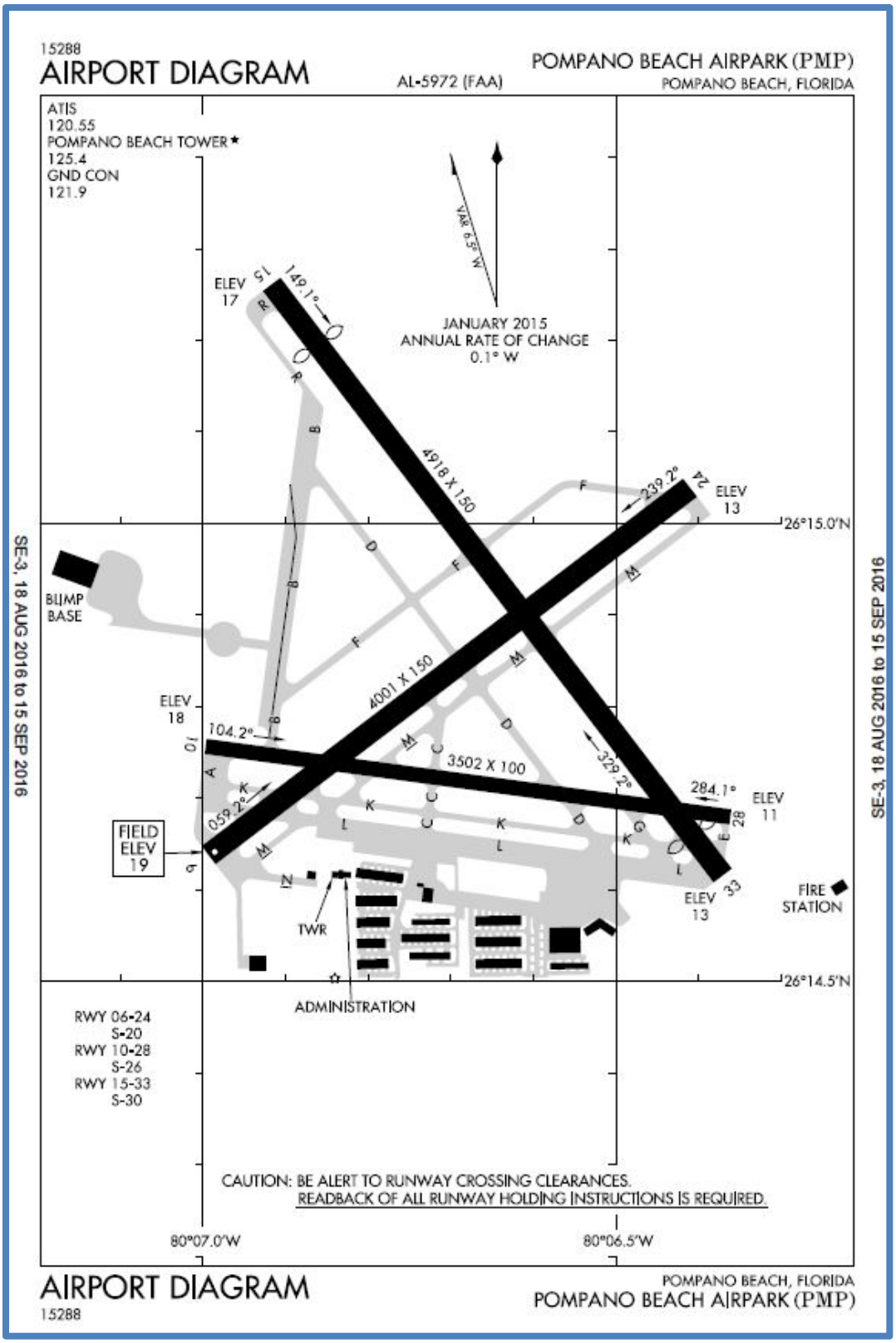


Figure 3 Airport Diagram (source www.faa.gov)

The four-predominant land use/cover types on airport property are described below (see **Figure 2**).

1. Airfield Infrastructure/Aviation Development – This area includes all paved runways, taxiways, aprons, buildings, hangars, navigation aids, roadways, and parking areas associated with airport development.

2. Maintained Grass Areas – This includes the mowed/maintained areas within and outside of the AOA. Much of the maintained grass areas consist of native vegetation typically found within scrub or sandhill communities. This includes ruderal grasses and gopher apple. Because of the nature of scrub/sandhill communities, the native vegetation and ruderal grasses are low growing species with intermittent bare sandy areas.

3. Surface Waters – This includes a wet detention area and several stormwater conveyance ditches throughout the AOA. This also includes a small lake immediately adjacent and east of the approach to Runway 24. This lake is on the City owned and maintained golf course that abuts the eastern side of the airport.

4. Wooded areas – The AOA is bordered by forested woodlands intermittently distributed throughout the airport property. These wooded areas are comprised of oak and sand pine scrub, intermixed with nuisance, exotic and landscape vegetation. As shown in Figure 2, Broward County placed a land use overlay on several of these areas and designated the areas as Local Areas of Particular Concern (LAPC). Further, the City of Pompano placed a conservation easement over one area of woodlands.

Landscaping vegetation and additional maintained grass/landscaped areas are associated with the access road, airport tower and operating offices, and airport owned/leased buildings, excluded from the AOA.

1.2 Current Wildlife Hazard Management Setting

Limited wildlife hazard management has been conducted at PMP. During the study, airport maintenance staff periodically noted wildlife observed within the AOA. Maintenance staff are available during the day to respond to wildlife incidents or requests to harass wildlife away from the AOA or remove carcasses if needed. Vehicles are the primary deterrence tool utilized by PMP maintenance staff. In addition, PMP staff monitor the perimeter fence for breaches around portions of the airfield. Most the perimeter fence appeared to be intact during site inspections. One large breach was found along the fence, behind the wooded areas on the northern portion of the AOA (Photo 1-1).

Photo 1-1 Breach in perimeter fence.

1.2.1 Legal Status of Wildlife and Permits at PMP

Many of the bird species on and near PMP are protected under the United States Fish and Wildlife Service (USFWS) Migratory Bird Treaty Act of 1918 (MBTA). A migratory bird is defined as any species of bird that lives, reproduces, or migrates within or across international borders at some point during their life cycle. The MBTA makes it illegal for people to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried, by any means whatever, receive for shipment, transportation, or carriage, or export, at any time, or in any manner, any migratory bird,… or any part, nest, or egg of any such bird." In total, 836 bird species are protected by the MBTA, including most cattle egrets, crows, and vultures. The USFWS issues a Depredation Permit to airports that allows the take of migratory birds when they pose a threat to human safety. Currently, PMP does not possess a USFWS Depredation Permit to legally take hazardous species protected by the MBTA. Possession of a USFWS Depredation Permit does not authorize the take or harassment of any species protected under the Endangered Species Act of 1973 (ESA). There were no species protected by the ESA observed at PMP during this WHA.

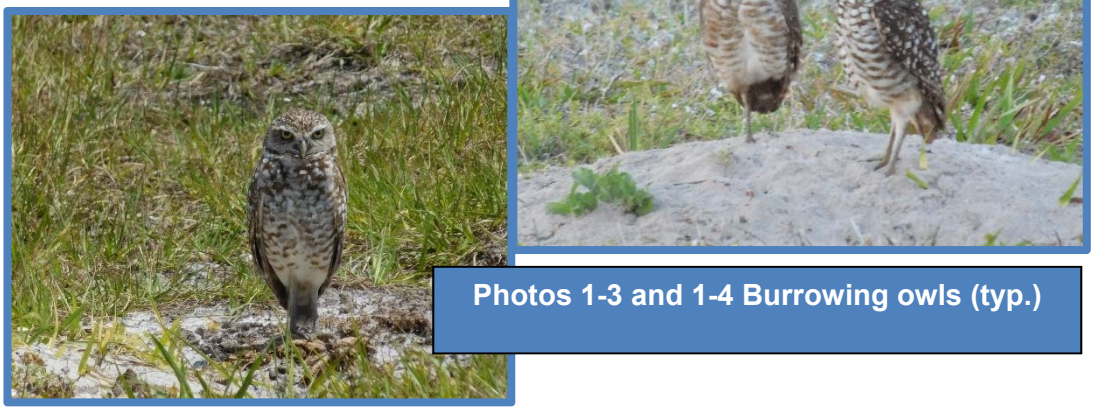
Species not protected by the MBTA include non-native species or exotic species. At PMP, these species include European starlings (*Sturnus vulgaris*), Eurasian collared doves (*Streptopelia decaocto*) and rock pigeons (*Columba livia*). These species can be harassed, lethally taken, and their nests can be destroyed without any permits. In addition, the federal government has issued control orders under the Code of Federal Regulations (CFR) that allow for the depredation of blackbirds under specific conditions. 50 CFR 21.49. Depredation order for blackbirds, cowbirds, grackles, crows and magpies allow for the take of these species at airports without permits. Please reference the specific order for further details.

The Bald and Golden Eagle Protection Act of 1940 (BAGEPA) adds an additional layer of protection to native eagles. 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. Furthermore, "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 nearest known nest based on the Florida Fish and Wildlife Conservation Commission (FWC) eagle nest locator is nest BO 003 4.5 miles northwest of the airport in Quiet Waters Recreational Area (Deerfield Beach). This nest was active as late as the 2016/2017 nesting season (personal observation). Bald eagles were not observed at PMP during this WHA and little to know habitat for nesting occurs on or near the airport. However, as this species continues to thrive, nesting territories are getting scarcer. Thus, there is the potential for bald eagles to occur in or near the airport in the future.

The FWC is the state agency involved with regulating Florida's wildlife. FWC Rule 68A-9.012 *Take of Wildlife on Airport Property* effective July 27, 2010, 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. Non-lethal measures to exclude, modify habitat, or harass must be documented to justify taking of a protected species. Gopher tortoises on airports can be relocated from a safety area to adjacent airport property, but require a permit to be relocated off airport property. The taking of gopher tortoises and/or the filling of their burrows prior to excavation is prohibited under any circumstance. PMP has numerous gopher tortoise burrows on-site (Photo 1-2) and PMP had several permits issued for relocation of gopher tortoises off-site, when the burrows conflicted with proposed runway or taxiway improvements.

Photo 1-2 Gopher tortoise and burrow (typ.)

Burrowing owl burrows (Photos 1-3 and 1-4) can be taken when non-active. PMP has numerous burrowing owls throughout the airport. Prior to the FWC Rule 68A-9.012, PMP obtained several permits to "take" burrowing owls for various runway and taxiway projects.



Photos 1-3 and 1-4 Burrowing owls (typ.)

Section 2.0 Analysis of Events that Prompted the Assessment

This section includes information to address 14 CFR Part 139.337 (c) (1) "An analysis of the events or circumstances that prompted the assessment." An overview of the strike statistics from the FAA National Wildlife Strike Database and a review of the strike records for PMP are included in this section.

2.1 Purpose of the WHA

Typically, an airport will initiate a WHA to comply with 14 CFR Part 139.337(b), which states each certificate holder must conduct a WHA when a triggering event occurs on or near their airport. A triggering event can be defined as:

(1) An air carrier aircraft experiences multiple wildlife strikes;

(2) An air carrier aircraft experiences substantial damage from striking wildlife;

(3) An air carrier aircraft experiences an engine ingestion of wildlife; or

(4) Wildlife of a size, or in numbers, capable of causing any of the above is observed to have access to any airport flight pattern or aircraft movement area

Although no specific triggering event was noted at PMP and PMP is not a Part 139 certificated airport, PMP does accept Federal grant funding which obligates the airport to maintain and operate the airport safely, efficiently and in accordance with specified maintenance and operational conditions, many of which are found in the Part 139 requirements. Furthermore, the FAA strongly encourages all certificated and general aviation airports to conduct a WHA following the 2009 "Miracle on the Hudson" event; therefore, PMP staff initiated this WHA.

Although PMP is not a certificated airport, this WHA is being conducted per the requirements set forth in 14 CFR Part 139.337 *Wildlife Hazard Management*. At this time, there are no specific wildlife-related regulations from the FAA for non-certificated airports, so it is recommended to follow Part 139 guidance. 14 CFR Part 139.337 (c) states the following elements must be addressed within the WHA:

> (c) The wildlife hazard assessment required in paragraph (b) of this section must be conducted by a wildlife damage management biologist who has professional training and/or experience in wildlife hazard management at airports or an individual working under direct supervision of such an individual. The wildlife hazard assessment must contain at least the following:
>
> (1) An analysis of the events or circumstances that prompted the assessment.
>
> (2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.
>
> (3) Identification and location of features on and near the airport that attract wildlife.
>
> (4) A description of wildlife hazards to air carrier operations.

(5) Recommended actions for reducing identified wildlife hazards to air carrier operations.

The PMP WHA was conducted by an FAA Qualified Airport Wildlife Biologist as outlined in FAA Advisory Circular (AC) 150/5200-36A (see page ii "List of Preparers" for qualifications).

2.2 FAA National Wildlife Strike Database Overview

The FAA National Wildlife Strike Database has been collecting wildlife strike information since January 1, 1990. Wildlife strikes are reported on a voluntary basis by airport personnel, pilots, ATC staff, airlines, and other stakeholders. The database is open to the public and can be accessed at the following website: http://wildlife.faa.gov . At the time of this WHA, the database was updated with strike reports through 30 April 2016 and included a total of 180,177 strike reports.

Annually, the FAA and USDA jointly produce a serial report that summarizes data trends in the database for civilian operations and provides general information on ongoing federal programs. The most recent serial report was published in November 2016 and included data for a 26-year timeframe, from 1990 through 2015 (Dolbeer et al., 2016). The report concluded that strike reporting continued to increase by 13% between 2014 and 2015 and reports of damaging strikes also increased 13% during this time period. Overall, GA strike reporting increased 40% between 2011 and 2015, while damaging strikes reported increased 37 % during this period. The analysis of strike reports for general aviation airports concluded that 73% of wildlife strikes occurred at or below 500 feet above ground level (AGL). Above 500 feet AGL, the number of strikes declined by 44% for each gain in height for GA aircraft. Regarding damage, the report states that bird strikes occurring above 500 feet involving general aviation aircraft, had a greater potential of causing damage when compared to commercial service aircraft. There is a decline in damaging strikes for commercial aircraft since 2000, but not for general aviation aircraft.

2.3 FAA Wildlife Strike Report Summary for PMP

A total of seventeen (17) strikes were reported at PMP in the FAA National Wildlife Strike Database between January 1, 1990 and May 1, 2017. **Table 2** includes a list of the strike reports from the database and provides basic strike report information. A summary of strikes with damage is provided just below **Table 2**. During the study, the airport documented an apparent strike of an American kestrel though no aircraft damage was reported by any pilot utilizing the airport. The American kestrel was found on Runway 10 during a routine Foreign Object Debris (FOD) check (Photo 1-4).

Photo 1-4 American kestrel found on Runway during WHA.

Table 2 PMP Wildlife Strike Data from the FAA National Wildlife Strike Database (January 1, 1990- May 1, 2017)						
Incident Date	**Runway**	**Aircraft Type**	**Species Reported Struck**	**Damage Reported**	**Height of Strike (ft. AGL)**	**Person Filing Report**
12/17/1990	14	BE-36	Vulture	Minor	460	Pilot
02/18/1993	NR	C-172	Vulture	None	50	Tower
12/03/1993	NR	Learjet-25	Gulls	None	0	Pilot
10/23/1994	NR	PA-28	Vulture	None	800	NR
12/10/1994	NR	C-172	Gulls	Minor	300	Pilot
02/01/1995	NR	C-152	Vulture	Minor	20	NR
05/03/1996	20	PA-28	White-Tailed Deer	Significant	0	Pilot
08/14/1998	10	C-172	Unknown - Bird	None	900	Pilot
11/12/1998	NR	C-172	Egrets	None	20	Pilot
10/20/2003	10	C-152	Egrets	None	0	Tower
11/28/2003	NR	C-172	Unknown-Bird (medium)	Minor	150	NR
09/27/2004	24	PA-28	Gulls	Minor	0	Tower
09/02/2009	15	C-172	Unknown – Bird (Medium)	None	800	Pilot
01/01/2010	24	C-310	Gulls	None	0	NR
08/27/2013	33	PA-31 Navajo	Hawks	None	0	Pilot
08/31/2013	33	Learjet-55	Hawks	None	0	Pilot
10/31/2013	6	PA-28	Unknown - Bird	None	0	NR
12/17/2015	15	BE-90 King	Unknown - Bird	Minor	0	Pilot
Damage Codes: N = None; M = Minor; M? = Uncertain; S = Substantial						
NR = Not reported						
source: http://wildlife.faa.gov/database.aspx (download on 7/5/17)						

Strikes with Damage

12/17/1990 Strike Report: Vulture

The pilot reported seeing two birds on approach to runway 14[4] [sic]. The plane pulled up right as did the birds. Pilot heard the birds hit and blood covered half the windshield. Pilot ended the approach and returned to Boca to inspect the A/C. Bird was found sticking out of left front engine compartment.

12/10/1994 Strike Report: Gulls

The pilot reported striking 1 gull during on climb, but the runway was not reported. This strike resulted in a bent exhaust muffler/bent cowling according to the pilot's remarks. No effect to the flight was reported.

02/01/1995 Strike Report: Vulture

One vulture was struck on approach but the runway was not reported and there was no effect to the flight reported. Damage reported included "minor abrasion".

05/03/1996 Strike Report: White-Tailed Deer

A white-tailed deer was struck on landing roll on Runway 20 [sic][5]. This strike resulted in damage to three ribs on right wing and a dented fuel tank.

11/28/2003 Strike Report: Unknown-Bird (medium)

On approach an unknown, medium sized bird was struck resulting in damage to the right wing. The skin buckled inward toward the spar from one of the false ribs.

09/27/2004 Strike Report: Gulls

On landing, one gull was struck resulting in two small dings on the LE left wing.

12/17/2015 Strike Report: Unknown – Bird (size not reported)

On landing, an unknown bird was struck. The pilot radioed the tower to report a bird strike and requested permission to taxi to the ramp to inspect the ACFT. The strike report indicates light damage but the remarks are cut off in the report so the location of damage is unknown.

[4] PMP does not have, nor to our knowledge has ever had a Runway 14. It is assumed that this was a mistake in reporting. But it is included here because it was in the strike data base for PMP

[5] PMP does not have, nor to our knowledge has ever had a Runway 20. It is assumed that this was a mistake in reporting. But it is included here because it was in the strike data base for PMP.

Section 3.0 Wildlife Hazard Assessment Data Collection and Analysis

This section includes the methods used to complete the data collection phase of the assessment. Data collected for the PMP WHA meets the required element of 14 CFR Part 139.337 (c) (2) which states that the assessment must include the "identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences." Observations are summarized in this section for the fixed-point observations, nighttime spotlight surveys, and small mammal trapping.

3.1 Study Area

The general study areas for the PMP WHA were based on the separation criteria described in FAA Advisory Circular (AC) 150/5200-33B "Wildlife Hazard Attractants on or Near Airports" (2007). The following information from AC 150/5200-33B describes the separation criteria distances from the AOA. **Figure 4** is a copy of the referenced "Figure 1" in the AC excerpt below:

The basis for the separation criteria contained in this section can be found in existing FAA regulations. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (the majority occur under 3,000 feet above ground level), and (3) National Transportation Safety Board (NTSB) recommendations.

> **1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT:** Airports that do not sell Jet-A fuel normally serve piston-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 5,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance measured from the nearest aircraft operations areas.
>
> **1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT**: Airports selling Jet-A fuel normally serve turbine-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 10,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance from the nearest aircraft movement areas.
>
> **1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE:** For all airports, the FAA recommends a distance of 5 statute miles between the farthest edge of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

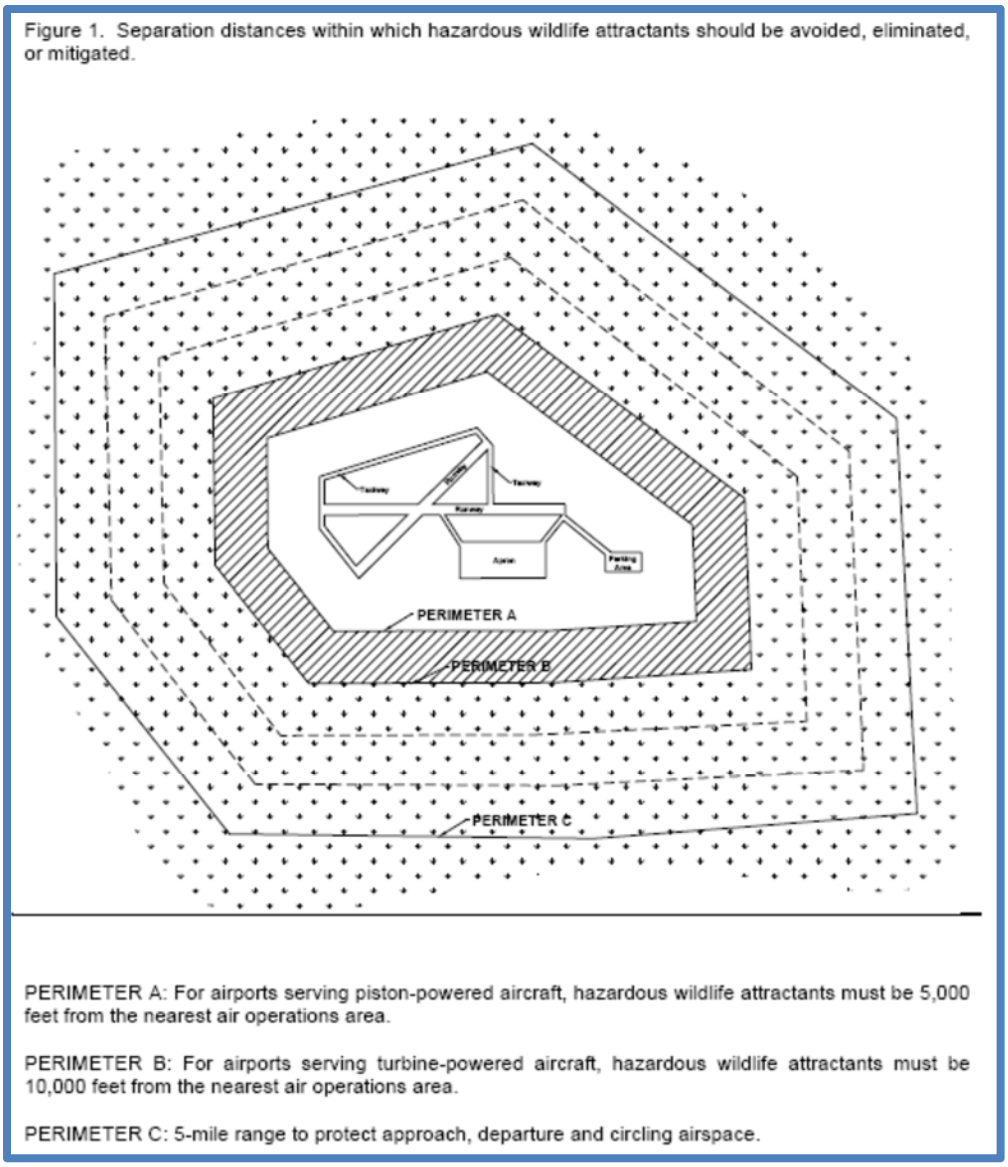


Figure 4 Separation Distances for Perimeter A, B, and C from FAA AC 150/5200-33B

Figure 5 depicts the 5-mile separation criteria area from the PMP AOA. The 5-mile separation criteria area is reviewed to determine if there are any known or potential land uses that are highly attractive to wildlife and could pose a threat to aircraft that are approaching, departing, circling, or training at or below 3,000 feet (e.g. landfills). For these exhibits, the PMP AOA is defined as the PMP property boundary, not only the movement areas.

PMP services turbine-powered aircraft, therefore the 10,000-foot separation criteria were incorporated into the WHA study area. **Figure 6** shows the 10,000-foot separation criteria from the PMP AOA. The 10,000-foot separation criterion is considered when establishing observation sites used during the monthly wildlife observations. Known or observed wildlife attractants in this study area are documented as part of the monthly wildlife data collection.

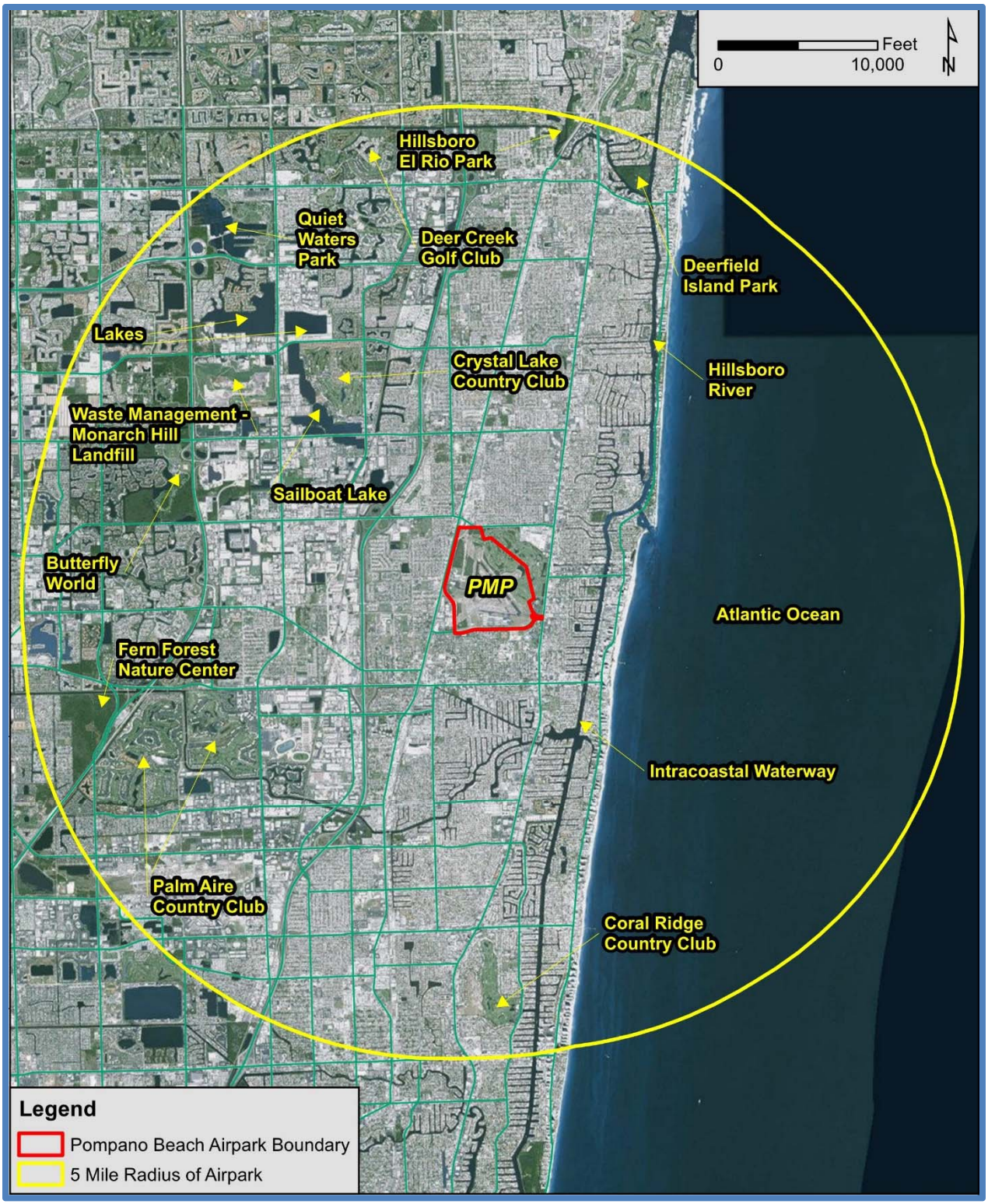


Figure 5 Potential wildlife attractants within 5-miles of PMP

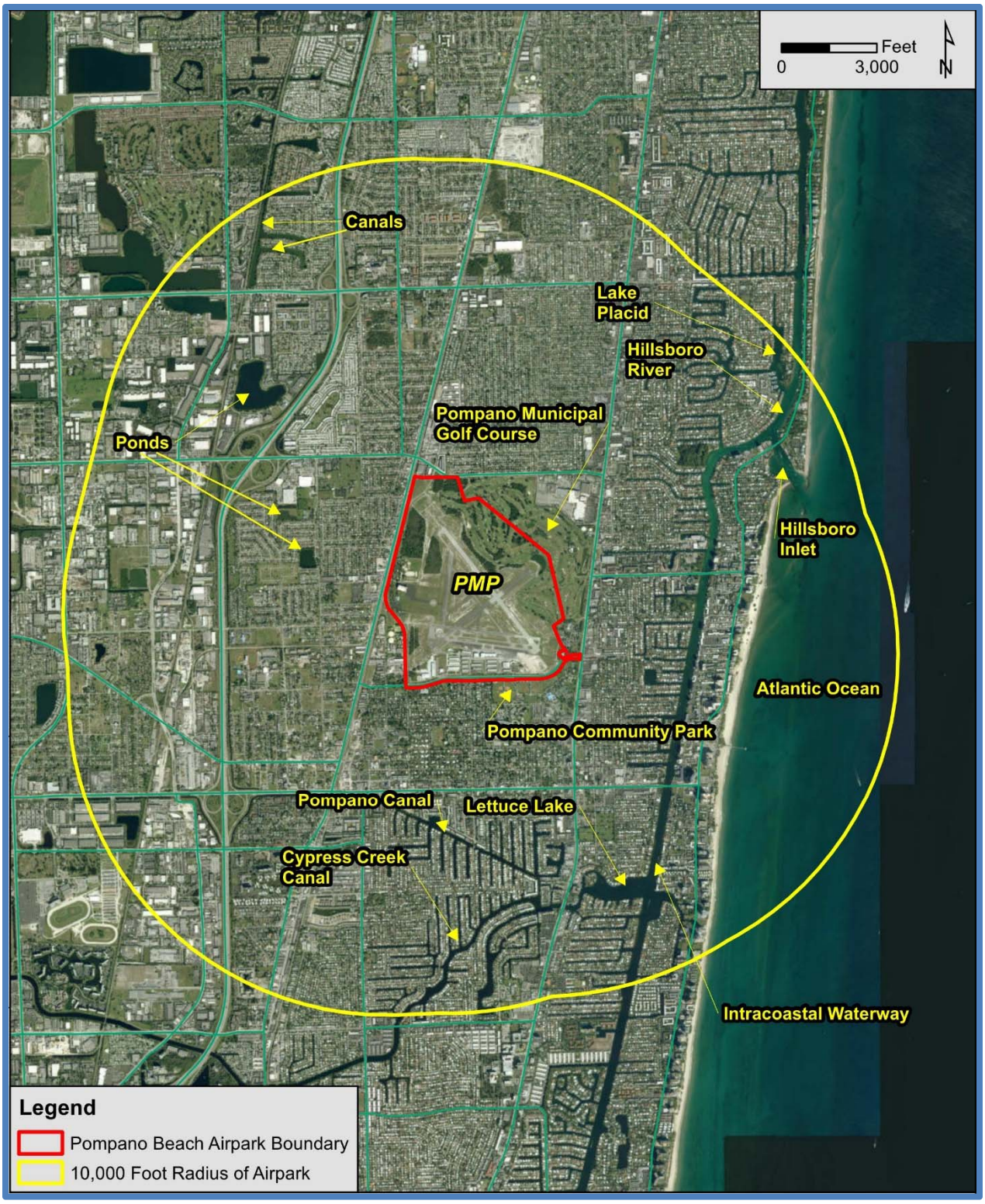


Figure 6 Potential wildlife attractants within 10,000 feet of PMP

3.2 Data Collection Methodology

3.2.1 Fixed-Point Observations

A total of ten (10) wildlife monitoring stations were established within the AOA and outside the AOA, but within the 10,000-foot separation criteria (see **Figure 7**). The on-airport monitoring stations were positioned to view the entire AOA. The off-airport monitoring stations were in accessible areas that included aircraft approach or departure corridors, areas that were identified as potential attractants, and where these attractants could cause wildlife to cross the airfield or aircraft corridors. Wildlife observations were collected for 12 consecutive months (May 2016 through April 2017). Surveys were conducted once per month. Each survey iteration consisted of two dawn, midday, and dusk surveys conducted over a 3-day period. Each time period had a three-hour timeframe (or less) to complete observations at each monitoring station.

- **Dawn** – Beginning 15 minutes prior to sunrise or when lighting was adequate to make visual wildlife identifications and last up to three hours after sunrise.
- **Midday** – Beginning 1 ½ hours prior to noon and ending 1 ½ hours after noon.
- **Dusk** – Beginning two to three hours prior to sunset and lasting up to 15 minutes after sunset or until lighting was not adequate to make visual wildlife identifications.

During fixed-point observations, each monitoring station was surveyed for 5 minutes. Biologists utilized binoculars, field guides, a timer, the monitoring station grid overlay map, and the observation log sheet to record wildlife information at each site (see **Appendix A** for a sample observation log sheet). All wildlife observations were recorded on the log sheet. Each log sheet includes the time of the survey iteration (dawn, midday, or dusk), general weather conditions (temperature, sky condition, and wind), name of the observer, and date. In addition, at each monitoring station, the time, species, number observed, location, and activity were documented. An excel database was used for the data entry and analysis.

During the fixed-point observation data collection, general observations of wildlife were documented when in route to and from the observation points (either before or after the 5-minute timed data collection at a monitoring station within the dawn, midday or dusk time periods). General observations were also recorded during each survey and included in the quantitative data analyses.

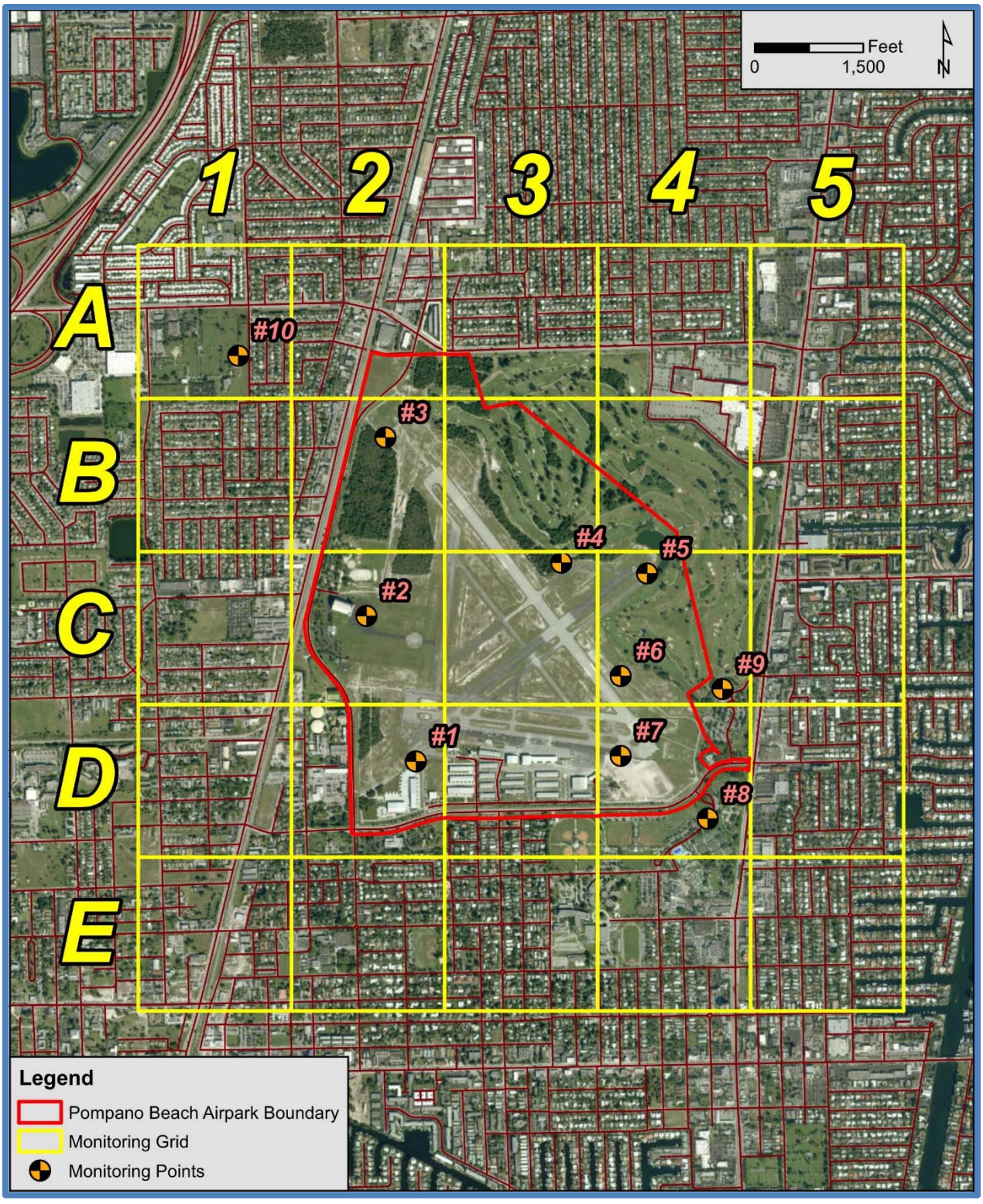


Figure 7 Wildlife Monitoring Grid and Monitoring Points

3.2.2 Nighttime Spotlight Surveys

Nighttime spotlight surveys were conducted once a month inside the AOA at approximately 1 hour past sunset. The observer(s) drove around the AOA using the airport perimeter roads to survey the AOA with a handheld spotlight. This survey allows the biologist to document wildlife utilizing the AOA at night and record species that may not be seen during the daytime. There was no time requirement for the survey so long as the AOA was covered. Data was recorded on the data sheets.

3.2.3 Small Mammal Trapping

Small mammal trapping occurred twice within the 12 consecutive months of wildlife observations. One event was conducted in the winter (21 December 2016) and one event in the spring (28 April 2017) using Sherman live traps (**Photo 3-1**). Five (5) transect locations were identified (**Figure 8** is a map of the transect locations). Transect lengths varied depending on the location. For example, transects along the pond and wooded area were approximately 20 feet in length with each trap set approximately 2 feet apart while traps at the dumpster at the Sheltair facility (Transect 1) or the construction refuse area (Transect 4) were placed around the areas and not necessarily in a straight line transect. The traps were baited, set at dusk, and collected at dawn. Small-mammal data is discussed below.

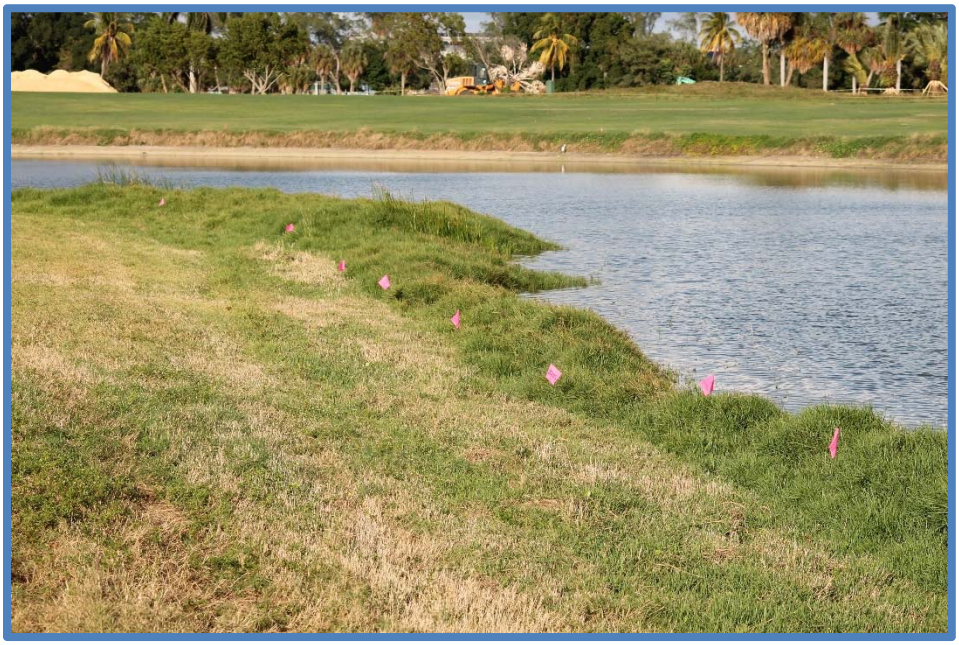


Photo 3-1 Small mammal trapping transect (typ.). Traps were marked in the field with pink pin flags for easy visibility to airport employees and biologists conducting the study.

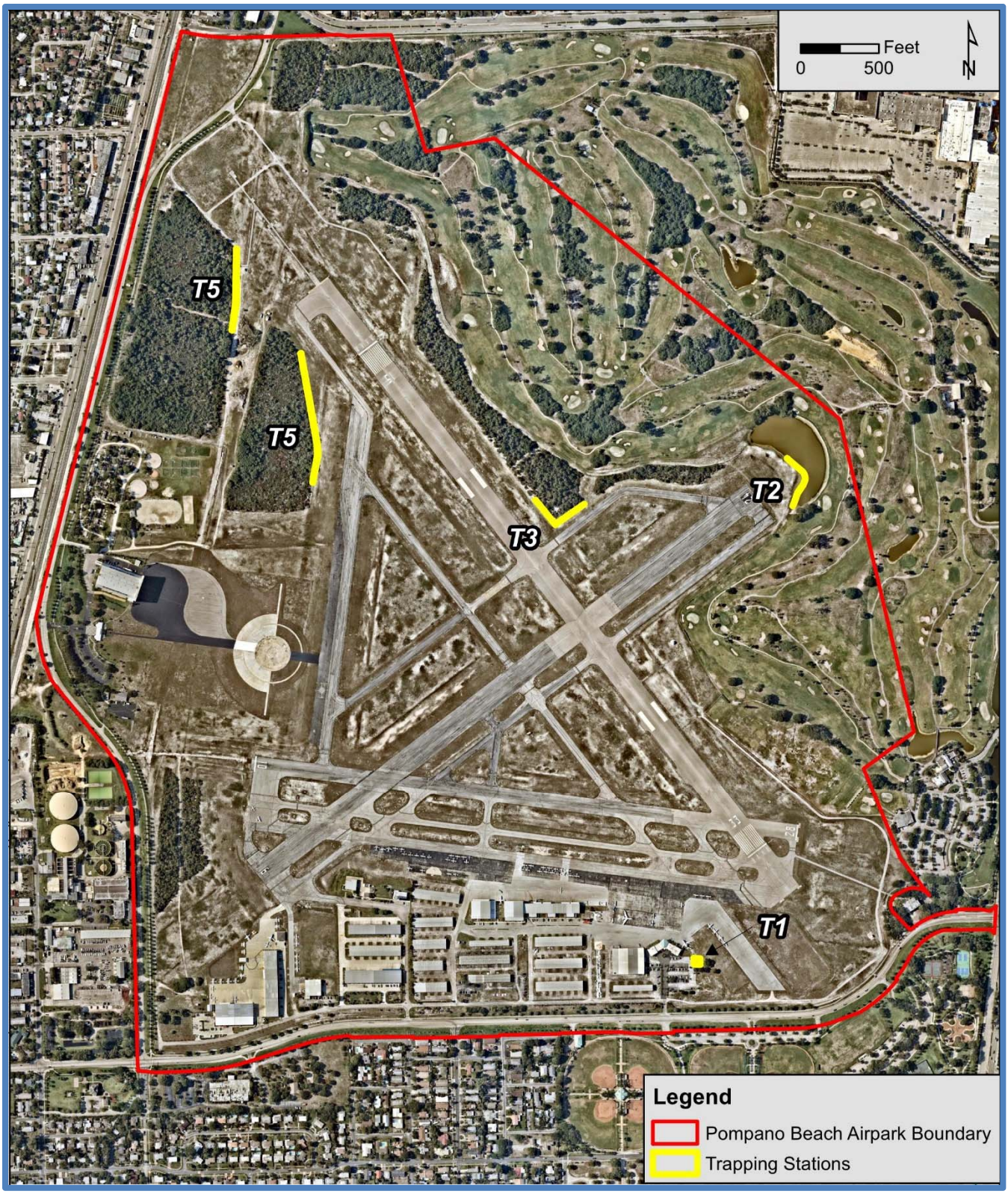


Figure 8 Small Mammal Trapping Survey

3.4 Data Collection Analysis

3.4.1 Fixed-Point Observations

The fixed-point observation data is divided into two sets: birds and mammals. Analysis of the data includes summaries for most abundant, seasonal trends, time-of-day, location, activity, and a discussion of relative risk.

Birds

During the 12 consecutive months of fixed-point observations, a total of 7,827 individual birds were observed and recorded. These individuals represent 45 species. **Table 3** provides a list of the species, scientific name, the Institute for Bird Populations' Four-letter Alpha Code, and guild. The guild is a grouping of the birds based on common behavior, taxonomy, or food resource.

The FAA has provided guidance to airports related to the relative risk of species or species groups to aviation. The most current relative risk ranking or scoring accepted by the FAA is provided in Draft AC 150/5200-33C that was published for public comment in 2013. The draft AC provides the following description of the list:

> **"**Table 1. Ranking of 77 bird and mammal species or groups (1 = most hazardous) as to relative hazard to aircraft in airport environments (i.e., ≤500 ft. [152 m] above ground level), based on a composite rank. The composite rank reflects 3 variables: the percentage of total strikes (for that species–group) that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft, and the percentage of total strikes that caused an effect on flight (EOF). Strike data are from the Federal Aviation Administration National Wildlife Strike Database, for strikes that occurred in the United States from 1990 to 2009."

The ranking list is referenced from the Wildlife Society Bulletin 35(4):394–402; 2011*; "Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management"* (see **Appendix B**).

Table 3-1 includes the birds observed during the fixed-point observations and their relative hazard scores (RHS) in FAA AC 150/5200-33C (Draft) if they were provided. All rankings were normalized to a scale of 100, therefore, 100 is the highest score a species can receive (meaning the most hazardous) and 0 is the lowest score assigned to any species (least hazardous).

Table 3 Birds Observed at PMP – Point Count Observations					
Common Name	Scientific Name	Alpha Code	No. of Individuals	Guild	Relative Hazard Score
American Crow	*Corvus brachyrhynchos*	AMCR	106	Corvid	12
American Kestrel	*Falco sparverius*	AMKE	113	Raptor	6
Anhinga	*Anhinga anhinga*	ANHI	38	Waterfowl	
Black-bellied Whistling-duck	*Dendrocygna autumnalis*	BBWD	2	Waterfowl	48
Brown-headed Cowbird	*Molothrus ater*	BRCO	35	Blackbird	9
Blue Jay	*Cyanocitta cristata*	BLJA	2	Songbird	
Black Vulture	*Coragyps atratus*	BLVU	1	Raptor	
Black-necked Stilt	*Himantopus mexicanus*	BNST	1	Shorebird	
Boat-tailed Grackle	*Quiscalus major*	BTGR	1223	Blackbird	
Brown Pelican	*Pelecanus occidentalis*	BRPE	3	Waterbird	40
Brown Thrasher	*Toxostoma rufum*	BRTH	1	Songbird	
Burrowing Owl	*Athene cunicularia*	BUOW	296	Raptor	3
Cattle Egret	*Bubulcus ibis*	CAEG	806	Wading Bird	23
Chimney Swift	*Chaetura pelagica*	CHSW	5	Aerial Forager	3
Common Grackle	*Quiscalus quiscula*	COGR	40	Blackbird	9
Cooper's Hawk	*Accipiter cooperii*	COHA	3	Raptor	18
Common Nighthawk	*Chordeiles minor*	CONI	1	Nightjar	1
Double-crested cormorant	*Phalacrocorax auritus*	DCCO	186	Waterbird	43
Eurasian Collared Dove	*Streptopelia decaocto*	ECDO	254	Dove/Pigeon	
European Starling	*Sturnus vulgaris*	EUST	1172	Blackbird	9
Fish Crow	*Corvus ossifragus*	FICR	1005	Corvid	
Great Blue Heron	*Ardea herodias*	GBHE	50	Wading Bird	31
Gull-billed Tern	*Gelochelidon nilotica*	GBTE	4	Waterbird	2
Gray Kingbird	*Tyrannus dominicensis*	GRAK	1	Songbird	
Great Egret	*Ardea alba*	GREG	164	Wading Bird	28
Green Heron	*Butorides virescens*	GRHE	40	Wading Bird	

Table 3 Birds Observed at PMP – Point Count Observations					
Common Name	Scientific Name	Alpha Code	No. of Individuals	Guild	Relative Hazard Score
Herring Gull	*Larus argentatus*	HEGU	4	Waterbird	29
Hooded Merganser	*Lophodytes cucullatus*	HOME	2	Waterfowl	48
Killdeer	*Charadrius vociferus*	KILL	27	Shorebird	7
Little Blue Heron	*Egretta caerulea*	LBHE	19	Wading Bird	
Least Tern	*Sternula antillarum*	LETE	38	Waterbird	2
Loggerhead Shrike	*Lanius ludovicianus*	LOSH	30	Songbird	
Mallard	*Anas platyrhynchos*	MALL	18	Waterfowl	29
Mottled Duck	*Anas fulvigula*	MODU	17	Waterfowl	48
Monk Parakeet	*Myiopsitta monachus*	MOPA	47	Songbird	
Mourning Dove	*Zenaida macroura*	MODO	456	Dove/Pigeon	10
Northern Harrier	*Circus cyaneus*	NOHA	1	Raptor	5
Northern Mockingbird	*Mimus polyglottos*	NOMO	6	Songbird	
Northern Pintail	*Anas acuta*	NOPI	1	Waterfowl	48
Osprey	*Pandion haliaetus*	OSPR	4	Raptor	53
Pied-billed Grebe	*Podilymbus podiceps*	PBGR	26	Waterfowl	
Purple Martin	*Progne subis*	PUMA	131	Aerial Forager	2
Red-breasted Merganser	*Mergus serrator*	RBME	8	Waterfowl	48
Rock Pigeon	*Columba livia*	ROPI	77	Dove/Pigeon	20
Red-shouldered Hawk	*Buteo lineatus*	RSHA	2	Raptor	18
Red-tailed Hawk	*Buteo jamaicensis*	RTHA	22	Raptor	25
Snowy Egret	*Egretta thula*	SNEG	21	Wading Bird	
Tricolored Heron	*Egretta tricolor*	TRHE	24	Wading Bird	
Tree Swallow	*Tachycineta bicolor*	TRES	5	Aerial Forager	1
Turkey Vulture	*Cathartes aura*	TUVU	168	Raptor	44
Unidentified Duck	*N/A*	N/A	4	Waterfowl	48
Unidentified Gull	*N/A*	N/A	2	Waterbird	29

Table 3 Birds Observed at PMP – Point Count Observations					
Common Name	Scientific Name	Alpha Code	No. of Individuals	Guild	Relative Hazard Score
Unidentified Parrot	*N/A*	N/A	27	Songbird	
Unidentified Warbler	*N/A*	N/A	4	Songbird	
White Ibis	*Eudocimus albus*	WHIB	1081	Wading Bird	
Willet	*Tringa semipalmata*	WILL	2	Shorebird	
Wood Stork	*Mycteria americana*	WOST	1	Wading Bird	
Note 1: Relative hazard scores were obtained from Wildlife Society Bulletin 35(4):394–402; 2011; "Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management" (see Appendix B). These scores are consistent with the Draft FAA AC 150/5200-33C.					
Source: Kimley-Horn, 2017					

Summary Analysis for Birds – Number of Individuals Observed

During the 12 consecutive months of fixed-point surveys, the most commonly observed species was the boat-tailed grackle (1,123 observed). Twelve (12) species made up 89% of all individual observations at PMP. **Figure 9** shows the percentage of each of the top 12 species out of the total observations (7,528). The number of individuals for the top 89% observed species is provided in **Table 4**.

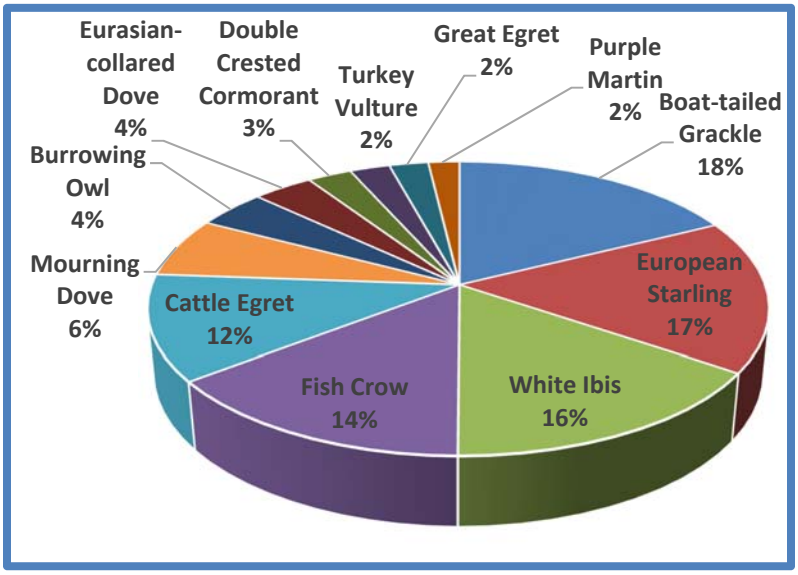


Figure 9 Most abundant species observed (top 89%) at PMP from May 2016 – April 2017.

Table 4 Top 89% of Species Observed	
Common Name	**No. of Individuals**
Boat Tailed Grackle	1223
European Starling	1172
White Ibis	1081
Fish Crow	1005
Cattle Egret	806
Mourning Dove	456
Burrowing Owl	296
Eurasian Collared-dove	254
Double Crested Cormorant	186
Turkey Vulture	168
Great Egret	164
Purple Martin	131
Source: Kimley-Horn, 2017	

Summary Analysis for Birds - Guild

To analyze the bird data, the various species were organized into groups or guilds. The groupings were based on similar behavior and/or habitat preferences, and not necessarily species relationships. For example, hawks and owls were grouped together as "Raptors". The "Passerines" group comprises Eastern meadowlarks, robins, bluebirds, etc. and, anhingas were lumped into the "Waterfowl" group. 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. Table 3 lists the guild assigned to each species observed during the PMP WHA. For a list of all observed species per guild, see **Appendix C**.

Figure 10 shows the percentage of observations for each guild and **Table 5** provides the total number observed for each guild. Blackbirds accounted for approximately 31% of all counted birds during the fixed-point observations. Wading Birds and Corvids had the second and third highest guild count with 28% and 14%, respectively, of the observations. All other guilds combined accounted for 10% or less of the total observations.

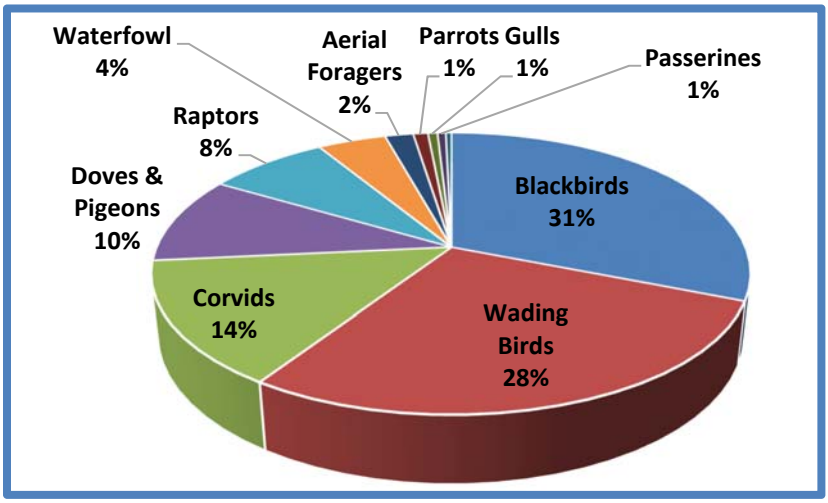


Figure 10 Percentage of bird species recorded by guild at PMP from May 2016 – April 2017. Shorebirds are not labeled as they each comprise less than 1% of total observations.

Table 5 Bird Observations by Guild

Guild	No. of Individuals
Blackbirds	2430
Wading Birds	2207
Corvids	1113
Doves & Pigeons	787
Raptors	610
Waterfowl	345
Aerial Foragers	142
Parrots	74
Gulls	48
Passerines	42
Shorebirds	29
Source: Kimley-Horn, 2017	

Summary Analysis for Birds – Season and Month

The individual count data for fixed-point observations was charted by season to analyze potential seasonal trends of birds on or near the airport. The following divisions of data were used in the seasonal analysis:

- Spring: March, April and May;
- Summer: June, July, and August;
- Fall: September, October, November;
- Winter: December, January, February.

Figure 11 depicts the total recorded birds by season. The greatest number of birds observed was observed in the winter and summer months with the fewest number observed in the spring.

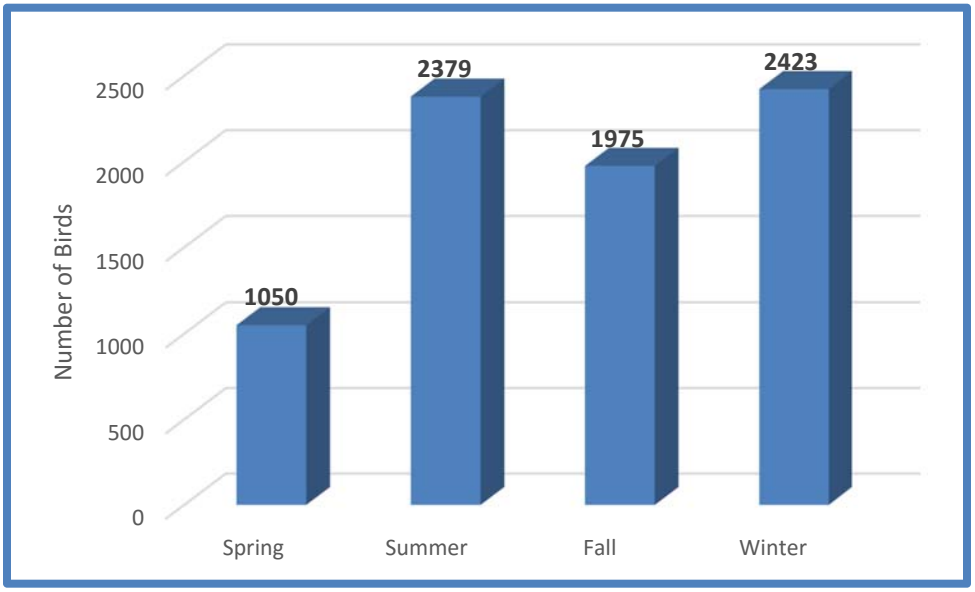


Figure 11 Number of birds recorded per season at PMP from May 2016 through April 2017.

Figure 12 illustrates the fixed-point observations by month. This analysis reveals that bird counts are highest in December. Average flock size was also greatest in December when there was an influx of white ibis, European starlings and fish crows.

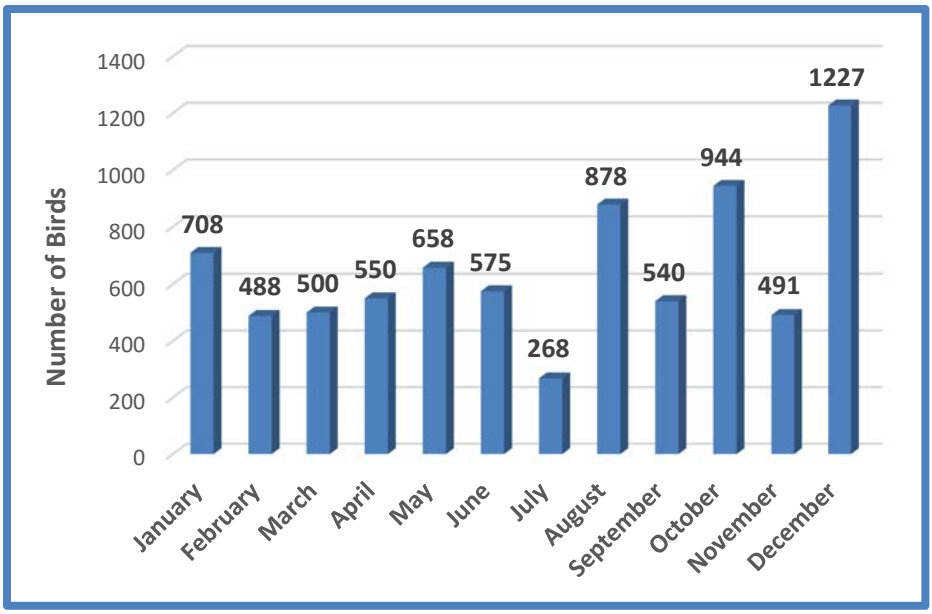


Figure 12 Number of birds counted per month at PMP from May 2016 through April 2017.

A detailed look at the data from December, the month with the highest total for number of individuals, reveals that approximately 66% of all observations were comprised of only five (5) species (shown in **Table 3-4**.) These species are common migrants who winter in the southern United States or Central and South America. Crows, cattle egrets, white ibis and boat-tailed grackles are also common year-round in south Florida; however, they tend to form larger flocks during the colder months. PMP is surrounded by parks, golf courses and other open recreational spaces with large landscape trees and many foraging habitats that are common for these species.

Table 6 Most Commonly Observed Species in December (top 66%)

Common Name	No. Individuals Observed
White Ibis	239
European Starlings	170
Fish Crows	151
Cattle Egret	139
Boat-tailed Grackle	119
Source: Kimley-Horn, 2017	

Summary Analysis for Birds – Time of Day

Figure 13 depicts the fixed-point observation data per time of day (dawn, midday, or dusk). Little difference was observed between the dawn, midday and dusk surveys. Only the night time surveys showed minimal observances and this was primarily limited to foraging Florida burrowing owls.

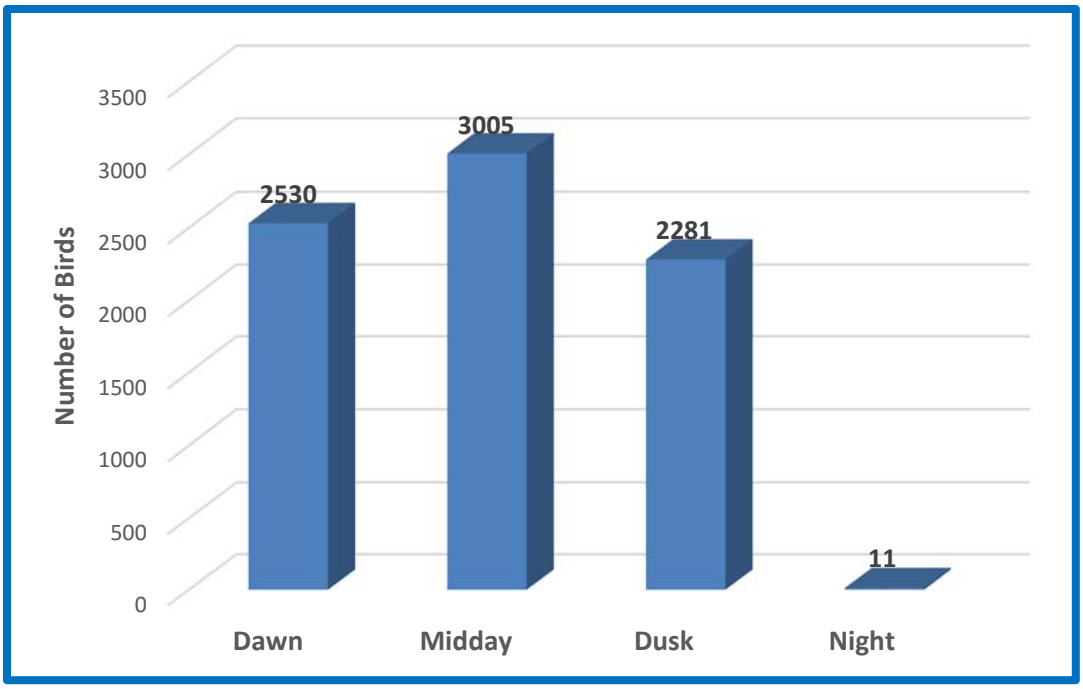


Figure 13 Number of birds counted per time of day at PMP from May 2016 through April 2017.

Summary Analysis for Birds – Activity

During the fixed-point surveys, behavior of all birds at PMP was recorded with each observation. A list of all activity codes is provided in Appendix A (field data sheet). The birds' most dominant activity was recorded. **Figure 14** displays the observation data sorted by activity (activities shown include recorded activities that comprised >1% of the data). "Foraging" was the most commonly recorded activity (34%). Foraging was defined as birds eating or actively searching for food. Many of the species observed such as white ibis, boat-tailed grackles, and various wading birds actively foraged throughout the day taking advantage of the mowed grass and ponds associated with the airport, local parks, road rights-of-ways and the golf course. Flying locally was the second most commonly recorded activity for birds observed at PMP (22%). This activity was documented when birds were flying from one point of observation to another point - defending territories, searching for food, performing mating displays, or flying in an irregular pattern lower than a single-story building. The birds were utilizing the landscape, not just flying over on their way to/from somewhere else. "Flying passed" was observed 17% of the time. Flying – passed was used when a bird (or birds) was/were observed in flight; flying passed the observer and/or AOA. The bird(s) were not necessarily utilizing the airport, but rather just passing through. A typical "fly passed" was higher than a single-story building. Perching was recorded 14% of the time and many of these observations were documented on structures on and off the airfield, such as power lines, light poles and landscape trees. Loafing was recorded 10% of the time and "soaring" was recorded 3% of the time. Loafing can be defined as standing on the ground, sleeping, or resting. Perching, loafing, and foraging all have a ground component to the activity, meaning the birds were using the vegetation, water, or structures on or around the airport in some way.

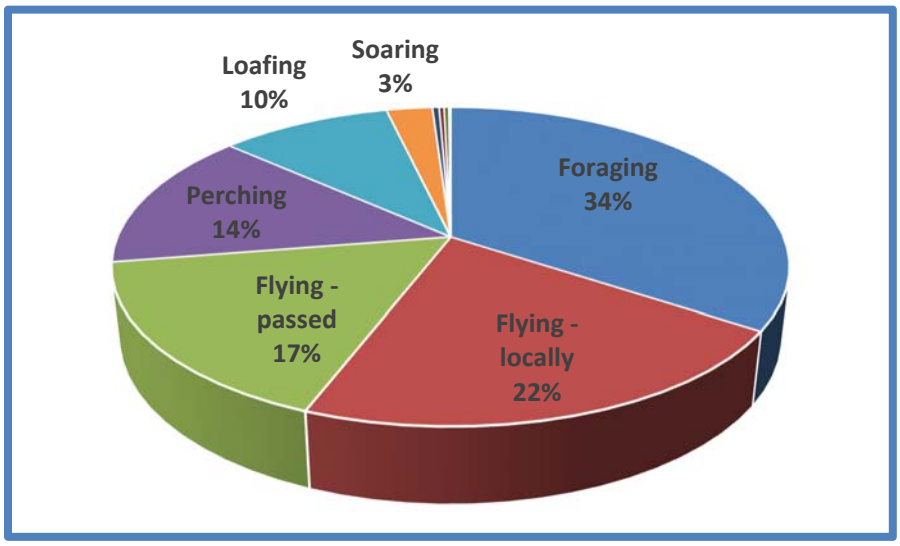


Figure 14 Percentage of bird observations per activity at PMP from May 2016 through April 2017. Roosting, hawking insects, nesting, swimming, bedding down, and hovering are not labeled on the chart as they each comprised less than 1% of total observations.

When analyzing the activity data, it is important to note whether birds are utilizing habitats on or near the airport or if they are simply flying passed the area. The "flying passed" and soaring activities represents 20% of all observations. Therefore, approximately 80% of observations consisted of flying on or near the airport or utilizing the ground, vegetation, water, and/or structures associated with the airport and adjacent properties.

Summary Analysis for Bird Species – Grid Location

As shown in **Figure 7**, a grid set of 0.5 mile x 0.5 mile grids were superimposed over the monitoring station viewing areas. Each observation recorded during the fixed-point surveys documented the dominant grid where the birds were observed. The top three grids with the highest number of total observations are shown in **Table 7**. The total number of individuals observed in grids C4, D4, and B4 represents approximately 63% of all observed individuals during the fixed-point observations.

Table 7 Top 3 Grids for Number Individuals Observed

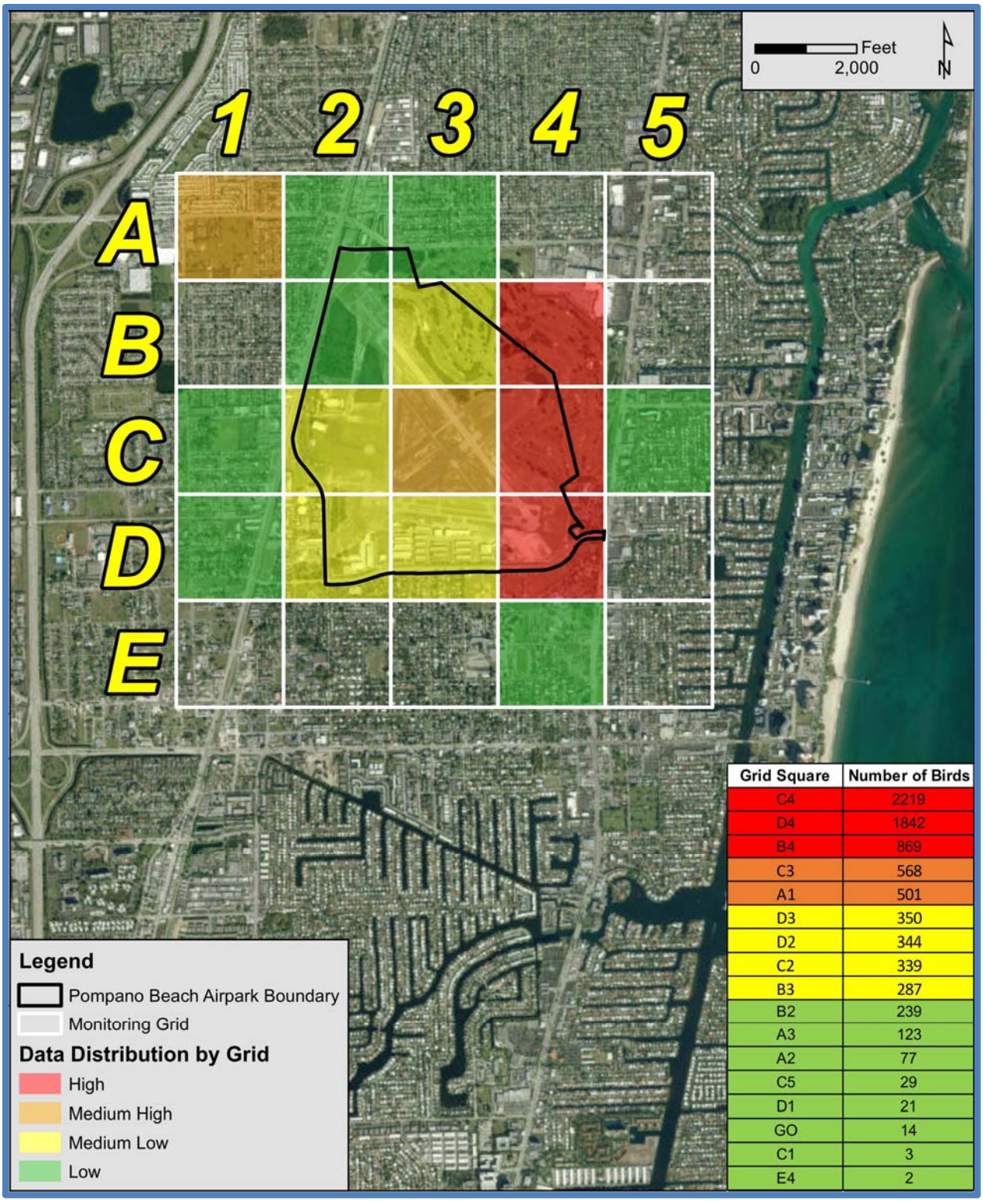
Grid	Number of Individual Birds Observed
C4	2219
D4	1842
B4	869

Source: Kimley-Horn, 2017

To display the observation data on the grid map, a distribution of high to low counts was developed. From that data set, nested means were used to create High, Medium High, Medium Low, and Low total observation categories. **Figure 15** provides the display of this analysis. Several grids are outside the airport and observation areas so there were no data points for these grids. These include A4 and A5, B1 and B5, C5, D5, and E1, E2, E3 and E5. Grids C4, D4, and B4 were ranked in the High observation category (red). These grids cover primarily the golf course and the area adjacent to the approach ends of Runways 33 and 24. There are several ponds (**Photo 3-2**) on the golf course including one small pond east of the approach to Runway 24. Additionally, numerous landscape trees occur on the golf course that were used for perching and roosting. With the airport fence line, it was common to see birds foraging in the open grass and sandy areas within these grids and there are also several burrowing owls in this area.

Photo 3-2 Pond at approach to Runway 24.

Grids A1 and C3 were ranked in the Medium High category. Grid A1 is outside the airport boundaries within the area of the local cemetery. On several occasions, particularly during or after mowing events, large flocks of white ibis could be seen foraging and boat-tailed grackles and fish crows were common at the cemetery as well. Grid C3 is in the middle of the AOA, at the runway intersection. Numerous burrowing owls occur in this location and foraging by boat-tailed grackles and fish crows was often observed. Grids B3, C2, D2 and D3 were ranked in the Medium Low category. Each of these grids is in the AOA or partially within the AOA. B3, C2, and D2 are also areas where burrowing owls were observed as well as foraging by boat-tailed grackles, fish crows, and cattle egrets. Seasonally, American kestrels (foraging/perching) and turkey vultures (perching/soaring) were noted within these grids. D2 is the area near the Tower, airport offices and FBO offices/hangars. In these areas, numerous birds were observed perched on buildings and power lines including mourning doves, boat-tailed grackles, fish crows and European starlings. The remaining grids were ranked in the low category (e.g. least amount of observations).



Grid Square	Number of Birds
C4	2219
D4	1842
B4	869
C3	568
A1	501
D3	350
D2	344
C2	339
B3	287
B2	239
A3	123
A2	77
C5	29
D1	21
GO	14
C1	3
E4	2

Figure 15 Total Observed by Grid Data Distribution

Mammals

During the 12 consecutive months of fixed-point observations, only two (2) mammal species, or their sign, were observed and documented. **Table 8** lists the species, number of individuals observed, and the relative hazard score from draft AC 150-5200-33C (see *Section 3.3.1 Birds* for a description of relative hazard scores). This table does not include the results of the small-mammal trapping. **Table 8** contains only mammals observed during fixed-point surveys and nighttime spotlight surveys.

Table 8 Mammals Observed During Fixed-Point Observations

Common Name	Scientific Name	Total No. Observed during survey period	Relative Hazard Score[1]
Raccoon	*Procyon lotor*	8	20
Coyote	*Canis latrans*	5	22

Note 1: Relative hazard scores were obtained from Wildlife Society Bulletin 35(4):394–402; 2011; "Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management" (see Appendix B). These scores are consistent with the Draft FAA AC 150/5200-33C.

Source: Kimley-Horn, 2017

Raccoons were the most commonly observed mammals. Racoons were observed on five occasions with a total number of eight (8) observed during the WHA and most observations were in grid square B4 near the pond and golf course. Raccoons can easily climb fences or access the AOA via fence breaches, so excluding them with fencing is difficult. Although they typically do not cause damage to aircraft, they are given an RHS of 20, so they have been reported as causing some damage. They are also a wildlife attractant for larger predators such as raptors and coyote, especially young raccoons. In general, raccoons are a low priority threat at PMP.

Coyote was observed during the WHA on 5 occasions, always leaving the runway and returning to the adjacent wooded area. Coyote have a RHS of 22 (out of 100). In addition to our observations of the coyote, airport staff reported coyotes on 3 separate occasions:

> 11 June 2016: Coyote observed in grass by Taxiway Delta. Not interfering with airport operations.
>
> 16 July 2016: Three coyotes observed. Two between Runway 6-24 and Runway 10-28 and 1 on Runway 15-33. The coyote on Runway 15-33 moved into the grass as the airport personnel approached in their truck but did not run into the woods; stayed in grass area.
>
> 3 September 2016: Two coyotes sleeping or resting on Taxiway Delta between Taxiways B and R.

Coyotes and their sign (scat) were directly observed during the WHA. Coyotes can cause significant damage to aircraft if struck. Airport staff and tower staff often reported seeing a single coyote on the airport during routine airfield inspections when biologists were not on-site for surveys. Coyote(s) have reportedly been on the airport for several years (greater than 7 years).

It is reported that the coyotes often lie on Runway 15-33 through the night and will rise in the early morning and return to the adjacent wooded areas.

Herpetofauna

During the 12 consecutive months of fixed-point observations, two (2) herpetofauna species, or their sign (burrows and scat), were observed and documented. **Table 9** lists the species and number of individuals observed. The FAA draft AC 150-5200-33C does not include a relative hazard score for these species. Iguanas occupy several abandoned burrows originally created by burrowing owls or gopher tortoises (**Photo 3-4**). They were documented perching in the trees (**Photo 3-5**) adjacent to the pond in grid square B4 and C4. Gopher tortoises occur throughout the airfield and were seen foraging within the AOA, crossing runways and taxiways between their burrows and foraging areas, and crossing under the fences to forage on the golf course (**Photos 3-6, 3-7, and 3-8**).

Photos 3-4 and 3-5 Iguanas (typ.)

Table 9 Herpetofauna Observed During Fixed-Point Observations

Common Name	Scientific Name	Observed during survey period	Relative Hazard Score[1]
Gopher Tortoise	*Gopherus polyphemus*	18	N/A
Iguana	*Iguana iguana*	11	N/A
Source: Kimley-Horn, 2017			

Photos 3-6, 3-7 and 3-8 Gopher Tortoise (Typ.)

3.4.2 Small Mammal Trapping

No small mammals were trapped during the fall or spring season. However, hawks and other raptors were observed so it is fair to assume that small mammals do occur on the airport property, despite the lack of trapping success.

3.5 Relative Risk Analysis for Species Observed at PMP

Table 10 provides a list of the top 10 most hazardous species observed at PMP. These species are listed in order of relative risk value. Relative risk values were calculated for the species in **Table 10** by using the following equation. Refer to *Section 3.3.1 Fixed-Point Observations, Birds* for a more detailed explanation of relative hazard scores.

Relative Risk Value = (N) (RHS) (frequency of strikes)

N = total number of individuals counted for each species

RHS = Relative Hazard Score outlined above (DeVault, et. al., 2011)

Frequency of strikes = number of strikes reported to FAA National Wildlife Strike Database from 1990 through 2009 that occurred at or below 500 ft AGL (airport environment) divided by the total number of species-identified strikes that meet that same criteria (23,503 strikes total, recorded in DeVault, et. al., 2011)

Table 10 Top 10 Most Hazardous Species at PMP (Highest Relative Risk Values)

Rank	Common Name	Guild	No. Individuals	Relative Hazard Score	Frequency of Strikes	Relative Risk Value
1	European Starling	Blackbirds	1223	9	0.0599	659.3
2	Cattle Egret	Wading Birds	806	23	0.0048	88.98
3	Mourning Dove	Doves & Pigeons	456	10	0.0559	254
4	Rock Pigeon	Doves & Pigeons	77	20	0.0440	67.76
5	Turkey Vulture	Raptors	168	44	0.0068	50.3
6	Double-Crested Cormorant	Water bird	186	43	0.001	8
7	American Crow	Corvids	106	12	0.0060	7.63
8	Great Egret	Wading Bird	164	28	0.001	4.59
9	Killdeer	Shorebird	27	7	0.024	4.53
10	American Kestrel	Raptor	113	6	0.003	2.03

Note: All substitute RHS assignments noted in Table 3-1 are also used for Frequency of Strikes assignments. Species without an RHS were eliminated from all Relative Risk Value calculations.

Source: Kimley-Horn, 2017

Using relative risk values to compare species observed at PMP allows for the consideration of several important factors: (1) how many of each species were observed at PMP (2) the species individual relative hazard score, which accounts for both body mass and flocking behavior and (3) how likely these species are to be struck by an aircraft nationwide, as reported to the FAA National Wildlife Strike Database. Incorporating these factors in the risk value allows PMP staff to prioritize hazardous species based on overall risk of that species, not solely its abundance at PMP. A very commonly observed species at PMP (e.g. boat-tailed grackle), does not always mean it is the greatest hazard when incorporating body size, flocking behavior, and likelihood to be struck (e.g. European starling).

Based on the calculated relative risk values, European starlings were determined to be the highest risk (most hazardous) species at PMP. However, most observations of this species was on the golf course, power lines across Copans Road, power lines and landscaping near the airport hangars and office, and within the landscaping in parking lots at the golf course restaurant and parks. Each of the top 10 species and the attractant associated with the species or guild is described in greater detail in *Sections 4 and 5* of this WHA. It is important to note that the relative risk values above are relative to the other species listed on the table and are only valid at PMP because they are based on the number of observations of each species at PMP.

Section 4.0 Identification of Hazardous Wildlife Attractants on and Near the Airport

This section identifies the wildlife attractants at PMP. This meets the required element of 14 CFR Part 139.337 (c) (3) which states that the assessment must include the "identification and location of features on and near the airport that attract wildlife." Attractants are not listed in any specific order.

4.1 Wildlife Attractants – On the Airport

4.1.1 Airfield Turf

PMP was built on a sand ridge in what was most likely sand pine and oak scrub habitat. Thus, much of the "turf" at PMP is native low growing plants such as gopher apple and ruderal native and non-native grasses. Additionally, because of the soils and nature of scrub habitats there are many open sand or sandy/shell areas throughout the airfield. The airfield "turf" also includes several dry detention areas that are flooded only for very short periods after a heavy rain event and provide habitat for several ground foraging, opportunistic species.

The airfield turf is maintained by mowing as needed and the majority of the airfield turf was in compliance with the FAA recommended intermediate grass height (6 to 12 inches). Some areas though have shorter (<6 inches) grass than is prescribed (**Photo 4-1**). The short grass is primarily along the ramp, taxiways, and runways. It was stated during the initial site inspection that these areas should be maintained within the FAA recommended height of 6 to 12 inches to dissuade smaller flocking birds such as mourning doves, cattle egrets, and European starlings from congregating closer to the movement areas (see **Appendix D** for a copy of the initial "WHA Site Inspection Technical Review"). These species use visual cues to communicate with each other and to alert the group if a predator is approaching or danger is nearby. Intermediate grass height disrupts or blocks the ability for these birds to visually communicate, therefore, they are less likely to flock in large numbers in these areas. The taller grass height also makes it difficult for these species to find food items (e.g. seeds, grit, and insects). A simple rule of thumb is, if you can see the eye of the bird, the grass is probably too short. Mourning doves, cattle egrets and starlings are the top 3 most hazardous species at PMP (Table 10).

Photo 4-1 Grass/ruderal vegetation at PMP (typ.)

4.1.2 Airfield Structures & Perching Opportunities

Numerous perching opportunities are present within the AOA including; airfield lighting, hangars, airfield signage, parked aircraft, navigational equipment, perimeter fencing, power lines, etc. Perching sites for raptors are of greatest concern within the AOA. Raptors use perch sites to search for prey on the airfield and will use successful perch sites repeatedly. There is evidence that red-tailed hawk distribution is linked to a combination of available prey, low-density plant cover (e.g. vegetation that easily exposes rodents to predation, like short grass), and perch availability (Blackwell and Wright, 2006).

Photo 4-2 Many turkey vultures perched on hangar at PMP.

A variety of methods and equipment are available for excluding birds from perch sites (e.g. bird spikes, bird spiders, etc.). PMP staff should remove perching structures whenever possible (if the structure is not being used for aviation operations). When removal is not an option, deterrents should be used (**Photo 4-2**). This may require airport staff to coordinate with tenants or other government bodies (e.g. FAA) to receive permission to alter these structures.

4.1.3 Wooded Areas

The AOA has several remnant patches of oak and sand pine scrub habitat (**Photo 4-3**) particularly in the northwest and southeast portions of the airport. These areas provide habitat for both mammals and birds. Of specific concern, the wooded areas provide shelter and direct AOA access for mammals (e.g. coyote) and perching and roosting opportunities for birds, especially raptors. Wooded areas should be removed or excluded from the AOA with secure perimeter fencing.

Photo 4-3 Remnant wooded areas (typ.).

4.1.4 Burrows within the AOA

Many gopher tortoises and burrowing owls were observed throughout the AOA at PMP (Photos 4-4 and 4-5). Both species are known for the large borrows they excavate and inhabit. Additionally, iguanas have been noted in the past inhabiting the burrows and airport staff have indicated that they have seen numerous iguanas within the AOA and at burrows. Gopher tortoises can excavate large burrows, providing homes for up to 200 different commensal species. Due to their behaviors, neither the gopher tortoise nor the burrowing owl are extremely hazardous species to aviation, however, they certainly can cause a strike and may cause damage to aircraft. The greater concern comes from their burrows being near movement areas, specifically within the runway safety area. These burrows can be very large and create holes within the safety area that may damage aircraft.

Photos 4-4 and 4-5 Gopher Tortoise and Burrowing Owl Burrows

4.1.5 Perimeter Fence (unsecure areas, breaches, and gate closures)

A chain-link perimeter fence completely encloses the PMP property boundary except for the stormwater pond on the golf course at the approach to Runway 24.

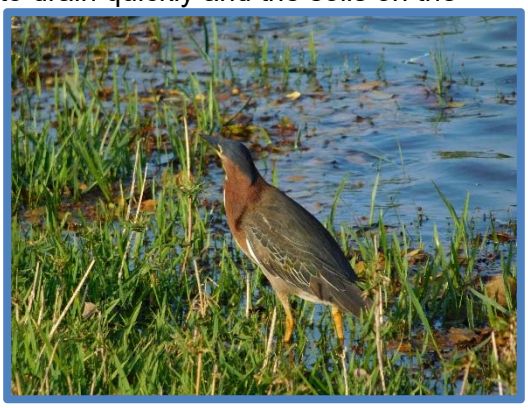
Photo 4-6 Perimeter fence breach

Photo 4-7 Perimeter fence gate space greater than 6 inches

Secure perimeter fencing is the primary tool used to exclude mammals from an AOA. For the most part the perimeter fence is in good shape with few gaps or breaches. However, the perimeter fence at PMP does have some gaps at gates and breaches. One large breach was found along the fence, behind the wooded areas on the northern portion of the AOA (Photo 4-6 and 4-7). This space is large enough for mammals such as coyote and domestic dogs to enter the airfield. The presence of coyote within the AOA could be reduced, if not eliminated, by upgrading the existing perimeter fence and/or by constructing new fence to exclude all wooded habitats. FAA CertAlert 16-03 recommends, a 10 to 12-foot chain link fence with 3-strand barbed wire outriggers and a 4-foot skirt of chain-link attached to the bottom, buried at a 45-degree angle on the outside, to prevent animals from jumping over or digging under the fence. Burying fence at PMP may not be financially feasible and patrolling the fence to identify and repair breaches may be a more practical option. If breaches persist in certain stretches, PMP may want to consider burying the fence in those areas, specifically. The FAA also recommends that gates have no more than a six (6) inch opening between, under, or adjacent to the fence. Gates along the perimeter fence should be adjusted, where possible, to ensure gaps between the gate and fence are less than six (6) inches.

4.1.6 Surface Waters

There are several ditches and dry detention ponds within the AOA that convey stormwater from or through airport property. These have been designed to drain quickly and the soils on the airport allow water to move through these features rapidly so that no standing water remains. The dry detention areas have low growing grasses that attract crows, grackles and cattle egrets for foraging. This activity though was observed throughout the study and not just following rainy periods.



Photos 4-8 and 4-9 Green Heron and Double Crested Cormorants foraging/loafing on pond bank

There is a large pond located directly at the approach to Runway 24 (**Photos 4-8, 4-9, 4-10 and 4-11**). The pond is within the runway safety area. During the site surveys, aquatic vegetation was observed along the pond banks, which were also very gradual. Gradual pond banks allow for a large littoral zone, attracting a variety of wildlife species. Wading birds, blackbirds, and waterfowl are all attracted to a dense littoral zone and a pond with gradual banks. To reduce the attractiveness, regular vegetation removal is recommended. Reconstructing the pond with steep side slopes would also help to reduce the attractiveness. Herons, egrets, grackles, cormorants, mallards, and least terns were all observed utilizing this pond during the study (**Photos 4-8, 4-9, 4-10 and 4-11**). The pond is the greatest wildlife attractant on the airfield at PMP.

Photos 4-10 and 4-11 Mallard ducks leaving pond to loaf in grass and white Ibis foraging in pond.

4.1.7 Areas of standing water throughout the AOA.

Low areas of standing water are present on paved surfaces within the AOA following a heavy rain event (**Photo 4-12**). Temporary standing water is attractive to gulls, killdeer, and other species. Killdeer were observed using these low areas of standing water to forage and loaf. These areas do drain within the FAA designated 48-hour period. PMP staff should monitor the pavement following a heavy rain event for potentially hazardous wildlife. If killdeer or other species, especially gulls, are observed utilizing the water in numbers that are hazardous to aircraft at PMP, staff may need to blow or broom off the water into the grassy infields or disperse the wildlife via harassment. This can be evaluated on a case by case basis.

Photo 4-12 – Standing water on paved surfaces. Killdeer foraging.

4.2 Wildlife Attractants – Off Airport (10,000-Foot Separation Criteria)

4.2.1 Carrion

Although carrion was not directly observed within the AOA at PMP, or outside the perimeter fence, numerous vultures were present during portions of the survey period. The airport is in an urban environment with roads and development surrounding the airport. Thus, it is anticipated that a variety of animals could be struck by cars and become carrion for vultures. Carrion is highly attractive to a variety of animals, but specifically vultures. The airfield should be checked for carrion daily and carcasses should be removed whenever found, both inside and outside the perimeter fence. Carrion adjacent to the AOA may still cause hazardous wildlife (e.g. vultures) to cross the approach and departure corridors. Carrion (or roadkill) can be common along the major roads surrounding the airport (i.e. Copans Road, NE 10th Street, and NE 5th Avenue). PMP staff should periodically check the roads for carrion and remove it if found.

4.2.2 Surface Waters and Canals

Within the 10,000-foot separation criterial there are numerous stormwater ponds (golf course ponds and development stormwater ponds), canals (Pompano Canal, Cypress Creek Canal, lakes (Lettuce Lake and Lake Placid), the intracoastal water way (Hillsboro River) and the Atlantic Ocean. These surface waters can attract a variety of wildlife including species that were observed crossing the AOA on numerous occasions including cormorants, ducks, terns, and ibis.

4.2.3 Parks and Recreation Areas

PMP is bordered on the east by a large golf course. The golf course contains many ponds, including the pond at the approach to Runway 24, and various landscaping. The golf shop and restaurant parking lots and the dog park are lined with large landscape trees (**Photo 4-13**). The large trees provide excellent roosting and nesting habitat for grackles, doves, pigeons, and starlings. These species were continuously observed flying around the parking lots during the WHA. The golf shop and restaurant are located within the approach to Runway 28.

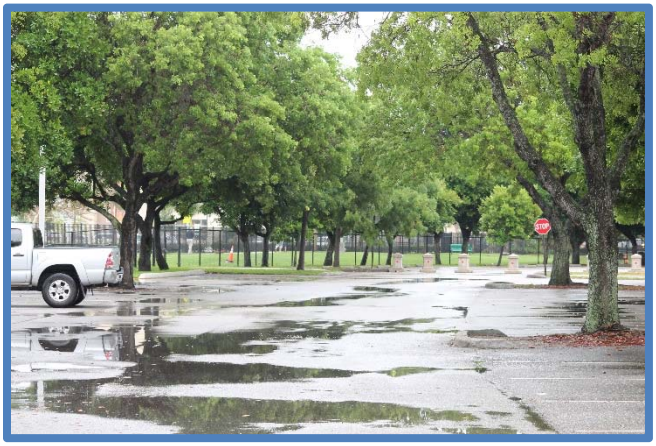


Photo 4-13 Parking lot landscaping and tree lined areas (typ.)

In addition, the Pompano Community Park (which consists of picnic pavilions, walking trails, baseball and soccer fields, the Pompano Aquatic Center (pool), and playground sets for kids) is located just south of PMP, at the approach to Runway 33. Many ibis, starlings, pigeons, grackles, and mallards were observed foraging within the park. Bird seed was noted on two occasions (**Photo 4-14**). It appears that a park patron comes to feed the birds here. Feeding the birds could be a direct hazard to aviation safety at PMP. This is likely an education issue that could be solved with signage explaining the risk that birds cause to aviation.

Photo 4-14 Pigeons foraging within parking lot (typ.)

4.2.4 Forest Lawn Cemetery

As shown on Figure 6, Forest Lawn Cemetery occurs within the 10,000-foot separation distance and observations were recorded at this location during this WHA (Monitoring Station #10). During the surveys, potentially hazardous birds were observed at the cemetery including Florida burrowing owls (**Photo 4-15**), fish crows, boat-tailed grackles and white ibis. The birds observed utilizing the cemetery did not appear to increase the risk of a strike at PMP because they were not observed crossing back and forth between the airport and the cemetery. Furthermore, Florida burrowing owls do not typically travel far from their burrow. Therefore, the Forest Lawn Cemetery was not considered a significant attractant to wildlife at PMP.

Photo 4-15 FL Burrowing owls at cemetery.

4.3 Wildlife Attractants – Off Airport (5-Mile Separation Criteria)

Although there are several potential off-site attractants surrounding PMP (e.g. Country Clubs with golf courses, lakes, and parks and natural areas), it appeared throughout this WHA that these attractants were too far away to have a significant impact on wildlife at PMP. The municipal landfill also occurs within the 5-mile separation criteria and is located directly within the approach to Runway 15-33. Reportedly, vultures and gulls have been observed on approach by local pilots and are a potential hazard[6]. There are no options for relocating or closing this runway, but there is the potential that vultures and gulls who frequent the landfill area and/or fly past the airport to and from the coast could represent a hazard to PMP. The airport does not have the authority to control wildlife at the landfill, but they do alert pilots that hazardous birds

Photo 4-16 Municipal landfill within 5-Mile separation criteria.

[6] ERS personal communication with local pilot.

may be in the vicinity via communications with ATC and on the Automatic Terminal Information System (ATIS).

4.4 Regional Influences

4.4.1 Synergistic Effects

FAA AC 150-5200-33B states**:**

> **2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES.** There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants or that are located outside of the separations identified in Sections 1-2 through 1-4 that are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace.

Figure 16 is a regional map that includes the east coast of Florida. PMP's proximity to the Atlantic Ocean and the Intracoastal Waterway can impact the species composition and numbers of wildlife around the airport. In addition, the Loxahatchee Wildlife Refuge and large marshes associated with the Everglades are located approximately 11 miles northwest and west, respectively from PMP. These waterbodies are highly attractive to a wide variety of wildlife and are directly along the Atlantic Flyway. Although these potential bird sanctuaries do not influence the daily wildlife observed at PMP directly, these places can influence the seasonal influxes of birds to the PMP area and/or cause potentially hazardous wildlife to cross the flight paths at PMP.

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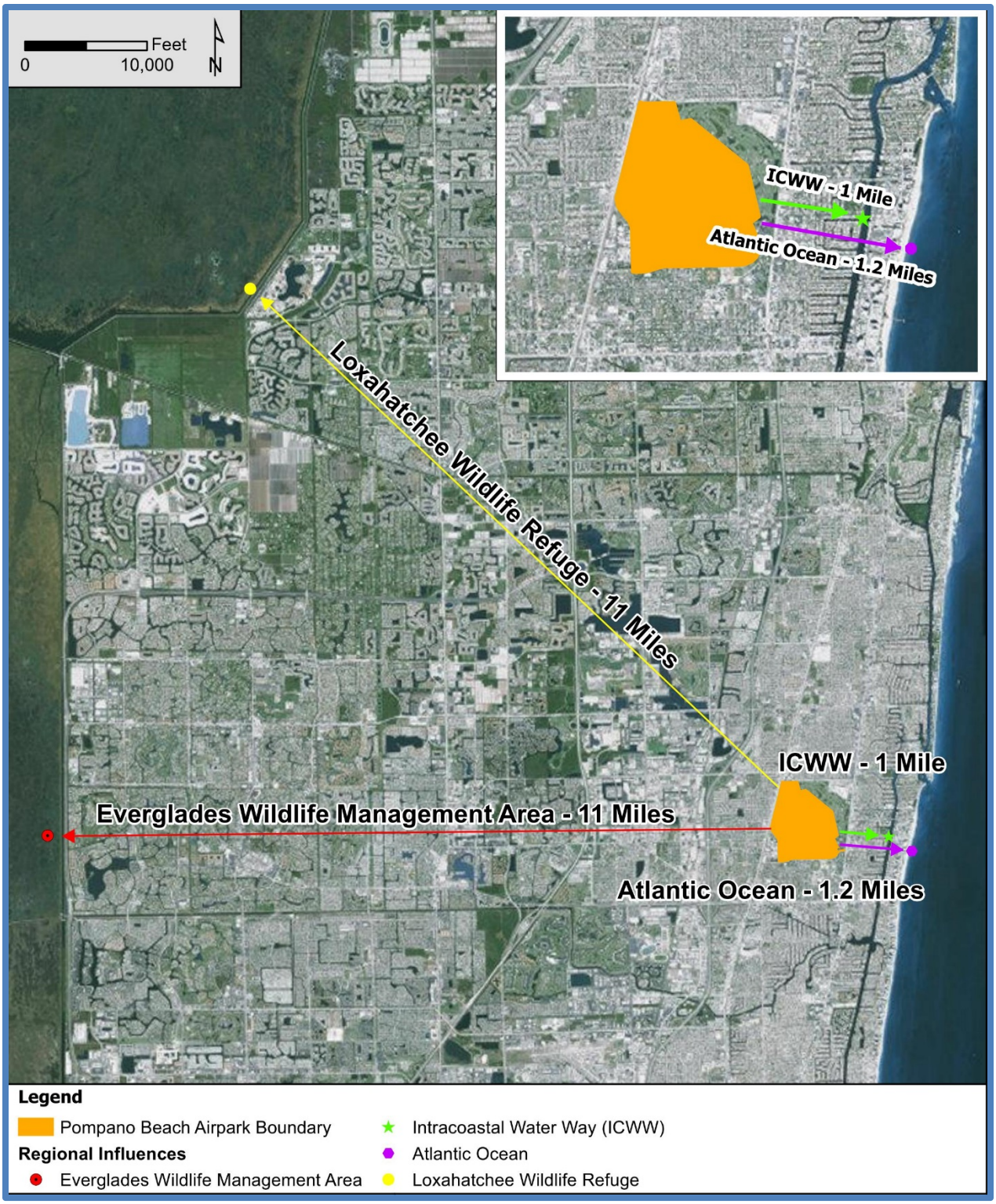

Figure 16 Regional Influences Map

4.4.2 Migratory Flyways – Seasonal Effects

The Mississippi and Atlantic flyways (shown in **Figure 17**) are migratory bird routes that extend from Canada and Greenland to Central and South America. Both flyways include South Florida. Migratory birds observed at PMP include waterfowl, shorebirds, and raptors. Influxes of migratory birds occur at different times of year in Florida. Generally, migratory birds are observed in spring and fall. PMP, however, experienced the greatest number of birds in the summer and winter though fall also had large numbers of birds observed. PMP experienced the least number of birds in the spring. Most the birds observed at PMP were year around residents which is typical for south Florida as it does not experience drastic changes in weather, including extended cold periods.

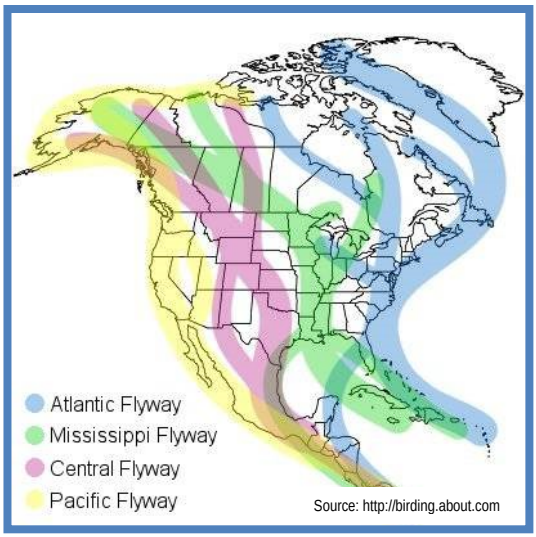

Figure 17 Migratory Flyways

Section 5.0 Description of Wildlife Hazards to Aircraft Operations

Section 5 includes a description of wildlife hazards to aircraft by specific bird and mammal species. This section meets the required element of 14 CFR Part 139.337 (c) (4) which states that the assessment must include "a description of wildlife hazards to air carrier operations." Wildlife hazards to general aviation at PMP are described below.

5.1 Wildlife Hazards by Species – Birds

5.1.1 Blackbirds

Description: Boat-tailed grackles, brown-headed cowbirds, and European starlings comprise the "blackbirds" group observed at PMP (**Figure 18**). Boat-tailed grackles are a large, blackbird with a very long, keel-shaped tail. Males are iridescent blue-black with yellow or brown eyes while the females are brown and not iridescent. Brown-headed cowbirds are a small blackbird. The males have a glossy brown head, heavy bill and dark eyes and a black body with a slight green sheen. The females are generally the same size but with a brownish-gray body and head. European starlings are small, dark birds with light speckles on their feathers. At times, their feathers appear iridescent. Their 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. These species are found year-round in Florida (Sibley, 2000).

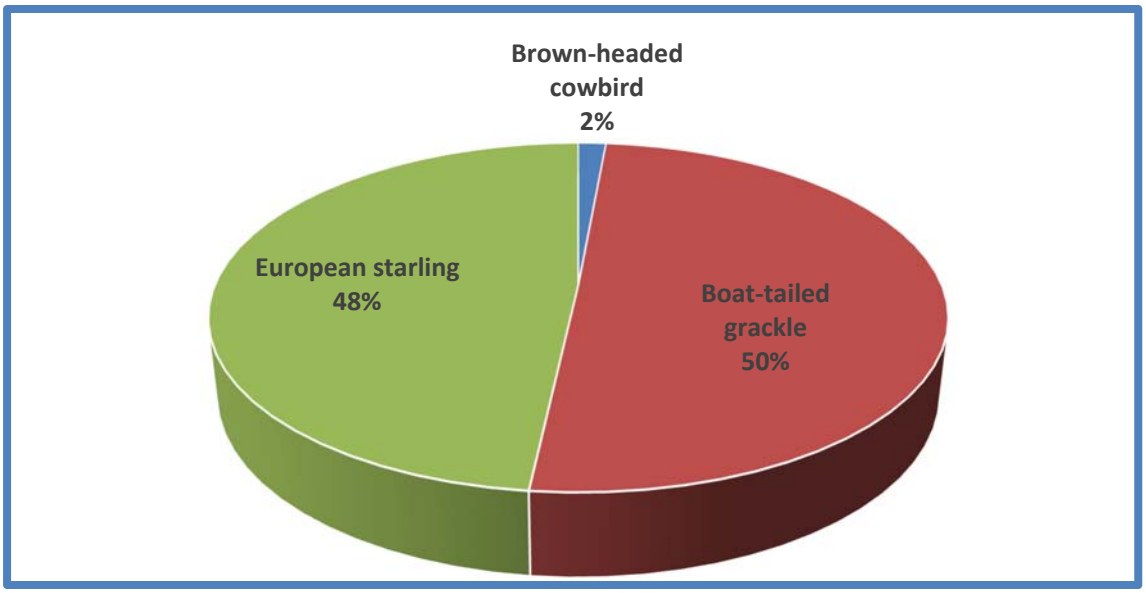

Figure 18 Species of blackbirds observed at PMP during

Observations: A total of 2430 blackbirds were observed during the fixed-point observations (31% of all birds observed). **Figure 18** depicts the percentage of each species of blackbird observed during the fixed-point observations. European starlings and boat-tailed grackles comprised most of the observations, with brown-headed cowbird comprising 2%.

Figure 19 provides the number of blackbirds observed by month at PMP during the WHA. Blackbirds were most abundant late spring/early summer and late in the year, with populations peaking in May and June.

The grackles were observed throughout the AOA and adjacent areas. They were most commonly seen in the short grass and around aquatic vegetation in ditches and stormwater ponds (**Photo 5-1**). European starlings were most commonly observed near the ponds on the golf course and around hangars. They were observed roosting in the large landscaping trees just outside the AOA. C4, D4 and B4 were the most common monitoring grids for blackbirds. These all correspond with the park, golf course and ponds adjacent and east of the airport.

Photo 5-1 Boat-tailed grackles foraging in ditch along taxiway at PMP.

Risk: Most blackbirds are relatively small birds ranging from the brown-headed cowbird (1.7 oz. or 48 g) to the boat-tailed grackle (7.5 oz. or 213 g), and; therefore, do not pose a major threat to aircraft as individuals (Sibley, 2000). The risk comes from their flocking behaviors. As discussed in Section 3.3.1, the relative hazard scores associated with the blackbirds group and European starlings is nine (9) on a scale of 0-100 (100 being the highest relative risk and 0 being the lowest relative risk). Due to their large populations and high chance of being struck, European starlings were ranked the most hazardous species (**Table 10**) to aviation at PMP.

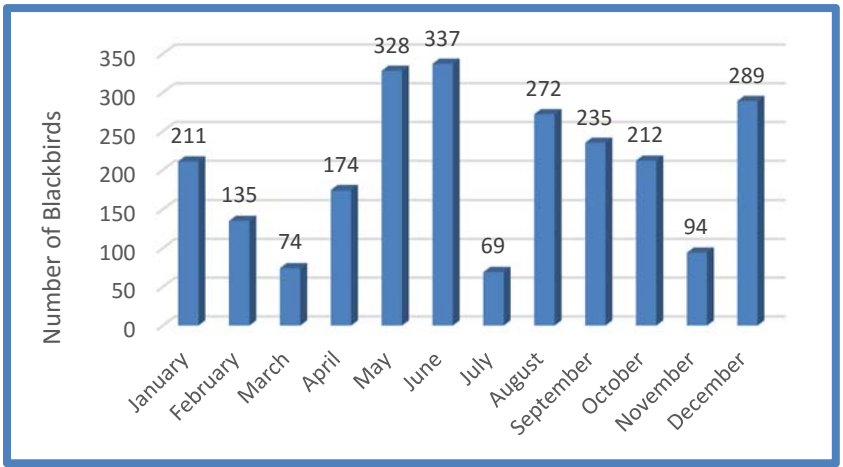

Figure 19 Number of blackbirds observed at PMP per month.

Control Measures: Reducing the risk of wildlife strikes involving blackbirds at PMP could include consistently maintaining mowed grass at an intermediate height (above 6 inches, especially around airport buildings), thinning large and dense landscaping trees and using pyrotechnics to scare/flush birds when loafing on the airfield.

Legal Status: All of the species discussed above, except the European starling, are protected by MBTA. Starlings were introduced by Europeans to New York City in the 1890s (Hygynstrom et. al., 1994). As they are not a native species, they are afforded no protection and can be taken (including nests and eggs) without a permit. There is no additional state protection for any of these species.

A federal standing order under the Code of Federal Regulations, "Depredation order for blackbirds, cowbirds, grackles, crows and magpies" (50 CFR 21.43) states that, "a Federal permit shall not be required to control yellow-headed, red-winged, rusty, and Brewer's blackbirds, cowbirds, all grackles, crows, and magpies, when found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance…" Aviation safety would fall under "health hazard" and, therefore, a permit is not required to take or harrass blackbird species found at PMP.

5.1.2 Shorebirds

Description Killdeer, black-necked stilt, and willet were the only shorebirds observed at PMP, with the black-necked stilt representing less than 1% of the observations. 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*". Killdeer are particularly attracted to open areas with short grass and bare ground. Killdeer prefer the bare ground for nesting, where they simply make a few scrapes in the substrate and lay their eggs. They eat mostly invertebrates including 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.

Black-necked stilts are a migratory species found along the shallow borders of freshwater and brackish ponds and marshes. Stilts typically forage for insects on or near the surface of the water using the pecking-seizing technique while standing or walking slowly. They eat mostly invertebrates including crustaceans, insects, small fish and tadpoles, and seeds (FWC). They have long, slender, red legs and black and white plumage. They often serve as sentinel species for other shorebirds, alerting them to intruders with a sharp yipping *vik!* or *wik!* often in long series. Stilts prefer to nest on soft substrates above water, such as small islands or clumps of vegetation (allaboutbirds.org). Willets are large, stocky shorebirds, have long legs and thick, straight bills and when flying, display a bold white and black stripe along each wing. Eastern willets are found in coastal salt marshes and on barrier beaches and islands. They probe for crabs, worms, and other prey in sand and mudflats, or pick at insects and mollusks.

Observations Shorebird observations were rare with only 29 recorded observations (27 killdeer, 2 willets and 1 black-necked stilt) and these observations were primarily in spring and summer for the killdeer and black-necked stilt and fall for the willet. **Figure 20** depicts the percentage of each species of shorebird observed during the fixed-point observations. Killdeer were most common in grid square C2 and B4. **Figure 21** provides the number of shorebirds observed per month.

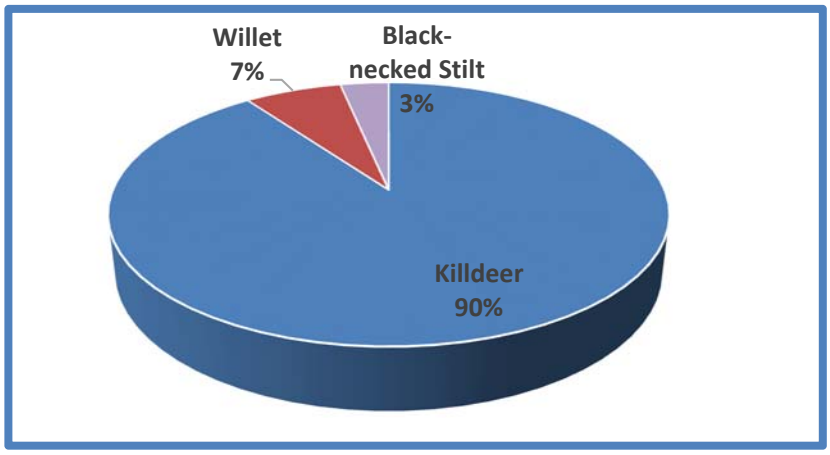

Figure 20 Percentage of Shorebirds at PMP.

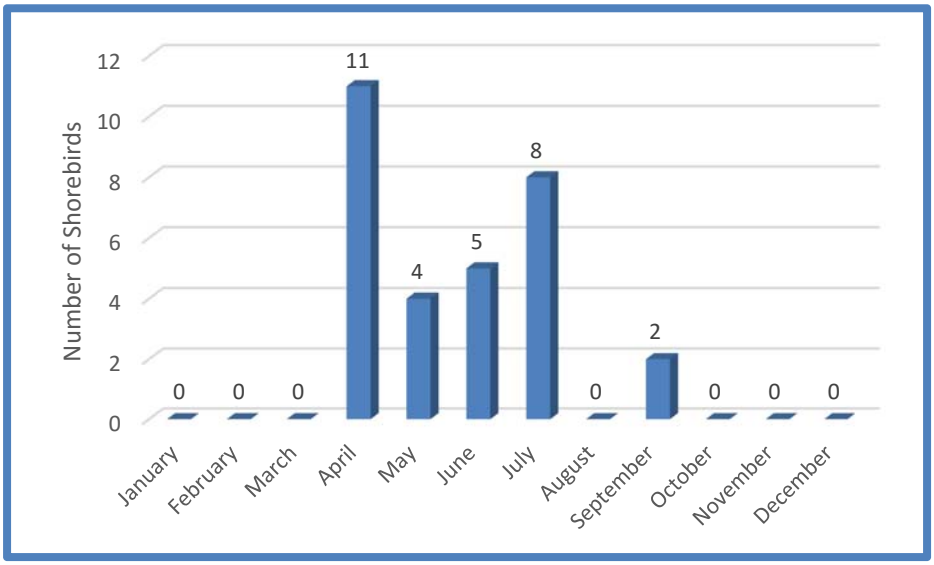

Figure 21 Number of shorebirds recorded per month at PMP

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 runways/taxiways or in the safety 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. Killdeer are ranked as the 9th most hazardous species at PMP based on Relative Risk Value (Table 10).

Control Measures The best way to control killdeer is habitat modification. Eliminating all bare areas (particularly any unused asphalt) will reduce potential nesting habitat. Keeping all grass at a minimum height of 6 or 7 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/bare ground. If a killdeer nest is found, it should be destroyed. It is best to destroy the nest as soon as eggs are laid. Shaking or oiling the eggs and placing them back in the nest is most beneficial. Egg "shaking" or oiling will cause them to be infertile, but reduce the chances of a re-nesting attempt. The female will continue to incubate the in viable eggs after they have been shaken. 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.

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 state protection for this species.

5.1.3 Wading Birds

Description The wading birds observed at PMP include: great blue heron, great egret, cattle egret, tricolored heron, little blue heron, green heron, white ibis, and snowy egret (**Figure 22**). It is best to consult a field guide for the specifics on these species; however, in general, herons and egrets have long legs, long necks, and long, pointed bills. Their diets consist primarily of small aquatic prey such as insects, amphibians, and small fishes. During the breeding season, they gather in large colonies near water and/or marshes. Pairs are predominantly monogamous and both parents care for the young (allaboutbirds.org). 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, often in large flocks. Short grass and open, mowed fields are the primary attractants to airports for cattle egrets. They prefer to follow a mower and catch any insects that may get disturbed along the way.

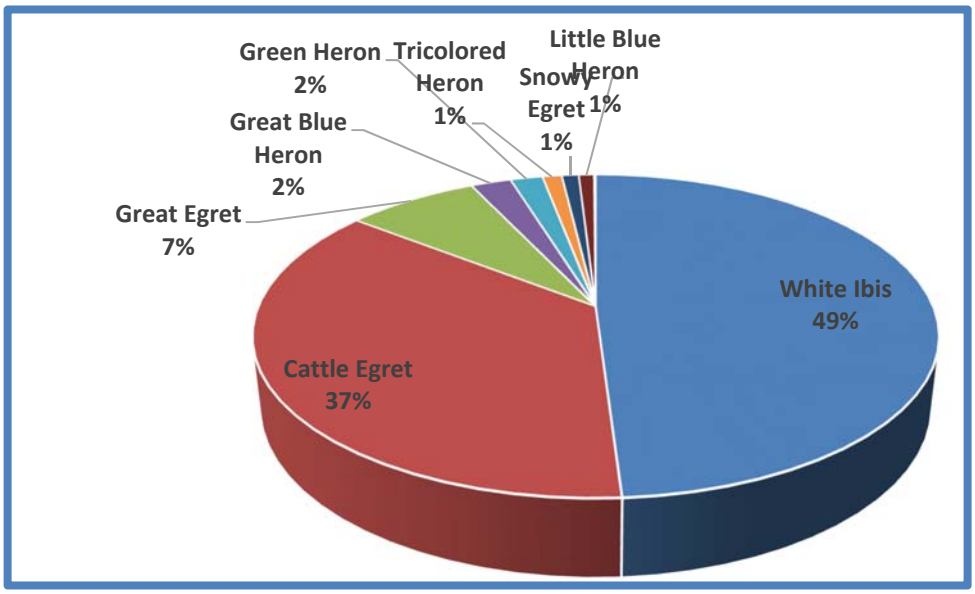

Figure 22 Wading bird percentages at PMP.

Observations Most wading birds observed were cattle egrets and white ibis and were observed each month of the assessment (**Figure 23**). The number of wading birds observed at PMP peaked during fall and winter. Both cattle egrets and ibis were most often observed in the grass areas of the golf course than the pond. However, the herons and egrets were most often observed in the golf course ponds, which is to be expected.

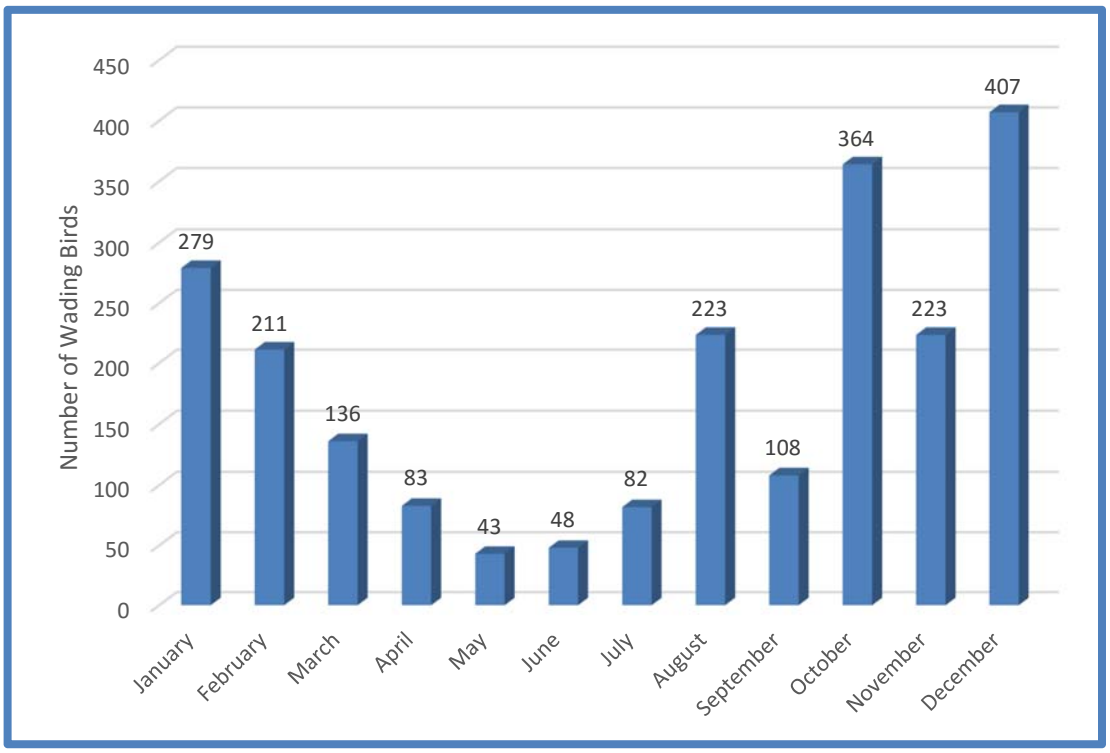

Figure 23 Wading birds by month at PMP.

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 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 near the movement areas as well. Due to these behaviors, they are an increased risk to aircraft at most airports. Cattle egrets were ranked the 2nd most hazardous bird species at PMP.

Control Measures

One way to reduce the number of cattle egrets and white ibis loafing and feeding on the AOA is to eliminate their food source (insects). The typical recommendation for reducing the attractiveness of an airfield to cattle egrets is to keep the grass height between 6 and 12 inches. Although this may not reduce the amount of prey, it will help to reduce the egret's prey visibility, and their ability to see one another in the flock. Similarly, maintaining a dense stand of grass may increase the number of invertebrates in the fields, however, it will make prey capture more difficult. This may be difficult to achieve at PMP where much of the airfield turf is ruderal vegetation and won't grow to a height of 6 inches or greater.

If cattle egrets are seen following the mower in large numbers (flocks greater than 10 individuals), it would be best to mow only at dawn and dusk. Cattle egrets only feed during the day and return to their roost at night. If mowing cannot be conducted at these times, 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). Harassment and

lethal control can 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. Cattle egrets should not be allowed to loaf or feed on the airport for any length of time (Hygynstrom et. al., 1994).

For the other wading bird species, the golf course ponds and particularly the pond at the approach to Runway 24 could be modified by preferably filling the pond or if not feasible, modify the pond to include steeper banks, reduced littoral shelves and removal of the trees along the northern bank that are used for roosting.

Legal Status All wading birds observed at PMP are federally protected by MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs, including cattle egrets. In addition, little blue heron and tri-colored heron are currently listed as a threatened species by FWC.

5.1.4 Waterfowl

Description The waterfowl observed at PMP include: double-crested cormorant, common gallinule, anhinga, pied-billed grebe, mallard, mottled duck, red-breasted merganser, brown pelican, and black-bellied whistling duck (**Figure 24**). It is best to consult a field guide for the specifics on these species; however, in general, mallards, northern pintails, and mottled ducks are dabbling ducks and feed in the water by tipping forward and grazing on underwater plants, grasses, seeds, and aquatic insects and invertebrates. Dabbling ducks are gregarious in nature and have adapted well to human-altered habitats. They can be found in golf courses, city parks, ponds, seasonally flooded marshes and ditches, and wet prairies (allaboutbirds.org). Mergansers, anhingas, and pied-billed grebes have different food requirements than most "waterfowl". They feed primarily on small fish and aquatic invertebrates. Unlike dabbling ducks, these species swim low in the water and completely submerge themselves to forage. Anhingas nest in loose groups of several to hundreds of pairs and sometimes with other colonial waterbirds, while mergansers nest in cavities or boxes 10-50 feet off the ground, and pied-billed grebes typically nest among tall emergent vegetation (allaboutbirds.org).

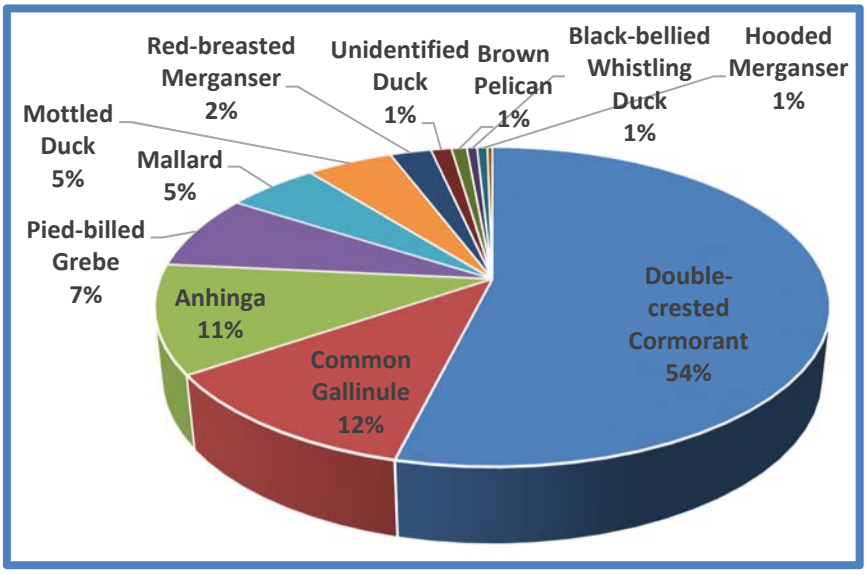

Figure 24 Waterfowl percentages at PMP.

Observations Most wading birds observed were double-crested cormorants. Waterfowl were observed each month of the survey, but with greatest number occurring in December when waterfowl are commonly wintering in the southern United States (**Figure 25**). As expected, most of the waterfowl were observed within the ponds, but particularly in grid B4 at the pond on approach to Runway 24. Additionally, during dawn and dusk surveys large flocks of double-crested cormorants were observed flying over the AOA (Runway 15) to and from the northwest.

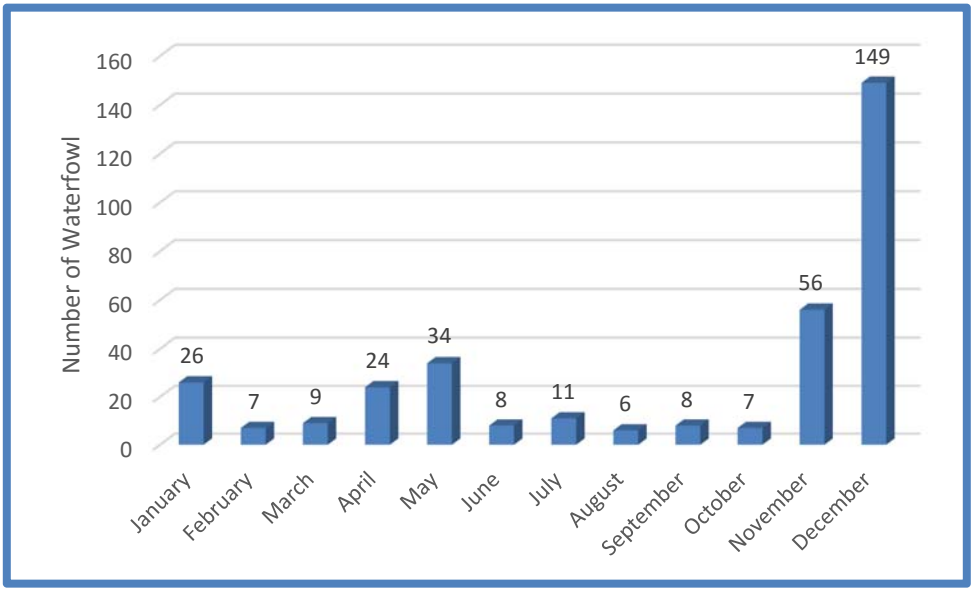

Figure 25 Waterfowl percentages at PMP.

Risks: The double-crested cormorant is a large waterfowl or seabird that ranges in weight from 2.6-5.5 lbs and has an average wingspan of 52 inches (Sibley, 2000). As it relates to PMP, cormorants were ranked the 6th most hazardous species to aviation (Table 10). There is an increased risk of a strike when they cross the arrival and departure corridors for Runway 15 during dawn and dusk. The risk is greatest during the winter months since their populations in the southern United States increase during that time.

Control Measures: Control measures for the waterfowl would be similar to that of the wading birds as it relates to the ponds adjacent to the airport. The golf course ponds and particularly the pond at the approach to Runway 24 could be modified by preferably filling the pond or if not feasible, modify the pond to include steeper banks, reduced littoral shelves and removal/control of vegetation along the banks. Placing rip/rap along the pond edge and treating vegetation that may grow could help reduce the attractiveness of the ponds for waterfowl.

Legal Status All waterfowl observed at PMP are federally protected by MBTA and require a USFWS Depredation Permit to pursue, capture, take, kill, or possess them or their nests and eggs. There are no additional state protections for these species.

5.1.5 Doves/Pigeons

Description: Mourning doves, Eurasian-collared doves and rock pigeons (feral pigeons) were observed at PMP. Mourning doves are the most abundant dove in the United States and are common year-round in Florida. They are the slenderest dove, with a long, pointed tail, narrow pointed wings and a gray-brown color overall. Rock pigeons are the familiar city pigeon, introduced to North America from Europe in the early 1600s, and can be found year-round in Florida as well. They are usually pale gray with two black wing bars and a white rump. They are normally found in flocks. Eurasian-collared doves are also an introduced species found year-round in Florida. They are most commonly observed in pairs or individuals.

Observations: Mourning doves were most abundant species in this guild with 456 (58%) observed (**Figure 26**). Doves were observed during every season at PMP, with increased sightings in the fall (**Figure 27**). They were most commonly observed flying over the runways or perched/flying over the golf course in grids C4 and D4, respectively.

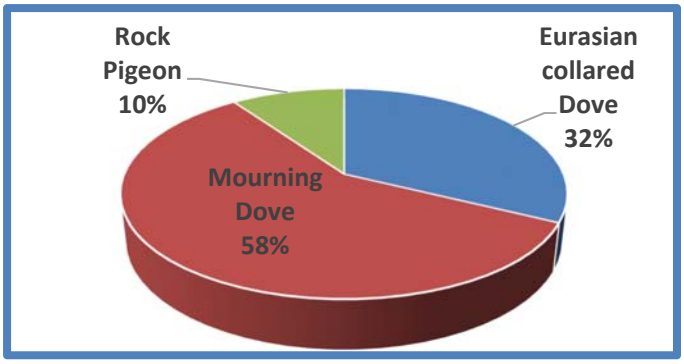

Figure 26 Percentage of Doves and Pigeon Guilds at PMP.

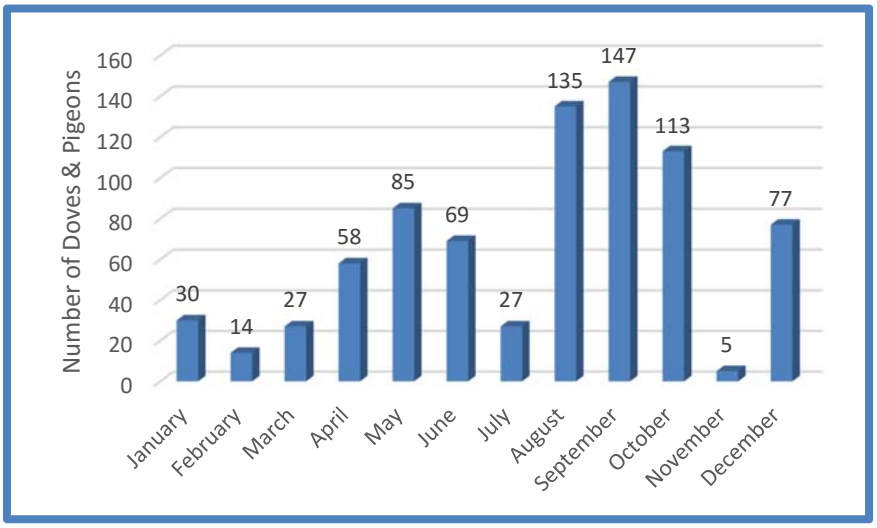

Figure 27 Number of Pigeons and Doves observed at PMP by month.

Risk: The relative hazard score for rock pigeons is 20 and for mourning doves is 10 on a scale of 0-100 (100 being the highest relative risk and 0 being the lowest relative risk). Both species can form large flocks and causing significant damage to aircraft. Mourning doves were ranked as the 3rd most hazardous species at PMP and pigeons are ranked 4th (Table 10).

Control Measures: Habitat management is the best long term solution. Habitat management techniques to control doves include maintaining a consistent grass height greater than 6 inches throughout the airfield (including around structures), creating a dense monoculture of grass to outcompete the weedy, seed-producing vegetation, and eliminating bare ground where possible. Mourning doves were commonly observed where there is available gravel and bare ground. Doves must ingest grit to digest their food, so gravel, sand, degraded pavement, etc. are attractive to these species.

Other control measures could include trimming the interior branches of the landscape trees within the golf course and parking lots, at the City parks adjacent to the airport, the landscape trees along the roads surrounding the airport, and within the airport. This reduces the attractiveness for roosting in these trees, but allows for the shade and aesthetic of the trees to remain. Terminating the feeding of these birds at the local municipal park is also critical. The airport is in an urban environment though with shopping centers, roadway landscaping, residential areas etc., therefore habitat modification will not completely eliminate this potential hazard.

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. 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. Falconry is another effective active control method for this group as they are common prey for raptors.

Legal Status: Mourning 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 laws. Rock pigeons and collared doves are not native species and therefore not protected by any federal or state laws.

5.1.6 Raptors

Description: The following raptors were observed at PMP during this WHA: American kestrel, black vulture, burrowing owl, Cooper's hawk, northern harrier, osprey, red-shouldered hawk, red-tailed hawk, and turkey vultures. These species are all predatory birds that possess hooked bills and talons for catching and killing prey. Most raptors are aerial birds and commonly soar for long distances in search of food. The variations in wing shapes and body proportions are related to their hunting styles and preferred prey. Buteos (red-shouldered and red-tailed hawk) have very broad wings and a short tail. They are often seen perched or soaring. Conversely, falcons (kestrel) and accipiters (Cooper's hawk) have longer, narrow wings that come to more of a point than a buteo. The northern harrier has an owl-like facial disc, which presumably assists them to detect prey by ear. Burrowing owls, turkey vultures, and American kestrels comprised 49%, 28%, and 19% of all raptor observations, respectively. (**Figure 28**).

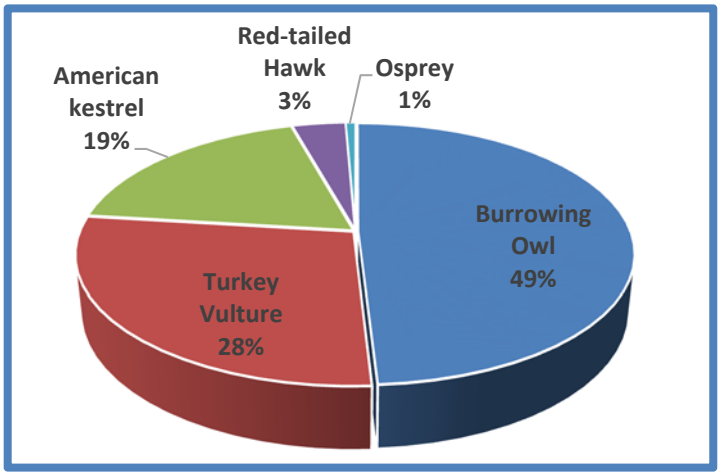

Figure 28 Percentage of each raptor species observed at PMP. Cooper's and red-shouldered hawks, black vulture and Northern harrier are not listed as they each comprise less than 1% of the total observations.

Burrowing owls are one of the smallest owls in Florida and can reach a length of 9 inches with a wingspan of 21 inches (FWC). They are often seen during the day standing erect on top of burrows or perched on fence in open prairies. Burrowing owls are barred and spotted with a white chin strip and have large yellow eyes. They are different from other owls in that they are active during the daytime rather than at night during the breeding season. Nesting season occurs between October and May.

Turkey vultures are often seen soaring or roosting in groups together, however, they are easily distinguished by shape, underwing, and wingbeats. Turkey vultures are all brown birds with a small red head, long tail, and silvery flight feathers (underneath *entire* wing). They soar in a pronounced "V" shape with clumsy, slow wingbeats. Turkey vultures are commonly solitary.

American kestrels are the smallest falcon and one of the most colorful raptors in North America (allaboutbirds.org). Males are distinguished by a slate-blue head and wings, while females' wings are reddish brown. Both sexes have a rusty-red back and tail and pairs of black vertical slashes on the sides of their pale faces. Kestrels are found in habitats with short vegetation in few trees to locate prey more easily and snatch their victims from the ground.

Observations: A total of 610 raptors were observed during the fixed-point observations. Most raptors observed were Florida burrowing owls (49%), followed by turkey vultures (28%), American kestrels (19%), red-tailed hawk (22%), and osprey (1%). Burrowing owls were observed standing erect at their burrows during the day, flying over the open grass fields, or perched on the fence within the AOA. Vultures were primarily observed perched on hangars, other structures on the AOA or soaring over roadways and buildings particularly along the west side of the airport. Hawks were observed in wooded areas throughout the airport and American kestrels were observed flying past the AOA particularly at the north end of the airport. C3 was the most common monitoring grid for observing raptors during the surveys. Raptors are present year-round, but there is an increase in the spring and fall (**Figure 29**). Many raptors, including vultures, migrate to the southern US for the winter. It appears from the graph that most of the raptors observed at PMP were migratory.

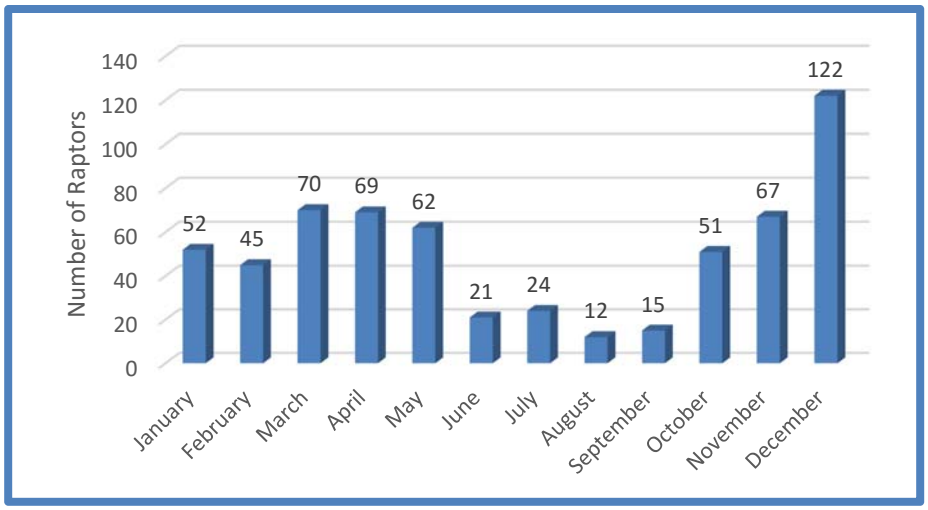

Figure 29 Number of raptors observed per month at PMP

Risk: Raptors observed at PMP range in size from the American kestrel, the smallest falcon in North America (up to 113 g or 0.25 lbs.), to larger raptors such as the turkey vulture, which can weigh over 2.3 kg (approximately 5 lbs.). The relative hazard scores for raptors range from 2.03 (American kestrel) to 50.3 (turkey vulture) on a scale of 0-100 (100 being the highest relative risk and 0 being the lowest relative risk). As noted above, the most abundant raptor observed was the Florida burrowing owl which does not have RHS followed by the turkey vulture with a combined total of 168 individuals recorded. Turkey vultures have a relative hazard score (RHS) of 50.3 (the highest-ranking raptor nationwide) and can cause substantial damage to aircraft. It was determined that turkey vultures were the 5th most hazardous species observed at PMP (Table 10). They are considered the fourth most hazardous bird species, nationwide, behind geese and ducks. Vultures are large birds that tend to soar during mid-day when the numbers of aircraft operations are highest. In addition to carrion, they're commonly attracted to large areas of dark asphalt or pavement (e.g. runways) that have been solar-heated to produce thermals.

It should be noted that Florida burrowing owls are not ranked in the *DeVault et al.* (Appendix B) paper and, therefore, do not have a relative hazard score (RHS) or relative risk value. This does not mean that they are not a hazardous species to aviation at PMP, they just did not meet the criteria to be included in the nationwide study when using data from 1990 through 2009.

Control Measures: The approach to reducing raptor hazards is to make the airfield, and surrounding airspace, unattractive by eliminating perching/nesting opportunities and food sources. Most raptors will perch on a snag or large, isolated tree before attacking their prey. On airports, they will also use man-made structures such as fencing, weather antennas, windsocks, and lighting systems (**Photo 5-2**). Adding perching deterrents, such as bird spiders, to man-made structures or eliminating any unused structures and snags can reduce perching opportunities.

Small mammals (rodents) were not observed during trapping events, but the presence of hawks and other raptors make it reasonable to assume that small mammals do occur on the AOA at PMP (see *Section 3.3.2 Small-mammals* for details). Reducing small mammal populations on the AOA will reduce the birds' primary food source. Removing wood areas within the airport could also help reduce the kestrel and hawk populations. Typically, lethal control is not recommended for hawks, owls, or falcons. A preferred alternative to lethal control is trapping and relocating these birds. There is evidence that relocating hawks at least 70 km (43.5 miles) away from the airfield can be a successful strategy to eliminate potential strikes with aircraft (Wernaart, et. al., 1999). In addition, pyrotechnics may be effective at dispersing raptors from perch sites.

Photo 5-2 Florida Burrowing Owl perched on fence.

To reduce the number of vultures on the airfield, no carrion should be allowed to remain on airport property. During routine airfield inspections, PMP staff should be observant of any carrion within the AOA or near the airfield. Carrion may be common after mowing tall grass. Rabbits and other small mammals seek shelter in the tall grass and are accidentally killed by the mower blades. Any carcasses found should be removed and buried. In addition to food sources, thermals that form over the airfield are also an attractant. If the vultures are out of range, the information should be communicated to incoming pilots.

Legal Status: All raptors, including vultures, 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 cannot be harassed without an additional permit from USFWS and they cannot be lethally taken. The Florida burrowing owl is listed as threatened by FWC, but inactive nests within the airfield can be taken. However, there is a regional population of burrowing owls in this area of Pompano Beach, thus, removal of burrows may not be a long-term solution as these individuals will relocate to another area of the airport and dig a new burrow.

5.1.7 Corvids

Description The following corvids were observed during the WHA at PMP: American crow (10%), fish crow (90%), and blue jay (less than 1%). The most common monitoring grids for observing corvids were D4 and C4. Both crow 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 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). Blue jays have a broad-wing and relatively short-tail. They are noisy and conspicuous residents

of woods, often traveling in small groups (Sibley. 2000). There plumage is pale blue on the upper side with flashing white tail and wing-patches, weighting approximately 3 oz. (85 g) and having a wingspan of 16 inches. Fish crows were observed more frequently at PMP than American crows and blue jays, so they will be the focus of this discussion. Corvids were observed every month, but they were observed in the greatest numbers in March, October and December (**Figure 30**).

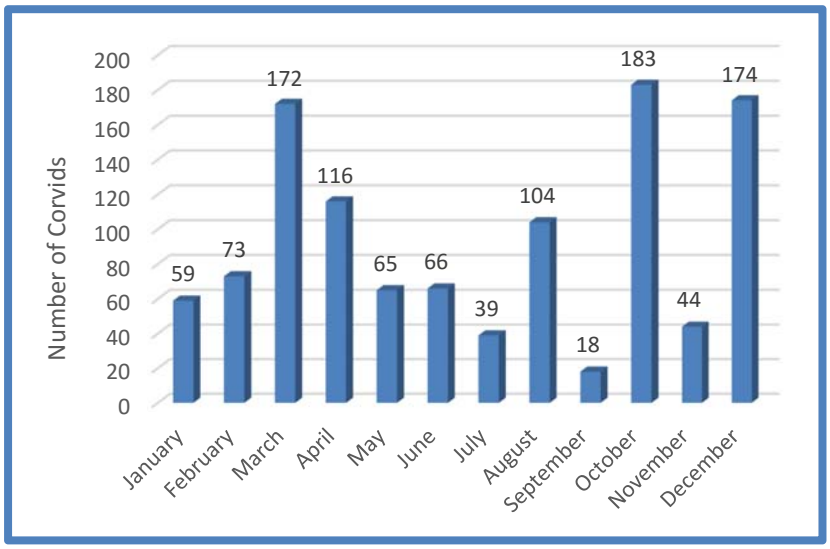

Figure 30 Number of corvids observed per month at PMP.

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. 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 can avoid collisions with aircraft. They move quickly out of the way of a plane during takeoff 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). Fish crows are not ranked in the *DeVault et al.* (Appendix B) paper and, therefore, do not have a relative hazard score (RHS) or relative risk value. However, American crows do have a RHS and are ranked 7th most hazardous species at PMP, due to their high numbers on the airfield in the fall and winter.

Control Measures Crows are 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. grass, trees, weeds, etc.), removing carrion from the movement areas, and ensuring all dumpster lids are 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). 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).

Legal Status American crows, fish crows, and blue jays 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.

5.2 Wildlife Hazards by Species – Mammals

5.2.1 Coyote

Description: Coyotes are usually grayish-brown, often with a patch of white chest hair. They are a shy and elusive, medium-sized canid, weighing approximately 9.07 to 13.6 kg (20-30 lbs.). Coyotes are extremely adaptable and can be found in rural, suburban, and urban landscapes. Coyotes are opportunistic feeders and forage on a variety of plants and animals including fruits, insects, rats and mice, rabbits, birds, deer, livestock, any type of carrion, and people's trash and pet food.

Observations: Coyotes can be found anywhere there are woodlands/shrub for cover. Two coyotes were observed in July near the Goodyear hangar and resting in the center of the AOA. The wooded area near the Goodyear hangar provides ample cover for the elusive coyote during the day. Additionally, the coyotes were observed laying on the runway in the early morning.

Risks: The risk of a coyote strike is decreased due to their behaviors. They can be elusive and avoid collisions quickly. However, they are the second most commonly struck mammal across the country (behind deer), so strikes do occur. When comparing coyotes to other hazardous wildlife at PMP, they are not ranked in the top 10 most hazardous species (Table 10).

Control Measures: The most effective way to control coyotes is exclusions. FAA Certalert No. 16-03 states, "The FAA recommends a 10-foot fence with 3-stranded barbed wire outriggers. In some cases, an airport may be able to use an 8-foot fence with 3-stranded barbed-wire outriggers, depending on the amount of deer activity in a local area. A 4- to 5- foot skirt of fence material, attached to the bottom of the fence and buried at a 45-degree angle on the outside of the fence, is ideal to prevent animals from digging under the fence and reduce the chance of washouts. This type of fencing also greatly increases airport security and safety. A concrete base along the bottom of the fence is also an option to prevent burrowing or digging under the fence. Airport Operators should keep the fence line right-of-way free of excess vegetation. The fenceline should be inspected daily, and a fence inspection schedule should be included in an airport's Wildlife Hazard Management Plan (WHMP). Washouts, breaks, or other holes in the fence need to be repaired as soon as they are discovered. Gates should close with less than 6-inch gaps to prevent entry by deer or coyotes".

Legal Status: Coyotes are not protected by federal or state laws and do not require a permit to be taken on airports.

5.3 Wildlife Hazard by Species – Reptiles

5.3.1 Gopher Tortoise

Description: The gopher tortoise is dark-brown to grayish black with elephantine hind feet, shovel-like forefeet, and a gular projection beneath the head on the yellowish, hingeless plastron or undershell. Their shells range from 5.9 to 14.6 inches long (Ernst and Barbour 1972). They dig deep burrows for shelter in upland habitats and forage on low-growing plants. The tortoise is considered a keystone species, as its burrows provide habitat for more than 350 other species.

Observations: Gopher tortoises were observed throughout the year, but most commonly seen in the central portion of the AOA in the runway safety area. The tortoises were also observed crossing the asphalt. The loose sand between the taxiway and runway provide optimal burrowing habitat for the tortoise, thus the potential for tortoises to cross the asphalt is high while animals are foraging.

Risks: Gopher tortoises were observed numerous times crossing taxiways to forage in the infield areas between the runway and taxiways and then returning to their burrows in woodland areas. They are a slow-moving species and there is some risk of being struck as aircraft are taxing for takeoff or landing, but the risk of damage to the aircraft is low. However, as they are a state-protected species, it is a significant risk to the tortoise if they are traversing the movement areas. The bigger risk to aircraft comes from the burrows created by the tortoises. Large holes within the safety areas or AOA could create a significant risk to aircraft.

Control Measures: The most effective way to control gopher tortoises is to excavate and relocate the tortoise. Once all tortoises are relocated, it is imperative to have a substantial, buried fence to prevent additional tortoises from re-colonizing the airfield.

Legal Status: Gopher Tortoises are listed as Threatened in Florida and both the tortoise and its burrow are protected under state law. A permit is required to relocate tortoises before any land clearing or development takes place. While the gopher tortoise is listed as federally threatened in Louisiana, Mississippi, and counties west of the Mobile and Tombigbee Rivers in Alabama, it is not federally threatened in Florida. Per FWC rule 68A-9.012 *Take of Wildlife on Airport Property*, gopher tortoise burrows can be collapsed within the safety area without a permit if the gopher tortoise has been relocated. FWC relies on airport staff to define their safety area.

Section 6.0 Recommended Actions for Reducing Wildlife Hazards

Section 6 includes passive, active, and administrative recommendations to decrease wildlife hazards to aircraft operations at PMP. This section meets the required element of 14 CFR Part 139.337 (c) (5) which states that the assessment must include "recommended actions for reducing identified wildlife hazards to air carrier operations." The following bulleted list summarizes the recommendations in this section. Sections 6.1 through 6.3 provide further details on each recommendation.

PASSIVE:

- Repair or block all breaches under the existing perimeter fence. Adjust gates to minimize openings to less than 6 inches.
- Remove or exclude all forested areas from within the perimeter fence. Many of these areas are included in either a conservation easement (City of Pompano Beach directed) or have been designated by Broward County as a Local Area of Particular Concern (LAPC). The LAPC is a land use overlay that restrictions development and/or impacts to these areas. Clearing of these areas would require release of the CE and/or a Variance from Broward County.
- Maintain a consistent, intermediate grass height throughout the AOA.
- Remove carrion promptly.
- Remove unnecessary perch sites or install exclusionary devices on known perch sites within airport property.
- Reduce the attractiveness of the stormwater pond at the approach to Runway 24.
- Maintain landscaping around off-site parks and parking lots to reduce attractiveness to wildlife.
- Consider installing signage at off-site park to discourage wildlife utilization.

ACTIVE:

- Wildlife that poses a threat to aviation should be dispersed from the AOA via harassment.
- If repeated harassment attempts are unsuccessful, hazardous wildlife should be removed from the AOA.
- Gopher tortoises and burrowing owls within the AOA should be relocated and their burrows should be filled.

ADMINISTRATIVE:

- Communicate with neighbors to aid in reducing wildlife hazards.
- PMP should develop a Wildlife Hazard Management Plan.
- PMP should obtain a USFWS Depredation Permit.

- PMP staff involved in the wildlife hazard management program should complete wildlife hazard management training as outlined in “FAA AC 150/5200-36A - Appendix D.”

- PMP should consult an FAA Qualified Airport Wildlife Biologist during major planning efforts and prior to development of construction plans on airport property that could create additional wildlife attractants (e.g. stormwater management facilities, new hangars, etc.).

6.1 Passive Management Recommendations

6.1.1 Repair or block all breaches under the existing perimeter fence. Adjust gates to minimize openings to less than 6 inches

Removing all wooded areas from the AOA may not be an economically viable option; however, an interior wildlife fence would assist PMP in providing safe airport operations and exclude the woodlands from the movement areas. Harassment efforts will likely be minimally effective, as there is significant available habitat (wooded areas) inside the PMP perimeter fence. Without a complete fence, proper management of coyote populations (regardless of which management techniques are implemented) will be difficult. These animals are a potential threat to aviation and can only be controlled in the long-term with secure wildlife fencing. The fence needs to fully enclose the AOA and exclude wooded habitat wherever possible.

Guidance from FAA CertAlert 16-03 recommends a 10-12-foot high chain link fence with 3-strand barbed wire outriggers and a four-foot skirt of chain-link fence buried at a 45-degree angle on the outside of the fence to prevent animals from digging under the fence and reduce the chance of washouts. However, any effort to secure the bottom portion of the fence is acceptable. This can include, but is not limited to, a concrete footer, attaching a piece of chain link fencing perpendicular to the bottom of the existing fence, or creating a skirt that is buried, but not at a 45-degree angle.

Any existing breaches should be repaired to prevent wildlife from passing under the fence. Breaches can be blocked with fill material (preferably fist size or larger rocks); metal rebar or fence posts spaced at no more than three (3) inches apart and 24 inches deep; sand bags; speed bumps; etc. In addition, gaps between or under gates should be 6 inches or less.

6.1.2 Where permitted, remove or exclude all forested areas from within the perimeter fence.

Removing or excluding the forested patches within the perimeter fence will eliminate/reduce the habitat for raptors and coyote on the AOA. By excluding this vegetation with wildlife fencing, it will greatly reduce the amount of available habitat for coyotes to forage. Coyotes likely use this cover as travel corridors as well, so they can travel undetected throughout the AOA. Removing the woodlands altogether, would also eliminate perching and nesting habitat for raptors. Removal and/or exclusion of this vegetation should be considered as part of future development projects.

6.1.3 Maintain a consistent, intermediate grass height throughout the AOA.

It is recommended that the grass height always be kept at a minimum of 6 inches. This is the 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. 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. Maintaining an intermediate grass height will be effective against killdeer, mourning doves, cattle egrets, and European starlings. Starlings and killdeer, in particular, prefer short, well maintained grass for foraging and nesting. Turf management is likely the most effective strategy for long-term success at reducing starling and cattle egret presence at the airport as they habituate quickly to most active management techniques.

Since a large portion of the AOA at PMP is ruderal vegetation on sandy soils, maintaining a minimum grass height of 6 inches may not be possible. It is recommended to encourage vegetation in these areas to be as dense as possible, rather than tall. Dense vegetation also reduces the ability for birds to move easily and impedes prey visibility. This should help to reduce the attractiveness of the turf as well.

6.1.4 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 AOA (small or large) should be removed immediately and disposed of properly (buried). Daily inspections for carrion are recommended and should include the areas outside the AOA that are in the approach and departure spaces. Vultures circling a carcass in these areas will also cause a strike hazard to incoming and outgoing aircraft.

6.1.5 Remove unnecessary perch sites or install exclusionary devices on known perch sites on airport property.

To deter birds such as hawks, vultures, starlings, and doves from loafing, nesting, and hunting on the airfield, it is recommended that perch sites within the AOA (that cannot be removed) should be outfitted with exclusion devices such as bird spikes or bird spiders (e.g. lights, directional signs, etc.). An easy and affordable solution for taxiway and runway lights is to secure a golf tee, upside down, on top of the light to reduce the available perching surface. PMP staff should coordinate the installation of exclusion devices on FAA owned/operated equipment if necessary. If the perch is an unused structure or a snag, it is best to just remove the feature.

6.1.6 Reduce the attractiveness of the stormwater pond at the approach to Runway 24.

This can be accomplished by reducing the aquatic vegetation along the banks and creating steep side slopes (3:1 ratio or greater) to reduce the littoral zone. Use of rock rip-rap lining or preferably, concrete lining, can also aid in pond maintenance in the long term. In addition, a grid system of wires or heavy monofilament spaced at one meter intervals over the pond can effectively deter waterfowl, gulls, terns, and potentially wading birds from accessing the water. It is not a physical barrier, but a psychological barrier. The birds perceive the wires as prohibiting access. This method is subject to habituation eventually. If possible, fill the pond at the approach end of

Runway 24. It would be best if the stormwater management treatment in this location was moved underground. Also, remove Brazilian pepper along the southern edge of the pond that is currently used for perching by a variety of birds and iguanas.

6.1.7 Maintain landscaping around off-site parks and parking lots to reduce attractiveness to wildlife

Trimming only the interior branches of the large oaks in the parking areas will reduce the attractiveness to birds, while still maintaining the aesthetics of the landscaping.

6.1.8 Consider installing signage at off-site park to discourage wildlife utilization.

Place signage around the Pompano Community Park and golf course shop and restaurant to inform patrons that feeding birds near airports should be prohibited and that it increases the risk of a bird strike at PMP.

6.2 Active Management Recommendations

6.2.1 Wildlife that poses a threat to aviation should be dispersed from the AOA via harassment.

Non-lethal harassment measures such as the use of pyrotechnics, vehicles, sirens, horns, sound cannons, effigies, trained canines, and falconry can provide deterrence for wildlife. Harassment measures should be used on a regular basis to move potentially hazardous species form the AOA. A variety of harassment measures should be used to minimize wildlife from becoming habituated to a single method, however, vehicle harassment is recommended as the first method of dispersal at PMP.

6.2.2 If repeated harassment attempts are unsuccessful, hazardous wildlife should be removed from the AOA.

Most wildlife is highly adaptable and will habituate to non-lethal harassment measures (e.g. vehicles, 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. 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, especially when dispersing a large flock. Shooting can be labor intensive and can be a sensitive issue with 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 can be target specific. Therefore, protected species or other non-target species are not placed at risk. It is recommended that a bird field identification guide be kept in the maintenance vehicles as well. All shooting activities should be coordinated with tenants and local law enforcement as necessary. It is best if lethal control is discreet and conducted by a wildlife professional or experienced hunter. Lethal control of birds requires a USFWS Migratory Bird Depredation Permit, however, coyote and other mammals can be taken on the airfield for the purposes of human health and safety without a permit.

6.2.3 Gopher tortoises and burrowing owls within the AOA should be relocated and their burrows should be filled.

Per FWC rule 68A-9.012 *Take of Wildlife on Airport Property*, gopher tortoise burrows can be collapsed within the safety area without a permit if the gopher tortoise has been relocated and it is confirmed that the burrow is unoccupied. FWC relies on airport staff to define their safety area. Also under 68A-9.012, burrowing owls can be taken in an emergency situation or after repeated, documented harassment techniques have failed. All state protected species taken on airports must be reported to FWC within 5 business days using Form FWC-AWIR 06-2010. Taking burrowing owls is not recommended, unless it is an emergency, and relocation of owls is the preferred control method.

6.3 Administrative Recommendations

6.3.1 Communicate with neighbors to aid in reducing wildlife hazards.

Coordinating with adjacent property owners to educate them on the threat of bird strikes and the potential risks to human health and safety can encourage them to either take action themselves or allow airport staff/contractors access to adjacent properties for control activities. Prohibiting feeding of birds at the adjacent municipal parks is critical.

6.3.2 PMP should develop a Wildlife Hazard Management Plan.

It is the professional opinion of ERS' qualified airport wildlife biologist that a WHMP should be developed for PMP. A WHMP will help PMP staff to establish procedures for addressing these hazards and assign specific mitigation responsibilities to staff members. It can also help identify capital projects for the future that will reduce the attractiveness of the AOA to wildlife.

6.3.3 PMP should obtain a USFWS Depredation Permit.

PMP does not currently possess a depredation permit required by the USFWS to take migratory birds protected by the MBTA. This permit should be obtained and renewed annually. Without this permit, taking migratory birds and/or their nests is prohibited.

6.3.4 PMP staff involved in the wildlife hazard management program should complete wildlife hazard management training as outlined in "FAA AC 150/5200-36A - Appendix D"

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 supervisor. Once a WHMP is approved by the FAA, training is required on an annual basis.

6.3.5 PMP should consult an FAA Qualified Airport Wildlife Biologist during major planning efforts and prior to development of construction plans on airport property that could create wildlife attractants (e.g. stormwater management facilities, new hangars, etc.).

If large projects or changes to the landscape are being considered at PMP, a qualified airport wildlife biologist should be contracted for input on how the proposed changes may impact wildlife at the airport. This is especially crucial if new stormwater management facilities are proposed. A multi-disciplinary approach encourages pre-planning, which can prevent problems and lead to cost savings in the future. FAA AC 150/5200-33B, Section 2-3 provides the following guidelines for stormwater management facilities at airports:

> **"b. New stormwater management facilities.** The FAA strongly recommends that off-airport stormwater management systems located within the separations identified in Sections 1-2 through 1-4 be designed and operated so as not to create above-ground standing water. Stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow, and linearly shaped water detention basins."

Section 7.0 References

Wildlife Strikes to Civil Aircraft in the United States 1990-2015. US Department of Transportation, Federal Aviation Administration and the US Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services. Dolbeer, Richard A., Weller, John R., Anderson, Amy L. and Beigier, Michael J. Federal Aviation Administration National Wildlife Strike Database Serial Report Number 22. November 2016. 121 pages.

Wildlife Society Bulletin 35(4):394–402; 2011; "Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management"

Appendix A

Sample Observation Log Sheet

WILDLIFE HAZARDS -MONTHLY SURVEY FIELD DATA SHEET

PAGE OF

AIRPORT NAME	OBSERVER(S) :	DATE (MM/DD/YY)	SURVEY PERIOD
Pompano Beach Airpark (PMP)			

TEMPERATURE (^{o}F)	WIND DIRECTION/SPEED (d/mph)	WEATHER CONDITION

TIME (local/24hr)	STATION	GRID SQUARE	SPECIES	NUMBER OF ANIMALS	ACTIVITY (See codes below)	LOCATION (See codes below)	COMMENTS

WEATHER

CL = cloudy
FG = fog
PC = partly cloudy
RN = rain
SN = snow/sleet
SU = sunny

ACTIVITY

BD = bedded down
FL = flying/localized
FO = foraging
FP = flying/passing
HO = hovering
HW = hawking insects
LF = loafing
PE = perching
RS = roosting
RN = running
SO = soaring
NS = nesting
VO = vocalizing

LOCATION

AOA = Airport OPS Area
APP = flight approach
ASP = asphalt/concrete
BNK = bank of ditch or pond
CRX = creek/stream
DTC = ditch
GLG = grass, long
GSH = grass, short
MAR = marsh/wetland
PND = pond
RMP = ramp
RWY = runway
SHR = shrubs
STR = structure
TSW = temporary standing water
TWY = taxiway
UNP = unpaved road
WDL = woodland
URB = urban area
TRE = tree
BARE = bare area/grit/dirt
GLF = golf course

Appendix B

Excerpt from Wildlife Society Bulletin 35(4):394–402; 2011*;* *Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management"*

Table 1. Ranking of 77 bird and mammal species or groups (1 = most hazardous) as to relative hazard to aircraft in airport environments (i.e., ≤500 ft. [152 m] above ground level), based on a composite rank. The composite rank reflects 3 variables: the percentage of total strikes (for that species–group) that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft, and the percentage of total strikes that caused an effect on flight (EOF). Strike data are from the Federal Aviation Administration National Wildlife Strike Database, for strikes that occurred in the United States from 1990 to 2009[1].

Species[2]	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Mule deer (*Odocoileus hemionus*)	47	96	38	83	1	1	1	1	100
White-tailed deer (*Odocoileus virginianus*)	814	87	36	68	2	2	3	2	88
Domestic dog	21	53	26	75	4	4	2	3	71
Other geese	20	68	32	32	3	3	8	4	61
Canada goose (*Branta canadensis)*	776	51	16	34	7	9	7	5	46
Turkey vulture (*Cathartes aura*)	159	46	16	34	10	7	6	5	44
Other ducks	77	49	24	30	8	5	11	7	48
Great horned owl (*Bubo virginianus*)	29	52	16	27	6	8	17	8	44
Double-crested cormorant (*Phalacrocorax auritis*)	24	52	13	29	5	13	13	8	43
Brown pelican (*Pelecanus occidentalis*)	31	35	13	38	14	14	5	10	40
Wild turkey (*Meleagris gallopavo*)	38	37	6	43	13	28	4	11	40
Sandhill crane (*Grus canadensis*)	66	43	10	28	11	19	15	11	37
Glaucous-winged gull (*Larus glaucescens*)	27	48	9	28	9	21	16	13	39
Bald eagle (*Haliaeetus leucocephalus*)	74	40	7	30	12	25	10	14	36
Great black-backed gull (*Larus marinus*)	20	26	21	22	18	6	23	14	32
Osprey (*Pandion haliaetus*)	77	32	12	26	16	15	19	16	32
Great blue heron (*Ardea herodius*)	132	32	8	28	15	23	14	17	31
Ring-necked pheasant (*Phasianus colchicus*)	45	26	14	22	20	10	26	18	29
Herring gull (*Larus argentatus*)	291	25	13	24	23	12	21	18	29
Snowy owl (*Bubo scandiacus*)	28	23	12	26	24	17	20	20	28
Mallard (*Anas platyrhynchos*)	221	31	11	21	17	18	28	21	29
Great egret (*Ardea alba*)	24	26	4	29	21	32	12	22	28
Red-tailed hawk (*Buteo jamaicensis*)	534	26	8	21	19	24	27	23	25
California gull (*Larus californicus*)	23	14	14	20	33	11	30	24	22
Cattle egret (*Bubulcus ibis*)	112	17	6	27	32	27	18	25	23
Ring-billed gull (*Larus delawarensis*)	362	21	8	20	26	22	33	26	23
Franklin's gull (*Larus pipixcan*)	26	9	9	23	41	20	22	27	19
Raccoon (*Procyon lotor*)	23	18	12	14	28	16	40	28	20

Species[2]	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Coyote (*Canis latrans*)	231	14	3	31	36	41	9	29	22
Rock dove (*Columba livia*)	1,035	18	6	19	29	26	34	30	20
Swainson's hawk (*Buteo swainsoni*)	24	17	4	20	31	33	31	31	19
Other hawks	34	14	4	22	34	37	25	32	18
Laughing gull (*Larus atricilla*)	106	14	4	21	35	34	29	33	18
Mew gull (*Larus canus*)	21	25	0	16	22	52	37	34	19
Peregrine falcon (*Falco peregrinus*)	44	18	5	7	30	29	53	35	14
Laysan albatross (*Phoebastria immutabilis*)	29	22	0	17	25	53	35	36	18
Rabbits (Leporidae)	78	11	3	15	37	39	39	37	13
Upland sandpiper (*Bartramia longicauda*)	32	8	4	16	43	36	36	37	13
Short-eared owl (*Asio flammeus*)	58	10	4	11	39	35	43	39	12
Black-bellied plover (*Pluvialis squatarola*)	20	18	0	16	27	54	38	40	15
Red fox (*Vulpes vulpes*)	31	8	0	22	42	55	24	41	14
American crow (*Corvus brachyrhynchos*)	141	10	3	13	40	40	41	41	12
Spotted dove (*Streptopelia chinensis*)	46	7	4	10	48	31	45	43	10
Barn owl (*Tyto alba*)	174	11	3	9	38	38	49	44	11
Mourning dove (*Zenaida macroura*)	1,313	7	3	13	45	42	42	45	10
Blackbirds	976	7	2	10	44	46	44	46	9
European starling (*Sturnus vulgaris*)	1,408	7	2	10	47	43	46	47	9
Bats (Chiroptera)	44	5	5	8	55	30	51	47	8
Killdeer (*Charadrius vociferus*)	553	6	1	7	51	48	52	49	7
American kestrel (*Falco sparverius*)	536	4	1	7	57	47	55	50	6
Zebra dove (*Geopelia striata*)	54	4	2	6	56	44	59	50	5
Snow bunting (*Plectrophenax nivalis*)	84	1	0	20	66	66	32	52	10
Common myna (*Acridotheres tristis*)	21	6	0	6	50	58	56	52	6
Bank swallow (*Riparia riparia*)	49	5	0	9	54	61	50	54	6
Meadowlarks	361	3	2	6	61	45	60	55	5
Woodchuck (*Marmota monax)*	41	7	0	3	46	56	68	56	5
Horned lark (*Eremophila alpestris*)	372	3	1	6	60	49	61	56	4
Sparrows	1,799	3	0	6	62	51	58	58	4
Northern harrier (*Circus cyaneus*)	24	5	0	5	52	59	62	59	5
American robin (*Turdus migratorius*)	159	2	0	10	64	65	47	60	5
Burrowing owl (*Athene cunicularia*)	20	6	0	0	49	57	73	61	3
Barn swallow (*Hirundo rustica*)	486	2	0	3	65	50	69	62	2
Wrens	28	4	0	4	58	62	66	63	3

Species[2]	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Terns	45	5	0	0	53	60	74	64	2
Finches	55	0	0	10	71	71	48	65	4
Chimney swift (*Chaetura pelagica*)	34	0	0	6	70	70	57	66	3
Common nighthawk (*Chordeiles minor*)	38	3	0	0	59	63	75	66	1
Pacific golden-plover (*Pluvialis apricaria*)	204	1	0	4	67	67	64	68	2
Purple martin (*Progne subis*)	57	2	0	2	63	64	72	69	2
Western sandpiper (*Calidris mauri*)	31	0	0	7	76	76	54	70	3
Cliff swallow (*Petrochelidon pyrrhonota*)	164	1	0	2	68	68	71	71	1
Skunks (Mephitidae)	30	0	0	4	74	74	63	72	2
Nutmeg mannikin (*Lonchura punctulata*)	26	0	0	4	72	72	67	72	2
Chestnut manikin (*Lonchura malacca*)	28	0	0	0	69	69	76	74	0
Wood warblers	30	0	0	4	77	77	65	75	2
Tree swallow (*Tachycineta bicolor*)	109	0	0	2	75	75	70	76	1
Opossum (*Didelphis virginiana*)	25	0	0	0	73	73	77	77	0

[1] Excerpted from the Wildlife Society Bulletin 35(4):394–402; 2011*; "Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management."* Refer to this publication for additional explanation of criteria and method of ranking and Wildlife Society Bulletin 28:372–378 "*Ranking the Hazard Level of Wildlife Species to Aviation"* for detailed definitions of damage and EOF.

[2] Other geese = snow goose (*Chen caerulescens*), brant (*Branta bernicla*), greater white-fronted goose (*Anser albifrons*); other ducks = 23 species in the family Anatidae; other hawks = Cooper's hawk (*Accipter cooperii*), sharp-shinned hawk (*A. striatus*), rough-legged hawk (*Buteo lagopus*), red-shouldered hawk (*B. lineatus*), broad-winged hawk (*B. platypterus*), ferruginous hawk (*B. regalis*); blackbirds = red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*); meadowlarks = eastern meadowlark (*Sturnella magna*), western meadowlark (*S. neglecta*); sparrows = 19 species in the family Emberizidae; wrens = house wren (*Troglodytes aedon*), Carolina wren (*Thryothorus ludovicianus*), marsh wren (*Cistothorus palustris*); terns = common tern (*Sterna hirundo*), arctic tern (*S. vittata*), Caspian tern (*S. caspia*), least tern (*S. antillarum*), fairy tern (*S. nereis*); finches = house finch (*Carpodacus mexicanus*), American goldfinch (*Carduelis tristis*); wood warblers = 13 species in the family Parulidae.

Appendix C

Species Observed per Guild

Species Observed at PMP Per Guild

Aerial Foragers
- Chimney swift
- Common nighthawk
- Purple martin
- Tree swallow

Blackbirds
- Boat-tailed grackle
- Brown-headed cowbird
- European starling

Corvids
- American crow
- Blue jay
- Fish crow

Doves & Pigeons
- Eurasian collared-dove
- Mourning dove
- Rock pigeon

Gulls
- Herring gull
- Gull-billed tern
- Least tern
- Unidentified gull

Passerines
- Brown thrasher
- Gray kingbird
- Loggerhead shrike
- Northern mockingbird

Parrots
- Monk parakeet
- Unidentified green parrots

Raptors
- American kestrel
- Black vulture
- Florida burrowing owl
- Northern harrier
- Osprey
- Red-shouldered hawk
- Red-tailed hawk
- Turkey vulture

Shorebirds
- Killdeer
- Willet

Wading Birds
- Black-necked stilt
- Cattle egret
- Great blue heron
- Great egret
- Green heron
- Little blue heron
- Snowy egret
- Tri-colored heron
- White ibis
- Wood stork

Waterfowl
- Anhinga
- Black-bellied whistling duck
- Brown pelican
- Common gallinule
- Hooded merganser
- Double-crested cormorant
- Mallard
- Mottled duck
- Northern pintail
- Pied-billed grebe
- Red-breasted merganser

Appendix D

Initial Wildlife Hazard Assessment Site Inspection Technical Review

Environmental Resource Solutions
Our Science. Your Success.

WHA Site Inspection Technical Review

Project	PMP Wildlife Hazard Assessment
Date	Inspection Date: May 17-19, 2016
Present	Steven Rocco, Airport Manager - PMP Dave Adams, Airport Operations/Maintenance Staff Bruce Bivins, Air Traffic Manager, ATC Tower Amy Reed – ERS Lynn Kiefer – KHA
Subject	Site Inspection Technical Review and Recommendations

Environmental Resource Solutions, Inc. (ERS), in partnership with Kimley-Horn and Associates (KHA), has prepared this technical memorandum to provide the staff of Pompano Beach Airpark (PMP) with an initial site analysis for the PMP wildlife hazard assessment (WHA). This memo summarizes the findings from the initial inspection of the air operations area (AOA) and off-site points, and a review of the wildlife observation stations that will be utilized during the assessment. Initial recommendations to reduce wildlife attractants or address elements of the overall wildlife hazard management program at PMP are provided in Section 3.0 for consideration by airport staff.

1.0 PMP WHA Project Set Up and Data Collection Overview

ERS & KHA conducted a project kick off and coordination meeting with PMP staff on May 17, 2016. During this meeting, ERS/KHA provided an overview of the WHA methodology, current wildlife strike data, national wildlife hazard setting, and anticipated project schedule. PMP staff provided background information related to airport operations, past and current wildlife observations, wildlife management techniques, and personnel availability.

The project area was defined using the Federal Aviation Administration (FAA) "General Separation Criteria for Hazardous Wildlife Attractant on or Near Airports" within FAA Advisory Circular (AC) 150/5200-33B. PMP operations include both piston-powered and turbine-powered aircraft. For the purposes of this WHA, the 10,000 foot and 5-mile separation criteria areas will be utilized for the project area (see Exhibits 1 and 2). The focus within the 5-mile buffer will be to assess compatible land uses and the airport's ability to review and coordinate comments on land use changes or development projects in these areas. The 10,000 foot separation criteria will be the focus for wildlife observations during the WHA and will also be reviewed for compatible land use off-airport. Below is a description of the FAA separation criteria from FAA AC 150/5200-33B.

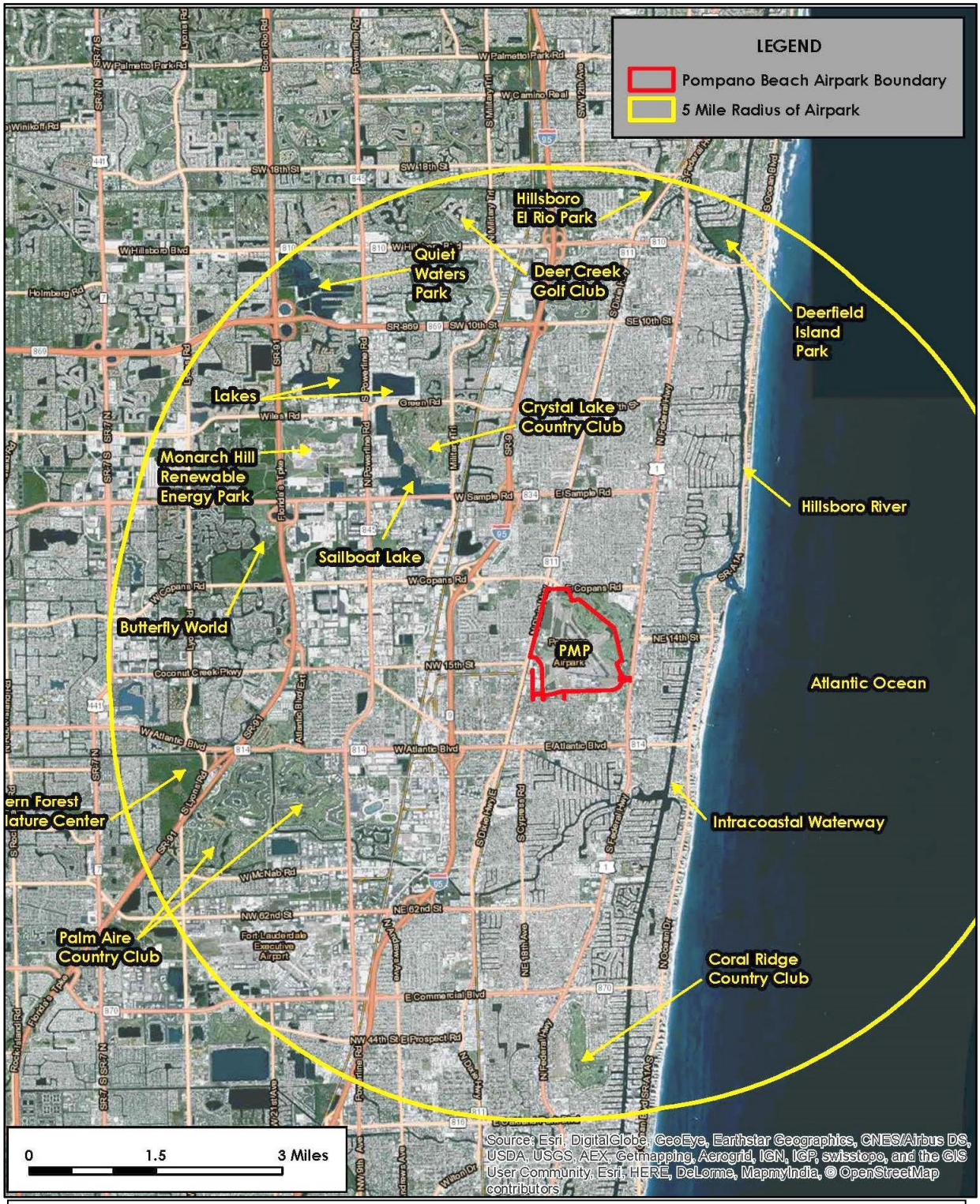

Exhibit 1. Potential wildlife attractants within the 5-mile separation criteria from Pompano Beach Airpark. The Monarch Hill Renewable Energy Park is a local landfill and of greatest concern within 5 miles.

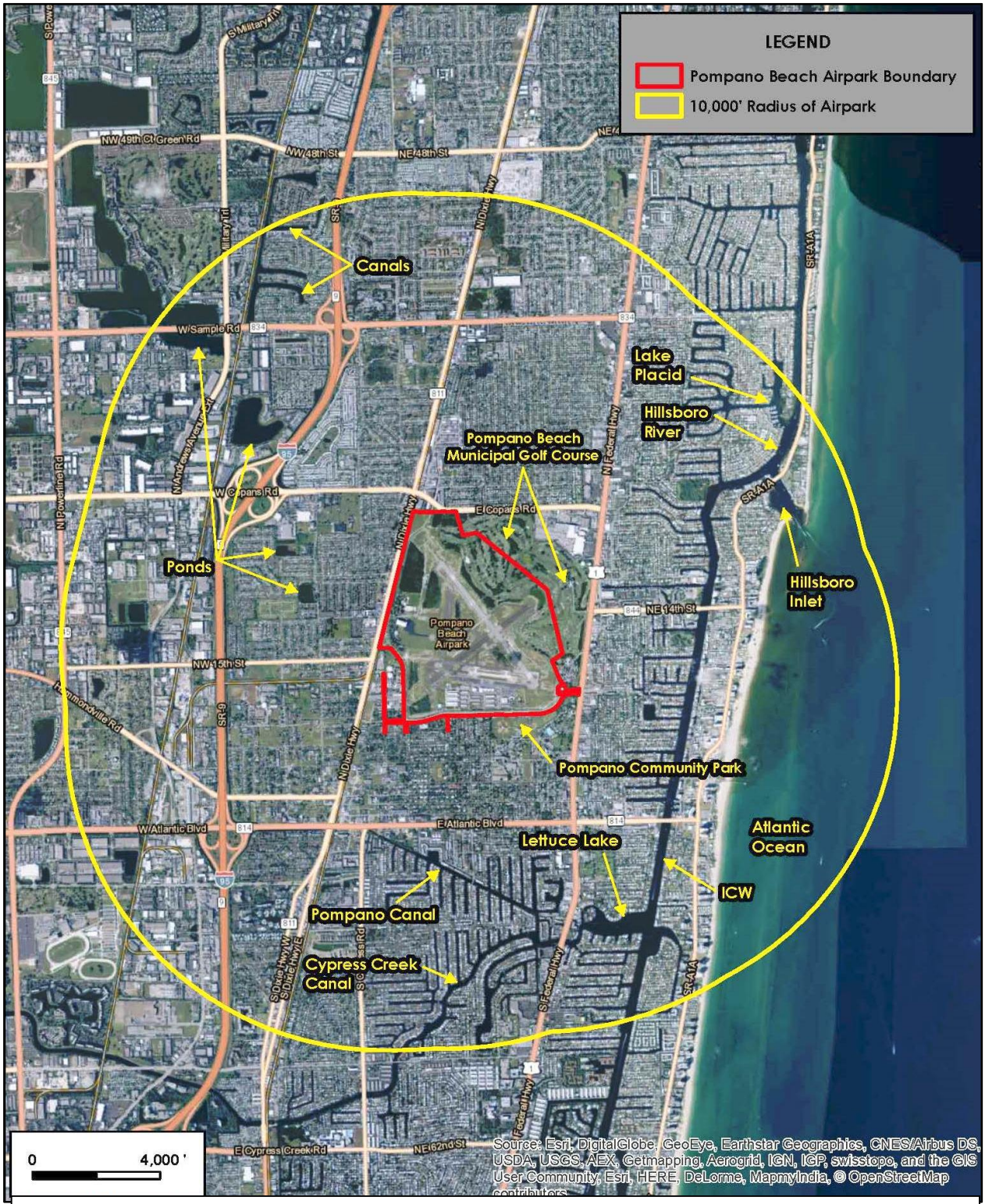

Exhibit 2. Potential wildlife attractants within the 10,000-foot separation criteria from Pompano Beach Airpark.

AC 150/5200-33B GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1. INTRODUCTION. When considering proposed land uses, airport operators, local planners, and developers must take into account whether the proposed land uses, including new development projects, will increase wildlife hazards. Land-use practices that attract or sustain hazardous wildlife populations on or near airports can significantly increase the potential for wildlife strikes.

The FAA recommends the minimum separation criteria outlined below for land-use practices that attract hazardous wildlife to the vicinity of airports. Please note that FAA criteria include land uses that cause movement of hazardous wildlife onto, into, or across the airport's approach or departure airspace or air operations area (AOA). See the discussion of the synergistic effects of surrounding land uses in Section 2-8 of AC 150/5200-33B.

The basis for the separation criteria contained in this section can be found in existing FAA regulations. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (78 percent occur under 1,000 feet and 90 percent occur under 3,000 feet above ground level), and (3) National Transportation Safety Board (NTSB) recommendations.

1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT. Airports that do not sell Jet-A fuel normally serve piston-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 5,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 (of the AC) or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant.

1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT. Airports selling Jet-A fuel normally serve turbine-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 10,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant.

1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE. For all airports, the FAA recommends a distance of 5-statute miles between the farthest edge of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

Prior to the initial site inspection, observation points were plotted on an aerial of PMP. The observation points were placed on or near the airfield to capture a variety of potential attractants both on and off the airport. During the site inspection, the observation points were field verified and/or adjusted to meet the needs of the WHA. Exhibit 3 depicts the location of the ten (10) wildlife observation points that will be used during data collection (revised during the initial site inspection and from input during the project kick-off meeting). There are seven (7) on-AOA observation points and three (3) off-AOA observation points.

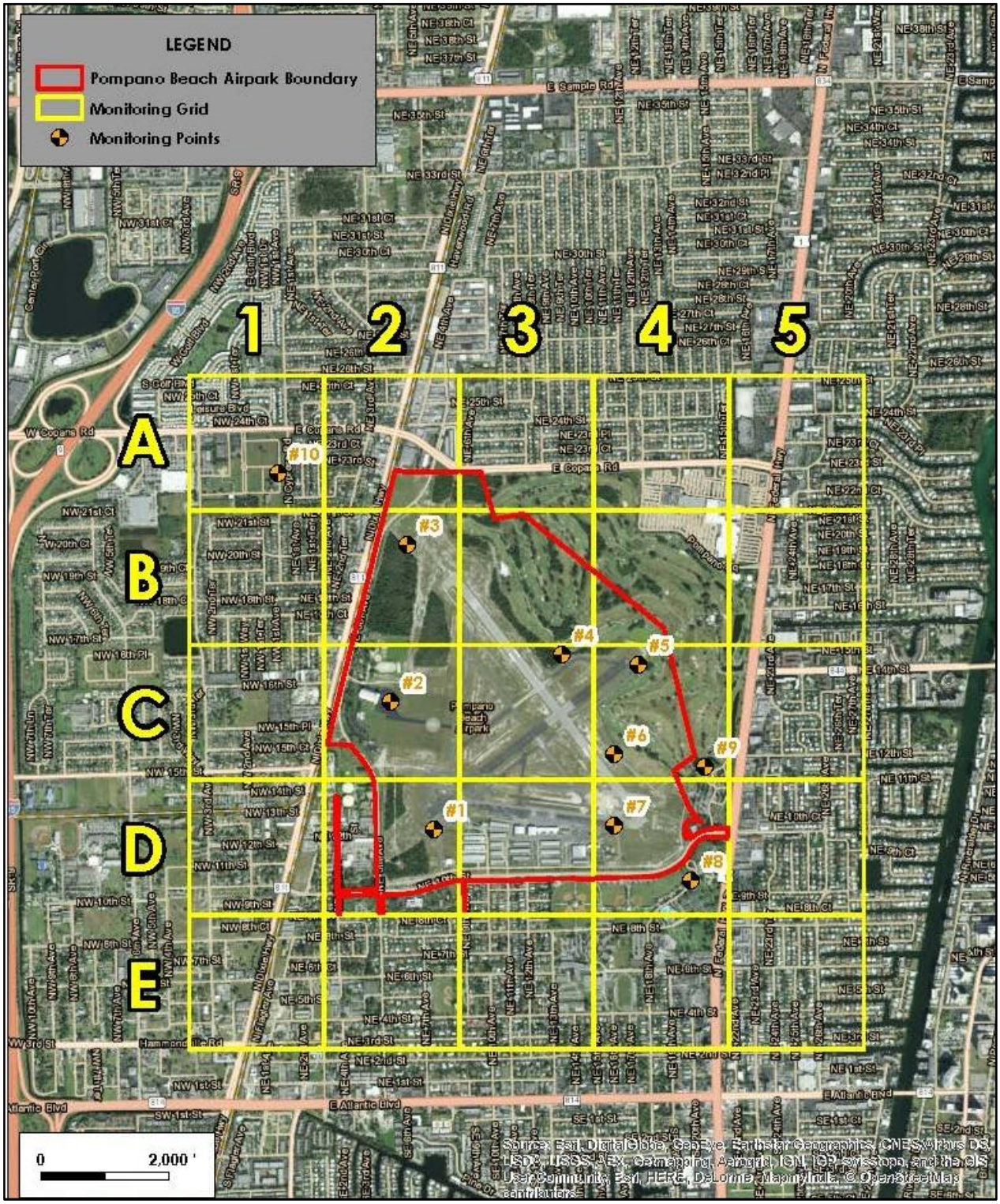

Exhibit 3. Monitoring grid and observation stations at PMP for data collection during the WHA

The WHA will consist of 12 months of surveys, beginning May 2016. Survey iterations will be conducted once per month over a three-day period. Each iteration will consist of two dawn, two midday, and two dusk surveys and the biologist will record observations at each monitoring station during each survey. There will also be monthly nighttime spotlight surveys conducted within the AOA. The intent of this data collection is to capture the types, numbers, and activities of wildlife in and around the AOA and within the 10,000 foot separation criteria. Data from the observations will be compiled and analyzed to develop recommendations. The ultimate goal is to decrease the attractiveness of the airfield (and surrounding area) to wildlife that has the potential to be hazardous to aircraft operations.

2.0 Initial Site Inspection

The initial surveys took place on May 17-19, 2016. The initial survey period included a vehicular survey of the AOA and field verification of the airside and landside wildlife observation point locations. During the inspection, ERS/KHA documented items of interest and discussed current and past wildlife hazard issues, habitat modifications, and other maintenance/operational activities at the airport. Throughout the site inspection, wildlife concerns were noted and potential recommendations were discussed. As a result of the site inspection, the following items have been identified as potential wildlife attractants, wildlife access areas to be addressed, or overall wildlife hazard management items.

2.1 Airfield Turf Management

The majority of the airfield turf was in compliance with the FAA recommended intermediate grass height (6 to 12 inches). However, some areas were noted as having shorter (< 6 inches) grass than is prescribed. Photo 1 is a picture of the mowed areas in the AOA that were shorter than the FAA guidance. These areas are mainly along the taxiways and runways. It is recommended that the grass be maintained within the intermediate height range (6 to 12 inches) to dissuade smaller flocking birds such as doves and European starlings from using this area. A general rule of thumb is that the grass should be tall enough to cover the starling's eye. This limits the bird's predator detection and makes them feel unsafe. Therefore, they choose a different (and safer) place to forage.

Photo 1. Short grass within the AOA at PMP

2.2 Stormwater Pond

There is a large pond that located directly at the approach to Runway 24. The pond is actually within the runway safety area (Photo 2). During the site inspection, aquatic vegetation was observed along the pond banks, which were also very gradual. Gradual pond banks allow for a large littoral zone, attracting a variety of wildlife species. Wading birds, blackbirds, and waterfowl are all attracted to a dense littoral zone and a pond with gradual banks. To reduce the attractiveness, regular vegetation removal is recommended. Reconstructing the pond with steep side slopes would also help to reduce the attractiveness. Herons, grackles, cormorants, mallards, and least terns were all observed utilizing this pond during the site inspection.

Photo 2. Stormwater pond at approach to Runway 24 at PMP.

2.3 Perimeter Fencing

Photo 3. Breach in perimeter fence at PMP.

During the initial project coordination meeting with staff, the presence of larger mammals, specifically coyote and domestic dogs, within the AOA was discussed. Breaches and gaps in perimeter fencing may have allowed these animals to access the AOA. Throughout the inspection of the AOA, the perimeter fence was checked for breaches and areas that provide wildlife access to the AOA. The majority of the perimeter fence appeared to be intact. One large breach was found along the fence, behind the wooded areas on the northern portion of the AOA (Photo 3). This space is large enough for mammals such as coyote and domestic dogs to enter the airfield. No coyotes or other large mammals were observed during this initial inspection. FAA CertAlert 04-16 recommends, “a 10 to 12-foot chain link fence with 3-strand barbed wire outriggers and a 4-foot skirt of chain-link attached to the bottom, buried at a 45 degree angle on the outside”, to prevent animals from jumping over or digging under the fence.

2.4 Burrows within the AOA

Many gopher tortoises (Photo 4) and burrowing owls (Photo 5) were observed throughout the AOA at PMP during the initial inspection. Both of these species are known for the large burrows they excavate and inhabit. Burrowing owls will often occupy inactive or abandoned gopher tortoise burrows. Gopher tortoises are expert excavators and can dig very large burrows, providing homes for up to 200 differenct commensal species. Neither the gopher tortoise nor the burrowing owl are extremely hazardous species to aviation, however, they certainly can cause a strike, and may cause damage to aircraft. The greater concern comes from their burrows being in close proximity to movement areas, specifically within the runway safety area. These burrows can be very large and create holes within the safety area that may damage aircraft.

Photo 4, left. Gopher tortoise just outside it's burrow on the AOA at PMP.
Photo 5, right. Two burrowing owl fledglings outside their burrow on the AOA at PMP.

2.5 Forested Areas within the AOA

There are a several forested areas within the AOA at PMP, specifically along the western and northern portions of the airfield (Photo 6). Although these patches are fragmented and small, they are large enough to support several larger mammals (e.g. coyote). These areas also provide nesting and roosting habitat for large birds such as raptors and crows. Ideally, it is best to eliminate wooded areas from the AOA to reduce the amount of available habitat for these hazardous species within the perimeter fence.

Photo 6. Wooded areas inside the perimeter fence at PMP.

2.6 Recreational Land Uses Adjacent to AOA

PMP is bordered on the east by a large golf course. The golf course contains many ponds, including the pond at the approach to Runway 24, and various landscaping. The golf shop and restaurant parking lots are lined with large oaks (Photo 7). The large trees provide excellent roosting and nesting habitat for grackles, doves, pigeons, and starlings. These species were continuously observed flying around the parking lots during the initial site inspection. The golf shop and restaurant are located within the approach to Runway 28.

In addition, the Pompano Community Park (which consists of picnic pavilions, walking trails, baseball and soccer fields, a pool, dog park, and playground sets for kids) is located just south of PMP, at the approach to Runway 33. Many ibis, starlings, pigeons, grackles, and mallards were observed foraging within the park. Bird seed was noted on two occasions (Photo 8). It appears that a park patron comes to feed the birds here. Feeding the birds could be a direct hazard to aviation safety at PMP. This is likely an education issue that could be solved with signage explaining the risk that birds cause to aviation.

Photo 7, top. Large trees lining the parking lot along the golf shop, golf course restaurant, and dog park.
Photo 8, bottom. Bird seed in parking lot at Pompano Community Park, just south of PMP.

3.0. Initial Recommendations

This section provides a summary of initial recommendations proposed by ERS/KHA. Table 3-1 includes preliminary recommendations based on information gathered during the initial site inspection and in discussions with PMP personnel.

TABLE 3-1 INITIAL RECOMMENDATIONS

Recommendation Number	Description
IR -1	Airfield turf, within the perimeter fence, should be consistently maintained at a height of 6 to 12 inches. Periodic inspections of mower decks should be implemented as a best management practice to ensure they are at an intermediate height.

TABLE 3-1 INITIAL RECOMMENDATIONS

Recommendation Number	Description
IR-2	PMP staff should reduce the attractiveness of the stormwater pond at the approach to Runway 24. This can be accomplished by reducing the aquatic vegetation along the banks and creating steep side slopes to reduce the littoral zone. Other techniques such as a wire grid or fishing line along the pond bank can also be employed.
IR-3	As an ongoing best management practice, PMP staff should repair breaches or sizable gaps in the perimeter fence, where possible, to prevent mammals from entering the AOA. For long term exclusion, airport staff should request funding and approvals to install wildlife fencing as described in FAA Cert Alert 04-16.
IR-4	Gopher tortoises and burrowing owls within the safety areas should be relocated and their burrows should be filled. This will eliminate the large holes in the safety areas.
IR-5	Eliminate wooded areas inside the perimeter fence. This can be done via exclusion (fencing) or tree removal. Ensure all permits, if necessary, are in place prior to removal of vegetation.
IR-6	Place signage around the Pompano Community Park and golf course shop and restaurant to inform patrons that feeding birds near airports should be prohibited and that it increases the risk of a bird strike at PMP. In addition, trimming only the interior branches of the large oaks in the parking areas will reduce the attractiveness to birds, while still maintaining the aesthetics of the landscaping.

4.0 Next Steps

As previously mentioned, the recommendations in this memo are initial recommendations provided to PMP for consideration. The recommendations within this memo may be retained in part or in full as part of the final WHA.

The data collection portion of the WHA began in May 2016, continues for 12 consecutive months, and will conclude in April 2017. Upon completion of the year-long data collection and continued communications with personnel, further detailed recommendations may be developed to address wildlife attractants and potential hazards to aviation safety. PMP personnel can expect the final WHA, including all data analysis, attractants, and recommendations, within two (2) months of completing all surveys.