Chapter 8
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Appendix A

Federal Aviation Administration Regulations -

protecting—all NAVAIDS on its airport against vandalism and theft; and

(c) Prevent, insofar as it is within the airport's authority, interruption of visual and electronic signals of NAVAIDS.

§ 139.335 Public protection.

(a) In a manner authorized by the Administrator, each certificate holder must provide—

(1) Safeguards to prevent inadvertent entry to the movement area by unauthorized persons or vehicles; and

(2) Reasonable protection of persons and property from aircraft blast.

(b) Fencing that meets the requirements of applicable FAA and Transportation Security Administration security regulations in areas subject to these regulations is acceptable for meeting the requirements of paragraph (a)(l) of this section.

§ 139.337 Wildlife hazard management.

(a) In accordance with its Airport Certification Manual and the requirements of this section, each certificate holder must take immediate action to alleviate wildlife hazards whenever they are detected.

(b) In a manner authorized by the Administrator, each certificate holder must ensure that a wildlife hazard assessment is conducted when any of the following events occurs on or near the airport:

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

(2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;

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

(4) Wildlife of a size, or in numbers, capable of causing an event described in paragraphs (b)(1), (b)(2), or (b)(3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

(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.

(d) The wildlife hazard assessment required under paragraph (b) of this section must be submitted to the Administrator for approval and determination of the need for a wildlife hazard management plan. In reaching this determination, the Administrator will consider—

(1) The wildlife hazard assessment;

(2) Actions recommended in the wildlife hazard assessment to reduce wildlife hazards;

(3) The aeronautical activity at the airport, including the frequency and size of air carrier aircraft;

(4) The views of the certificate holder;

(5) The views of the airport users; and

(6) Any other known factors relating to the wildlife hazard of which the Administrator is aware.

(e) When the Administrator determines that a wildlife hazard management plan is needed, the certificate holder must formulate and implement a plan using the wildlife hazard assessment as a basis. The plan must—

(1) Provide measures to alleviate or eliminate wildlife hazards to air carrier operations;

(2) Be submitted to, and approved by, the Administrator prior to implementation; and

(3) As authorized by the Administrator, become a part of the Airport Certification Manual.

(f) The plan must include at least the following:

(1) A list of the individuals having authority and responsibility for implementing each aspect of the plan.

(2) A list prioritizing the following actions identified in the wildlife hazard assessment and target dates for their initiation and completion:

(i) Wildlife population management;

(ii) Habitat modification; and

(iii) Land use changes.

(3) Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits.

(4) Identification of resources that the certificate holder will provide to implement the plan.

(5) Procedures to be followed during air carrier operations that at a minimum includes—

(i) Designation of personnel responsible for implementing the procedures;

(ii) Provisions to conduct physical inspections of the aircraft movement areas and other areas critical to successfully manage known wildlife hazards before air carrier operations begin;

(iii) Wildlife hazard control measures; and

(iv) Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower.

(6) Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following an event described in paragraphs (b)(1), (b)(2), and (b)(3) of this section, including:

(i) The plan's effectiveness in dealing with known wildlife hazards on and in the airport's vicinity and

(ii) Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated.

(7) A training program conducted by a qualified wildlife damage management biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the wildlife hazard management plan required by paragraph (d) of this section.

(g) FAA Advisory Circulars contain methods and procedures for wildlife hazard management at airports that are acceptable to the Administrator.

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS	**Date:** 8/28/2007	**AC No:** 150/5200-33B
	Initiated by: AAS-300	**Change:**

1. PURPOSE. This Advisory Circular (AC) provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. It also discusses airport development projects (including airport construction, expansion, and renovation) affecting aircraft movement near hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. APPLICABILITY. The Federal Aviation Administration (FAA) recommends that public-use airport operators implement the standards and practices contained in this AC. The holders of Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D (Part 139), may use the standards, practices, and recommendations contained in this AC to comply with the wildlife hazard management requirements of Part 139. Airports that have received Federal grant-in-aid assistance must use these standards. The FAA also recommends the guidance in this AC for land-use planners, operators of non-certificated airports, and developers of projects, facilities, and activities on or near airports.

3. CANCELLATION. This AC cancels AC 150/5200-33A, *Hazardous Wildlife Attractants on or near Airports*, dated July 27, 2004.

4. PRINCIPAL CHANGES. This AC contains the following major changes, which are marked with vertical bars in the margin:

a. Technical changes to paragraph references.

b. Wording on storm water detention ponds.

c. Deleted paragraph 4-3.b, *Additional Coordination.*

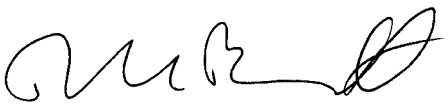
5. BACKGROUND. Information about the risks posed to aircraft by certain wildlife species has increased a great deal in recent years. Improved reporting, studies, documentation, and statistics clearly show that aircraft collisions with birds and other wildlife are a serious economic and public safety problem. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. Table 1

ranks the wildlife groups commonly involved in damaging strikes in the United States according to their relative hazard to aircraft. The ranking is based on the 47,212 records in the FAA National Wildlife Strike Database for the years 1990 through 2003. These hazard rankings, in conjunction with site-specific Wildlife Hazards Assessments (WHA), will help airport operators determine the relative abundance and use patterns of wildlife species and help focus hazardous wildlife management efforts on those species most likely to cause problems at an airport.

Most public-use airports have large tracts of open, undeveloped land that provide added margins of safety and noise mitigation. These areas can also present potential hazards to aviation if they encourage wildlife to enter an airport's approach or departure airspace or air operations area (AOA). Constructed or natural areas—such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, agricultural or aquaculture activities, surface mining, or wetlands—can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife.

During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, as well as billions of dollars in aircraft damage. Hazardous wildlife attractants on and near airports can jeopardize future airport expansion, making proper community land-use planning essential. This AC provides airport operators and those parties with whom they cooperate with the guidance they need to assess and address potentially hazardous wildlife attractants when locating new facilities and implementing certain land-use practices on or near public-use airports.

6. MEMORANDUM OF AGREEMENT BETWEEN FEDERAL RESOURCE AGENCIES. The FAA, the U.S. Air Force, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture - Wildlife Services signed a Memorandum of Agreement (MOA) in July 2003 to acknowledge their respective missions in protecting aviation from wildlife hazards. Through the MOA, the agencies established procedures necessary to coordinate their missions to address more effectively existing and future environmental conditions contributing to collisions between wildlife and aircraft (wildlife strikes) throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety while protecting the Nation’s valuable environmental resources.



DAVID L. BENNETT
Director, Office of Airport Safety
and Standards

Table 1. Ranking of 25 species groups as to relative hazard to aircraft (1=most hazardous) based on three criteria (damage, major damage, and effect-on-flight), a composite ranking based on all three rankings, and a relative hazard score. Data were derived from the FAA National Wildlife Strike Database, January 1990–April 2003.[1]

Species group	Ranking by criteria			Composite ranking[2]	Relative hazard score[3]
	Damage[4]	Major damage[5]	Effect on flight[6]		
Deer	1	1	1	1	100
Vultures	2	2	2	2	64
Geese	3	3	6	3	55
Cormorants/pelicans	4	5	3	4	54
Cranes	7	6	4	5	47
Eagles	6	9	7	6	41
Ducks	5	8	10	7	39
Osprey	8	4	8	8	39
Turkey/pheasants	9	7	11	9	33
Herons	11	14	9	10	27
Hawks (buteos)	10	12	12	11	25
Gulls	12	11	13	12	24
Rock pigeon	13	10	14	13	23
Owls	14	13	20	14	23
H. lark/s. bunting	18	15	15	15	17
Crows/ravens	15	16	16	16	16
Coyote	16	19	5	17	14
Mourning dove	17	17	17	18	14
Shorebirds	19	21	18	19	10
Blackbirds/starling	20	22	19	20	10
American kestrel	21	18	21	21	9
Meadowlarks	22	20	22	22	7
Swallows	24	23	24	23	4
Sparrows	25	24	23	24	4
Nighthawks	23	25	25	25	1

[1] Excerpted from the *Special Report for the FAA, "Ranking the Hazard Level of Wildlife Species to Civil Aviation in the USA: Update #1, July 2, 2003".* Refer to this report for additional explanations of criteria and method of ranking.

[2] Relative rank of each species group was compared with every other group for the three variables, placing the species group with the greatest hazard rank for $\geq$ 2 of the 3 variables above the next highest ranked group, then proceeding down the list.

[3] Percentage values, from Tables 3 and 4 in Footnote 1 of the *Special Report*, for the three criteria were summed and scaled down from 100, with 100 as the score for the species group with the maximum summed values and the greatest potential hazard to aircraft.

[4] Aircraft incurred at least some damage (destroyed, substantial, minor, or unknown) from strike.

[5] Aircraft incurred damage or structural failure, which adversely affected the structure strength, performance, or flight characteristics, and which would normally require major repair or replacement of the affected component, or the damage sustained makes it inadvisable to restore aircraft to airworthy condition.

[6] Aborted takeoff, engine shutdown, precautionary landing, or other.

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SECTION 1.

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 this AC.)

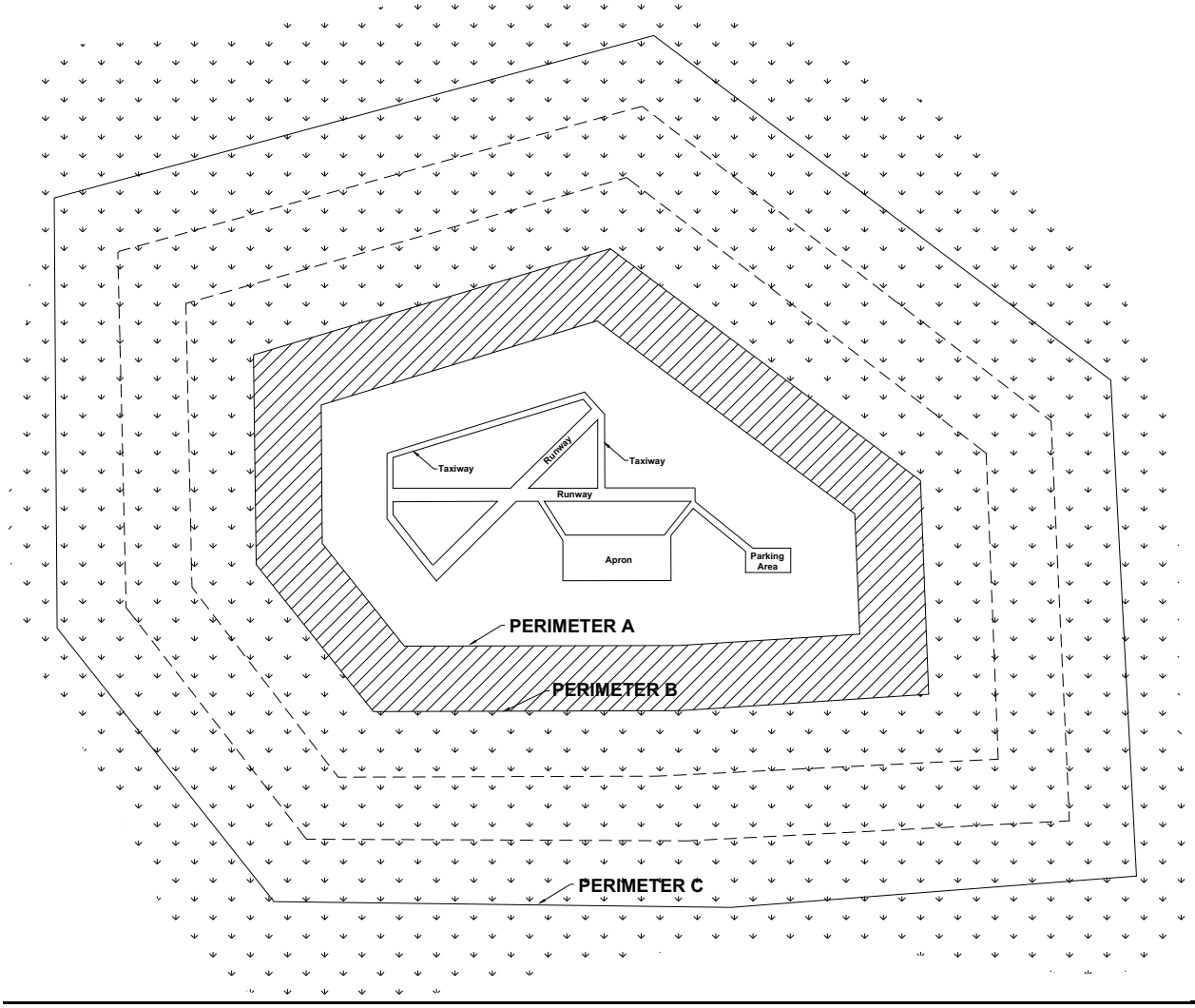
The basis for the separation criteria contained in this section can be found in existing FAA regulations. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (78 percent occur under 1,000 feet 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 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 1. Separation distances within which hazardous wildlife attractants should be avoided, eliminated, or mitigated.



PERIMETER A: For airports serving piston-powered aircraft, hazardous wildlife attractants must be 5,000 feet from the nearest air operations area.

PERIMETER B: For airports serving turbine-powered aircraft, hazardous wildlife attractants must be 10,000 feet from the nearest air operations area.

PERIMETER C: 5-mile range to protect approach, departure and circling airspace.

SECTION 2.

LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE.

2-1. GENERAL. The wildlife species and the size of the populations attracted to the airport environment vary considerably, depending on several factors, including land-use practices on or near the airport. This section discusses land-use practices having the potential to attract hazardous wildlife and threaten aviation safety. In addition to the specific considerations outlined below, airport operators should refer to *Wildlife Hazard Management at Airports,* prepared by FAA and U.S. Department of Agriculture (USDA) staff. (This manual is available in English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.FAA.gov.). And, *Prevention and Control of Wildlife Damage,* compiled by the University of Nebraska Cooperative Extension Division. (This manual is available online in a periodically updated version at: ianrwww.unl.edu/wildlife/solutions/handbook/.)

2-2. WASTE DISPOSAL OPERATIONS. Municipal solid waste landfills (MSWLF) are known to attract large numbers of hazardous wildlife, particularly birds. Because of this, these operations, when located within the separations identified in the siting criteria in Sections 1-2 through 1-4, are considered incompatible with safe airport operations.

a. Siting for new municipal solid waste landfills subject to AIR 21. Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) (AIR 21) prohibits the construction or establishment of a new MSWLF within 6 statute miles of certain public-use airports. Before these prohibitions apply, both the airport and the landfill must meet the very specific conditions described below. These restrictions do not apply to airports or landfills located within the state of Alaska.

The airport must (1) have received a Federal grant(s) under 49 U.S.C. § 47101, et. seq.; (2) be under control of a public agency; (3) serve some scheduled air carrier operations conducted in aircraft with less than 60 seats; and (4) have total annual enplanements consisting of at least 51 percent of scheduled air carrier enplanements conducted in aircraft with less than 60 passenger seats.

The proposed MSWLF must (1) be within 6 miles of the airport, as measured from airport property line to MSWLF property line, and (2) have started construction or establishment on or after April 5, 2001. Public Law 106-181 only limits the construction or establishment of some new MSWLF. It does not limit the expansion, either vertical or horizontal, of existing landfills.

NOTE: Consult the most recent version of AC 150/5200-34, *Construction or Establishment of Landfills Near Public Airports,* for a more detailed discussion of these restrictions.

b. Siting for new MSWLF not subject to AIR 21. If an airport and MSWLF do not meet the restrictions of Public Law 106-181, the FAA recommends against locating MSWLF within the separation distances identified in Sections 1-2 through 1-4. The separation distances should be measured from the closest point of the airport's AOA to the closest planned MSWLF cell.

c. Considerations for existing waste disposal facilities within the limits of separation criteria. The FAA recommends against airport development projects that would increase the number of aircraft operations or accommodate larger or faster aircraft near MSWLF operations located within the separations identified in Sections 1-2 through 1-4. In addition, in accordance with 40 CFR 258.10, owners or operators of existing MSWLF units that are located within the separations listed in Sections 1-2 through 1-4 must demonstrate that the unit is designed and operated so it does not pose a bird hazard to aircraft. (See Section 4-2(b) of this AC for a discussion of this demonstration requirement.)

d. Enclosed trash transfer stations. Enclosed waste-handling facilities that receive garbage behind closed doors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles generally are compatible with safe airport operations, provided they are not located on airport property or within the Runway Protection Zone (RPZ). These facilities should not handle or store putrescible waste outside or in a partially enclosed structure accessible to hazardous wildlife. Trash transfer facilities that are open on one or more sides; that store uncovered quantities of municipal solid waste outside, even if only for a short time; that use semi-trailers that leak or have trash clinging to the outside; or that do not control odors by ventilation and filtration systems (odor masking is not acceptable) do not meet the FAA's definition of fully enclosed trash transfer stations. The FAA considers these facilities incompatible with safe airport operations if they are located closer than the separation distances specified in Sections 1-2 through 1-4.

e. Composting operations on or near airport property. Composting operations that accept only yard waste (e.g., leaves, lawn clippings, or branches) generally do not attract hazardous wildlife. Sewage sludge, woodchips, and similar material are not municipal solid wastes and may be used as compost bulking agents. The compost, however, must never include food or other municipal solid waste. Composting operations should not be located on airport property. Off-airport property composting operations should be located no closer than the greater of the following distances: 1,200 feet from any AOA or the distance called for by airport design requirements (see AC 150/5300-13, *Airport Design*). This spacing should prevent material, personnel, or equipment from penetrating any Object Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway. Airport operators should monitor composting operations located in proximity to the airport to ensure that steam or thermal rise does not adversely affect air traffic. On-airport disposal of compost by-products should not be conducted for the reasons stated in 2-3f.

f. Underwater waste discharges. The FAA recommends against the underwater discharge of any food waste (e.g., fish processing offal) within the separations identified in Sections 1-2 through 1-4 because it could attract scavenging hazardous wildlife.

g. Recycling centers. Recycling centers that accept previously sorted non-food items, such as glass, newspaper, cardboard, or aluminum, are, in most cases, not attractive to hazardous wildlife and are acceptable.

h. Construction and demolition (C&D) debris facilities. C&D landfills do not generally attract hazardous wildlife and are acceptable if maintained in an orderly manner, admit no putrescible waste, and are not co-located with other waste disposal operations. However, C&D landfills have similar visual and operational characteristics to putrescible waste disposal sites. When co-located with putrescible waste disposal operations, C&D landfills are more likely to attract hazardous wildlife because of the similarities between these disposal facilities. Therefore, a C&D landfill co-located with another waste disposal operation should be located outside of the separations identified in Sections 1-2 through 1-4.

i. Fly ash disposal. The incinerated residue from resource recovery power/heat-generating facilities that are fired by municipal solid waste, coal, or wood is generally not a wildlife attractant because it no longer contains putrescible matter. Landfills accepting only fly ash are generally not considered to be wildlife attractants and are acceptable as long as they are maintained in an orderly manner, admit no putrescible waste of any kind, and are not co-located with other disposal operations that attract hazardous wildlife.

Since varying degrees of waste consumption are associated with general incineration (not resource recovery power/heat-generating facilities), the FAA considers the ash from general incinerators a regular waste disposal by-product and, therefore, a hazardous wildlife attractant if disposed of within the separation criteria outlined in Sections 1-2 through 1-4.

2-3. WATER MANAGEMENT FACILITIES. Drinking water intake and treatment facilities, storm water and wastewater treatment facilities, associated retention and settling ponds, ponds built for recreational use, and ponds that result from mining activities often attract large numbers of potentially hazardous wildlife. To prevent wildlife hazards, land-use developers and airport operators may need to develop management plans, in compliance with local and state regulations, to support the operation of storm water management facilities on or near all public-use airports to ensure a safe airport environment.

a. Existing storm water management facilities. On-airport storm water management facilities allow the quick removal of surface water, including discharges related to aircraft deicing, from impervious surfaces, such as pavement and terminal/hangar building roofs. Existing on-airport detention ponds collect storm water, protect water quality, and control runoff. Because they slowly release water

after storms, they create standing bodies of water that can attract hazardous wildlife. Where the airport has developed a Wildlife Hazard Management Plan (WHMP) in accordance with Part 139, the FAA requires immediate correction of any wildlife hazards arising from existing storm water facilities located on or near airports, using appropriate wildlife hazard mitigation techniques. Airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

Where possible, airport operators should modify storm water detention ponds to allow a maximum 48-hour detention period for the design storm. The FAA recommends that airport operators avoid or remove retention ponds and detention ponds featuring dead storage to eliminate standing water. Detention basins should remain totally dry between rainfalls. Where constant flow of water is anticipated through the basin, or where any portion of the basin bottom may remain wet, the detention facility should include a concrete or paved pad and/or ditch/swale in the bottom to prevent vegetation that may provide nesting habitat.

When it is not possible to drain a large detention pond completely, airport operators may use physical barriers, such as bird balls, wires grids, pillows, or netting, to deter birds and other hazardous wildlife. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office.

The FAA recommends that airport operators encourage off-airport storm water treatment facility operators to incorporate appropriate wildlife hazard mitigation techniques into storm water treatment facility operating practices when their facility is located within the separation criteria specified in Sections 1-2 through 1-4.

b. New storm water management facilities. The FAA strongly recommends that off-airport storm water 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, linearly shaped water detention basins. When it is not possible to place these ponds away from an airport's AOA, airport operators should use physical barriers, such as bird balls, wires grids, pillows, or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages

the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

c. **Existing wastewater treatment facilities.** The FAA strongly recommends that airport operators immediately correct any wildlife hazards arising from existing wastewater treatment facilities located on or near the airport. Where required, a WHMP developed in accordance with Part 139 will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should encourage wastewater treatment facility operators to incorporate measures, developed in consultation with a wildlife damage management biologist, to minimize hazardous wildlife attractants. Airport operators should also encourage those wastewater treatment facility operators to incorporate these mitigation techniques into their standard operating practices. In addition, airport operators should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

d. **New wastewater treatment facilities.** The FAA strongly recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in Sections 1-2 through 1-4. Appendix 1 defines wastewater treatment facility as “any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes.” The definition includes any pretreatment involving the reduction of the amount of pollutants or the elimination of pollutants prior to introducing such pollutants into a publicly owned treatment works (wastewater treatment facility). During the site-location analysis for wastewater treatment facilities, developers should consider the potential to attract hazardous wildlife if an airport is in the vicinity of the proposed site, and airport operators should voice their opposition to such facilities if they are in proximity to the airport.

e. **Artificial marshes.** In warmer climates, wastewater treatment facilities sometimes employ artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking birds, such as blackbirds and waterfowl, for breeding or roosting activities. The FAA strongly recommends against establishing artificial marshes within the separations identified in Sections 1-2 through 1-4.

f. **Wastewater discharge and sludge disposal.** The FAA recommends against the discharge of wastewater or sludge on airport property because it may improve soil moisture and quality on unpaved areas and lead to improved turf growth that can be an attractive food source for many species of animals. Also, the turf requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw, both of which can attract hazardous wildlife. In addition, the improved turf may attract grazing wildlife, such as deer and geese. Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

2-4. WETLANDS. Wetlands provide a variety of functions and can be regulated by local, state, and Federal laws. Normally, wetlands are attractive to many types of wildlife, including many which rank high on the list of hazardous wildlife species (Table 1).

NOTE: If questions exist as to whether an area qualifies as a wetland, contact the local division of the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, or a wetland consultant qualified to delineate wetlands.

a. Existing wetlands on or near airport property. If wetlands are located on or near airport property, airport operators should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations. At public-use airports, the FAA recommends immediately correcting, in cooperation with local, state, and Federal regulatory agencies, any wildlife hazards arising from existing wetlands located on or near airports. Where required, a WHMP will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

b. New airport development. Whenever possible, the FAA recommends locating new airports using the separations from wetlands identified in Sections 1-2 through 1-4. Where alternative sites are not practicable, or when airport operators are expanding an existing airport into or near wetlands, a wildlife damage management biologist, in consultation with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the state wildlife management agency should evaluate the wildlife hazards and prepare a WHMP that indicates methods of minimizing the hazards.

c. Mitigation for wetland impacts from airport projects. Wetland mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects or projects required to correct wildlife hazards from wetlands. Wetland mitigation must be designed so it does not create a wildlife hazard. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4.

(1) Onsite mitigation of wetland functions. The FAA may consider exceptions to locating mitigation activities outside the separations identified in Sections 1-2 through 1-4 if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge, which cannot be replicated when moved to a different location. Using existing airport property is sometimes the only feasible way to achieve the mitigation ratios mandated in regulatory orders and/or settlement agreements with the resource agencies. Conservation easements are an additional means of providing mitigation for project impacts. Typically the airport operator continues to own the property, and an easement is created stipulating that the property will be maintained as habitat for state or Federally listed species.

Mitigation must not inhibit the airport operator's ability to effectively control hazardous wildlife on or near the mitigation site or effectively maintain other aspects of safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife must be avoided. The FAA will review any onsite mitigation proposals to determine compatibility with safe airport operations. A wildlife damage management biologist should evaluate any wetland mitigation projects that are needed to protect unique wetland functions and that must be located in the separation criteria in Sections 1-2 through 1-4 before the mitigation is implemented. A WHMP should be developed to reduce the wildlife hazards.

(2) Offsite mitigation of wetland functions. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4 unless they provide unique functions that must remain onsite (see 2-4c(1)). Agencies that regulate impacts to or around wetlands recognize that it may be necessary to split wetland functions in mitigation schemes. Therefore, regulatory agencies may, under certain circumstances, allow portions of mitigation to take place in different locations.

(3) Mitigation banking. Wetland mitigation banking is the creation or restoration of wetlands in order to provide mitigation credits that can be used to offset permitted wetland losses. Mitigation banking benefits wetland resources by providing advance replacement for permitted wetland losses; consolidating small projects into larger, better-designed and managed units; and encouraging integration of wetland mitigation projects with watershed planning. This last benefit is most helpful for airport projects, as wetland impacts mitigated outside of the separations identified in Sections 1-2 through 1-4 can still be located within the same watershed. Wetland mitigation banks meeting the separation criteria offer an ecologically sound approach to mitigation in these situations. Airport operators should work with local watershed management agencies or organizations to develop mitigation banking for wetland impacts on airport property.

2-5. DREDGE SPOIL CONTAINMENT AREAS. The FAA recommends against locating dredge spoil containment areas (also known as Confined Disposal Facilities) within the separations identified in Sections 1-2 through 1-4 if the containment area or the spoils contain material that would attract hazardous wildlife.

2-6. AGRICULTURAL ACTIVITIES. Because most, if not all, agricultural crops can attract hazardous wildlife during some phase of production, the FAA recommends against the used of airport property for agricultural production, including hay crops, within the separations identified in Sections 1-2 through 1-4. . If the airport has no financial alternative to agricultural crops to produce income necessary to maintain the viability of the airport, then the airport shall follow the crop distance guidelines listed in the table titled "Minimum Distances between Certain Airport Features and Any On-Airport Agricultural Crops" found in AC 150/5300-13, *Airport Design*, Appendix 17. The cost of wildlife control and potential accidents should be weighed against the income produced by the on-airport crops when deciding whether to allow crops on the airport.

a. Livestock production. Confined livestock operations (i.e., feedlots, dairy operations, hog or chicken production facilities, or egg laying operations) often attract flocking birds, such as starlings, that pose a hazard to aviation. Therefore, The FAA recommends against such facilities within the separations identified in Sections 1-2 through 1-4. Any livestock operation within these separations should have a program developed to reduce the attractiveness of the site to species that are hazardous to aviation safety. Free-ranging livestock must not be grazed on airport property because the animals may wander onto the AOA. Furthermore, livestock feed, water, and manure may attract birds.

b. Aquaculture. Aquaculture activities (i.e. catfish or trout production) conducted outside of fully enclosed buildings are inherently attractive to a wide variety of birds. Existing aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4 must have a program developed to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should also oppose the establishment of new aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4.

c. Alternative uses of agricultural land. Some airports are surrounded by vast areas of farmed land within the distances specified in Sections 1-2 through 1-4. Seasonal uses of agricultural land for activities such as hunting can create a hazardous wildlife situation. In some areas, farmers will rent their land for hunting purposes. Rice farmers, for example, flood their land during waterfowl hunting season and obtain additional revenue by renting out duck blinds. The duck hunters then use decoys and call in hundreds, if not thousands, of birds, creating a tremendous threat to aircraft safety. A wildlife damage management biologist should review, in coordination with local farmers and producers, these types of seasonal land uses and incorporate them into the WHMP.

2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS.

a. Golf courses. The large grassy areas and open water found on most golf courses are attractive to hazardous wildlife, particularly Canada geese and some species of gulls. These species can pose a threat to aviation safety. The FAA recommends against construction of new golf courses within the separations identified in Sections 1-2 through 1-4. Existing golf courses located within these separations must develop a program to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should ensure these golf courses are monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be immediately implemented.

b. Landscaping and landscape maintenance. Depending on its geographic location, landscaping can attract hazardous wildlife. The FAA recommends that airport operators approach landscaping with caution and confine it to airport areas not associated with aircraft movements. A wildlife damage management biologist should review all landscaping plans. Airport operators should also monitor all landscaped areas on a continuing basis for the presence of hazardous wildlife. If

hazardous wildlife is detected, corrective actions should be immediately implemented.

Turf grass areas can be highly attractive to a variety of hazardous wildlife species. Research conducted by the USDA Wildlife Services' National Wildlife Research Center has shown that no one grass management regime will deter all species of hazardous wildlife in all situations. In cooperation with wildlife damage management biologist, airport operators should develop airport turf grass management plans on a prescription basis, depending on the airport's geographic locations and the type of hazardous wildlife likely to frequent the airport

Airport operators should ensure that plant varieties attractive to hazardous wildlife are not used on the airport. Disturbed areas or areas in need of re-vegetating should not be planted with seed mixtures containing millet or any other large-seed producing grass. For airport property already planted with seed mixtures containing millet, rye grass, or other large-seed producing grasses, the FAA recommends disking, plowing, or another suitable agricultural practice to prevent plant maturation and seed head production. Plantings should follow the specific recommendations for grass management and seed and plant selection made by the State University Cooperative Extension Service, the local office of Wildlife Services, or a qualified wildlife damage management biologist. Airport operators should also consider developing and implementing a preferred/prohibited plant species list, reviewed by a wildlife damage management biologist, which has been designed for the geographic location to reduce the attractiveness to hazardous wildlife for landscaping airport property.

c. Airports surrounded by wildlife habitat. The FAA recommends that operators of airports surrounded by woodlands, water, or wetlands refer to Section 2.4 of this AC. Operators of such airports should provide for a Wildlife Hazard Assessment (WHA) conducted by a wildlife damage management biologist. This WHA is the first step in preparing a WHMP, where required.

d. Other hazardous wildlife attractants. Other specific land uses or activities (e.g., sport or commercial fishing, shellfish harvesting, etc.), perhaps unique to certain regions of the country, have the potential to attract hazardous wildlife. Regardless of the source of the attraction, when hazardous wildlife is noted on a public-use airport, airport operators must take prompt remedial action(s) to protect aviation safety.

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. An example of this situation may involve a lake located outside of the separation criteria on the east side of an airport and a large hayfield on the west side of an airport, land uses that together could create a flyway for Canada geese directly across the airspace of the airport. There are numerous examples of such situations;

therefore, airport operators and the wildlife damage management biologist must consider the entire surrounding landscape and community when developing the WHMP.

SECTION 3.

PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS.

3.1. INTRODUCTION. In recognition of the increased risk of serious aircraft damage or the loss of human life that can result from a wildlife strike, the FAA may require the development of a Wildlife Hazard Management Plan (WHMP) when specific triggering events occur on or near the airport. Part 139.337 discusses the specific events that trigger a Wildlife Hazard Assessment (WHA) and the specific issues that a WHMP must address for FAA approval and inclusion in an Airport Certification Manual.

3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED WILDLIFE DAMAGE MANAGEMENT BIOLOGISTS. The FAA will use the Wildlife Hazard Assessment (WHA) conducted in accordance with Part 139 to determine if the airport needs a WHMP. Therefore, persons having the education, training, and expertise necessary to assess wildlife hazards must conduct the WHA. The airport operator may look to Wildlife Services or to qualified private consultants to conduct the WHA. When the services of a wildlife damage management biologist are required, the FAA recommends that land-use developers or airport operators contact a consultant specializing in wildlife damage management or the appropriate state director of Wildlife Services.

NOTE: Telephone numbers for the respective USDA Wildlife Services state offices can be obtained by contacting USDA Wildlife Services Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD, 20737-1234, Telephone (301) 734-7921, Fax (301) 734-5157 *(http://www.aphis.usda.gov/ws/)*.

3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL. This manual, prepared by FAA and USDA Wildlife Services staff, contains a compilation of information to assist airport personnel in the development, implementation, and evaluation of WHMPs at airports. The manual includes specific information on the nature of wildlife strikes, legal authority, regulations, wildlife management techniques, WHAs, WHMPs, and sources of help and information. The manual is available in three languages: English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.FAA.gov/. This manual only provides a starting point for addressing wildlife hazard issues at airports. Hazardous wildlife management is a complex discipline and conditions vary widely across the United States. Therefore, qualified wildlife damage management biologists must direct the development of a WHMP and the implementation of management actions by airport personnel.

There are many other resources complementary to this manual for use in developing and implementing WHMPs. Several are listed in the manual's bibliography.

3-4. WILDLIFE HAZARD ASSESSMENTS, TITLE 14, CODE OF FEDERAL REGULATIONS, PART 139. Part 139.337(b) requires airport operators to conduct a Wildlife Hazard Assessment (WHA) when certain events occur on or near the airport.

Part 139.337 (c) provides specific guidance as to what facts must be addressed in a WHA.

3-5. WILDLIFE HAZARD MANAGEMENT PLAN (WHMP). The FAA will consider the results of the WHA, along with the aeronautical activity at the airport and the views of the airport operator and airport users, in determining whether a formal WHMP is needed, in accordance with Part 139.337. If the FAA determines that a WHMP is needed, the airport operator must formulate and implement a WHMP, using the WHA as the basis for the plan.

The goal of an airport's Wildlife Hazard Management Plan is to minimize the risk to aviation safety, airport structures or equipment, or human health posed by populations of hazardous wildlife on and around the airport.

The WHMP must identify hazardous wildlife attractants on or near the airport and the appropriate wildlife damage management techniques to minimize the wildlife hazard. It must also prioritize the management measures.

3-6. LOCAL COORDINATION. The establishment of a Wildlife Hazards Working Group (WHWG) will facilitate the communication, cooperation, and coordination of the airport and its surrounding community necessary to ensure the effectiveness of the WHMP. The cooperation of the airport community is also necessary when new projects are considered. Whether on or off the airport, the input from all involved parties must be considered when a potentially hazardous wildlife attractant is being proposed. Airport operators should also incorporate public education activities with the local coordination efforts because some activities in the vicinity of your airport, while harmless under normal leisure conditions, can attract wildlife and present a danger to aircraft. For example, if public trails are planned near wetlands or in parks adjoining airport property, the public should know that feeding birds and other wildlife in the area may pose a risk to aircraft.

Airport operators should work with local and regional planning and zoning boards so as to be aware of proposed land-use changes, or modification of existing land uses, that could create hazardous wildlife attractants within the separations identified in Sections 1-2 through 1-4. Pay particular attention to proposed land uses involving creation or expansion of waste water treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas. At the very least, airport operators must ensure they are on the notification list of the local planning board or equivalent review entity for all communities located within 5 miles of the airport, so they will receive notification of any proposed project and have the opportunity to review it for attractiveness to hazardous wildlife.

3-7 COORDINATION/NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS. If an existing land-use practice creates a wildlife hazard and the land-use practice or wildlife hazard cannot be immediately eliminated, airport operators must issue a Notice to Airmen (NOTAM) and encourage the land–owner or manager to take steps to control the wildlife hazard and minimize further attraction.

SECTION 4.

FAA NOTIFICATION AND REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS

4-1. FAA REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS.

a. The FAA discourages the development of waste disposal and other facilities, discussed in Section 2, located within the 5,000/10,000-foot criteria specified in Sections 1-2 through 1-4.

b. For projects that are located outside the 5,000/10,000-foot criteria but within 5 statute miles of the airport's AOA, the FAA may review development plans, proposed land-use changes, operational changes, or wetland mitigation plans to determine if such changes present potential wildlife hazards to aircraft operations. The FAA considers sensitive airport areas as those that lie under or next to approach or departure airspace. This brief examination should indicate if further investigation is warranted.

c. Where a wildlife damage management biologist has conducted a further study to evaluate a site's compatibility with airport operations, the FAA may use the study results to make a determination.

4-2. WASTE MANAGEMENT FACILITIES.

a. Notification of new/expanded project proposal. Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) limits the construction or establishment of new MSWLF within 6 statute miles of certain public-use airports, when both the airport and the landfill meet very specific conditions. See Section 2-2 of this AC and AC 150/5200-34 for a more detailed discussion of these restrictions.

The Environmental Protection Agency (EPA) requires any MSWLF operator proposing a new or expanded waste disposal operation within 5 statute miles of a runway end to notify the appropriate FAA Regional Airports Division Office and the airport operator of the proposal (40 CFR 258, *Criteria for Municipal Solid Waste Landfills*, Section 258.10, *Airport Safety*). The EPA also requires owners or operators of new MSWLF units, or lateral expansions of existing MSWLF units, that are located within 10,000 feet of any airport runway end used by turbojet aircraft, or within 5,000 feet of any airport runway end used only by piston-type aircraft, to demonstrate successfully that such units are not hazards to aircraft. (See 4-2.b below.)

When new or expanded MSWLF are being proposed near airports, MSWLF operators must notify the airport operator and the FAA of the proposal as early as possible pursuant to 40 CFR 258.

b. Waste handling facilities within separations identified in Sections 1-2 through 1-4. To claim successfully that a waste-handling facility sited within the separations identified in Sections 1-2 through 1-4 does not attract hazardous wildlife and does not threaten aviation, the developer must establish convincingly that the facility will not handle putrescible material other than that as outlined in 2-2.d. The FAA strongly recommends against any facility other than that as outlined in 2-2.d (enclosed transfer stations). The FAA will use this information to determine if the facility will be a hazard to aviation.

c. Putrescible-Waste Facilities. In their effort to satisfy the EPA requirement, some putrescible-waste facility proponents may offer to undertake experimental measures to demonstrate that their proposed facility will not be a hazard to aircraft. To date, no such facility has been able to demonstrate an ability to reduce and sustain hazardous wildlife to levels that existed before the putrescible-waste landfill began operating. For this reason, demonstrations of experimental wildlife control measures may not be conducted within the separation identified in Sections 1-2 through 1-4.

4-3. OTHER LAND-USE PRACTICE CHANGES. As a matter of policy, the FAA encourages operators of public-use airports who become aware of proposed land use practice changes that may attract hazardous wildlife within 5 statute miles of their airports to promptly notify the FAA. The FAA also encourages proponents of such land use changes to notify the FAA as early in the planning process as possible. Advanced notice affords the FAA an opportunity (1) to evaluate the effect of a particular land-use change on aviation safety and (2) to support efforts by the airport sponsor to restrict the use of land next to or near the airport to uses that are compatible with the airport.

The airport operator, project proponent, or land-use operator may use FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, or other suitable documents similar to FAA Form 7460-1 to notify the appropriate FAA Regional Airports Division Office. Project proponents can contact the appropriate FAA Regional Airports Division Office for assistance with the notification process.

It is helpful if the notification includes a 15-minute quadrangle map of the area identifying the location of the proposed activity. The land-use operator or project proponent should also forward specific details of the proposed land-use change or operational change or expansion. In the case of solid waste landfills, the information should include the type of waste to be handled, how the waste will be processed, and final disposal methods.

a. Airports that have received Federal grant-in-aid assistance. Airports that have received Federal grant-in-aid assistance are required by their grant assurances to take appropriate actions to restrict the use of land next to or near the airport to uses that are compatible with normal airport operations. The FAA recommends that airport operators to the extent practicable oppose off-airport land-use changes or practices within the separations identified in Sections 1-2 through 1-4 that may attract hazardous wildlife. Failure to do so may lead to noncompliance with applicable grant assurances. The FAA will not approve the placement of airport

development projects pertaining to aircraft movement in the vicinity of hazardous wildlife attractants without appropriate mitigating measures. Increasing the intensity of wildlife control efforts is not a substitute for eliminating or reducing a proposed wildlife hazard. Airport operators should identify hazardous wildlife attractants and any associated wildlife hazards during any planning process for new airport development projects.

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APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR.

1. **GENERAL.** This appendix provides definitions of terms used throughout this AC.

    1. **Air operations area.** Any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved areas or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways, or apron.

    2. **Airport operator.** The operator (private or public) or sponsor of a public-use airport.

    3. **Approach or departure airspace.** The airspace, within 5 statute miles of an airport, through which aircraft move during landing or takeoff.

    4. **Bird balls.** High-density plastic floating balls that can be used to cover ponds and prevent birds from using the sites.

    5. **Certificate holder.** The holder of an Airport Operating Certificate issued under Title 14, Code of Federal Regulations, Part 139.

    6. **Construct a new MSWLF.** To begin to excavate, grade land, or raise structures to prepare a municipal solid waste landfill as permitted by the appropriate regulatory or permitting agency.

    7. **Detention ponds.** Storm water management ponds that hold storm water for short periods of time, a few hours to a few days.

    8. **Establish a new MSWLF.** When the first load of putrescible waste is received on-site for placement in a prepared municipal solid waste landfill.

    9. **Fly ash.** The fine, sand-like residue resulting from the complete incineration of an organic fuel source. Fly ash typically results from the combustion of coal or waste used to operate a power generating plant.

    10. **General aviation aircraft.** Any civil aviation aircraft not operating under 14 CFR Part 119, Certification: Air Carriers and Commercial Operators.

    11. **Hazardous wildlife.** Species of wildlife (birds, mammals, reptiles), including feral animals and domesticated animals not under control, that are associated with aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a strike hazard

    12. **Municipal Solid Waste Landfill (MSWLF).** A publicly or privately owned discrete area of land or an excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under 40 CFR § 257.2. An MSWLF may receive

other types wastes, such as commercial solid waste, non-hazardous sludge, small-quantity generator waste, and industrial solid waste, as defined under 40 CFR § 258.2. An MSWLF can consist of either a stand alone unit or several cells that receive household waste.

13. **New MSWLF.** A municipal solid waste landfill that was established or constructed after April 5, 2001.

14. **Piston-powered aircraft.** Fixed-wing aircraft powered by piston engines.

15. **Piston-use airport.** Any airport that does not sell Jet-A fuel for fixed-wing turbine-powered aircraft, and primarily serves fixed-wing, piston-powered aircraft. Incidental use of the airport by turbine-powered, fixed-wing aircraft would not affect this designation. However, such aircraft should not be based at the airport.

16. **Public agency.** A State or political subdivision of a State, a tax-supported organization, or an Indian tribe or pueblo (49 U.S.C. § 47102(19)).

17. **Public airport.** An airport used or intended to be used for public purposes that is under the control of a public agency; and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft is publicly owned (49 U.S.C. § 47102(20)).

18. **Public-use airport.** An airport used or intended to be used for public purposes, and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft may be under the control of a public agency or privately owned and used for public purposes (49 U.S.C. § 47102(21)).

19. **Putrescible waste.** Solid waste that contains organic matter capable of being decomposed by micro-organisms and of such a character and proportion as to be capable of attracting or providing food for birds (40 CFR §257.3-8).

20. **Putrescible-waste disposal operation.** Landfills, garbage dumps, underwater waste discharges, or similar facilities where activities include processing, burying, storing, or otherwise disposing of putrescible material, trash, and refuse.

21. **Retention ponds.** Storm water management ponds that hold water for several months.

22. **Runway protection zone (RPZ).** An area off the runway end to enhance the protection of people and property on the ground (see AC 150/5300-13). The dimensions of this zone vary with the airport design, aircraft, type of operation, and visibility minimum.

23. **Scheduled air carrier operation.** Any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier or commercial

operator for which the air carrier, commercial operator, or their representative offers in advance the departure location, departure time, and arrival location. It does not include any operation that is conducted as a supplemental operation under 14 CFR Part 119 or as a public charter operation under 14 CFR Part 380 (14 CFR § 119.3).

24. **Sewage sludge.** Any solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (40 CFR 257.2)

25. **Sludge.** Any solid, semi-solid, or liquid waste generated form a municipal, commercial or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect. (40 CFR 257.2)

26. **Solid waste.** Any garbage, refuse, sludge, from a waste treatment plant, water supply treatment plant or air pollution control facility and other discarded material, including, solid liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or by product material as defined by the Atomic Energy Act of 1954, as amended, (68 Stat. 923). (40 CFR 257.2)

27. **Turbine-powered aircraft.** Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft rotary-wing aircraft.

28. **Turbine-use airport.** Any airport that sells Jet-A fuel for fixed-wing turbine-powered aircraft.

29. **Wastewater treatment facility.** Any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes, including Publicly Owned Treatment Works (POTW), as defined by Section 212 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-576) and the Water Quality Act of 1987 (P.L. 100-4). This definition includes any pretreatment involving the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. (See 40 CFR Section 403.3 (q), (r), & (s)).

30. **Wildlife.** Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring thereof (50 CFR 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this AC, wildlife includes feral animals and domestic animals out of the control of their owners (14 CFR Part 139, Certification of Airports).

31. **Wildlife attractants.** Any human-made structure, land-use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace or the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, or wetlands.

32. **Wildlife hazard.** A potential for a damaging aircraft collision with wildlife on or near an airport.

33. **Wildlife strike.** A wildlife strike is deemed to have occurred when:

    a. A pilot reports striking 1 or more birds or other wildlife;

    b. Aircraft maintenance personnel identify aircraft damage as having been caused by a wildlife strike;

    c. Personnel on the ground report seeing an aircraft strike 1 or more birds or other wildlife;

    d. Bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified;

    e. The animal's presence on the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal) (Transport Canada, Airports Group, *Wildlife Control Procedures Manual*, Technical Publication 11500E, 1994).

2. RESERVED.

U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports

Date: June 28, 2006 **AC No:** 150/5200-36

Initiated by: AAS-300

1. Purpose.

This Advisory Circular (AC) describes the qualifications for wildlife biologists who conduct Wildlife Hazard Assessments for airports certificated under Title 14, Code of Federal Regulations, Part 139 (14 CFR, Part 139). In addition, it addresses the minimum wildlife hazard management curriculum for the initial and recurrent training of airport personnel involved in implementing a Federal Aviation Administration (FAA) approved Wildlife Hazard Management Plan.

2. Background.

Wildlife biologists conducting Wildlife Hazard Assessments or presenting training for airport personnel actively involved in implementing FAA approved Wildlife Hazard Management Plans at certificated airports must have professional training and/or experience in wildlife hazard management at airports [§139.337(c) and (f)(7)]. Airport personnel actively involved in implementing FAA approved Wildlife Hazard Management Plans must receive initial training and, every 12 consecutive months after that, recurrent training [§139.303(c) and (e) (Personnel)].

3. Applicability.

The Federal Aviation Administration (FAA) recommends that public-use airport operators fulfill the standards and practices contained in this AC. The holders of Airport Operating Certificates issued under Part 139, Subpart D, may use the standards, practices, and recommendations contained in this AC to comply with the wildlife hazard management requirements of Part 139. The FAA also recommends the guidance in this AC for persons wishing to conduct Wildlife Hazard Assessments and for those who help prepare Wildlife Hazard Management Plans or conduct the requisite training.

4. Related Reading Material.

Please review the most recent versions of the following documents:

a. FAA AC 150/5200-18C, *Airport Safety Self-Inspection.*

b. FAA AC 150/5200-32A, *Reporting Wildlife Aircraft Strikes.*

c. FAA AC 150/5200-33A, *Hazardous Wildlife Attractions on or Near Airports.*

d. FAA AC 150/5200-34A, *Construction or Establishment of Landfills Near Public Airports.*

e. FAA Office of Safety and Standards, Certalert no. 98-05. *Grasses Attractive to Hazardous Wildlife*.

f. FAA Office of Safety and Standards, Certalert no. 04-09, *Relationship Between FAA and WS.*

g. FAA Office of Safety and Standards, Certalert no. 04-16, *Deer Hazard to Aircraft and Deer Fencing.*

h. Cleary, E. C., R. A. Dolbeer, and S. E. Wright. .*Wildlife Strikes to Civil Aircraft in the United States.* FAA National Wildlife Aircraft Strike Database Serial Reports.

i. Cleary, E. C. and R. A. Dolbeer. 2005. *Wildlife Hazard Management at Airports: A Manual for Airport Operators***.** 2nd Ed. FAA, Office of Airport Safety and Standards, Washington, DC. 347 pages.

j. Report to Congress: *Potential Hazards to Aircraft by Locating Waste Disposal Sites in the Vicinity of Airports*, April 1996, DOT/FAA/AS/96-1.

k. Title 14, Code of Federal Regulation, Part 139, Certification of Airports.

l. Title 40, Code of Federal Regulation, Part 258, Criteria for Municipal Solid Waste Landfills.

Some of these documents and other information on wildlife management, including FAA Certalerts and guidance on siting hazardous wildlife attractants such as landfills, are available on the FAA website at http://www.faa.gov/airports_airtraffic/airports/ or http://wildlife-mitigation.tc.faa.gov/.

5. Professional Qualifications of Wildlife Biologists Conducting Wildlife Hazard Assessments and Wildlife Hazard Management Training at FAA Certificated Airports.

Wildlife biologists conducting airport Wildlife Hazard Assessments must meet certain education, training, and experience standards.

> §139.337(c) reads: Wildlife Hazard Assessment required in paragraph (b) of this section shall 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.

Airports with an FAA approved Wildlife Hazard Management Plan must provide employees the training needed to carryout the Plan.

§139.337(f)(7) reads: A training program conducted by a qualified wildlife damage management biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the Wildlife Hazard Management Plan required by paragraph (d) of this section.

To meet the requirements of §139.337(c) and (f)(7), wildlife management biologist (from now on referred to as a "qualified airport wildlife biologist") must:

a. Have the necessary academic coursework from accredited institutions and work experience to meet the qualifications of a GS-0486 series wildlife biologist as defined by the U.S. Office of Personnel Management classification standards (Appendix A); **or** be designated as a Certified Wildlife Biologist by The Wildlife Society (http://www.wildlife.org) **and,**

b. Have taken and passed an airport wildlife hazard management training course acceptable to the FAA Administrator (Appendix B[1]) **and,**

c. While working under the direct supervision of a qualified airport wildlife biologist, have conducted at least one Wildlife Hazard Assessment acceptable to the FAA Administrator (as described in §139.337(c)). **and,**

d. Have successfully complete at least one of the following within the past 3 years:

(1) An airport wildlife hazard management training course that is acceptable to the FAA Administrator (Appendix B) **or,**

(2) Attendance, as a registered participant, at a joint Bird Strike Committee–USA/Bird Strike Committee–Canada annual meeting, **or,**

(3) Other training acceptable to the FAA Administrator.

Persons wishing to conduct Wildlife Hazard Assessments or provide the requisite training should provide the Certificate Holder documentation verifying they meet the requirements outlined in 5 a – d above.

6. Initial and Recurrent Training for Airport Personnel Actively Involved in Managing Hazardous Wildlife On or Near Airports.

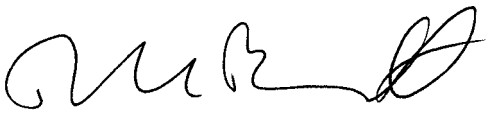
Personnel actively involved in implementing FAA approved Wildlife Hazard Management Plans are subject to the requirements of 14 CFR Part 139.303. §139.303 requires a specific training regimen for all airport personnel. §139.303(c) and (e) requires the holder of an Airport Operating Certificate issued under Part 139 to provide initial training and, every 12 months thereafter, recurrent training in wildlife hazard management to airport personnel actively involved in implementing FAA approved Wildlife Hazard Management Plans. The required training must include, "Any additional subject areas required under … §139.337 … " [§139.303(c)(5)]. And, "As appropriate, comply with the following training requirements of this part. … §139.337, Wildlife Hazard Management." [§139.303(e)(5)]

[1] Appendix B also contains instruction for those wishing to establish a training program to train wildlife biologist for designation as "qualified airport wildlife biologist" by the FAA Administrator.

§139.303(c) and (e) describe the minimum areas covered during initial and recurrent airport wildlife hazard management training. Depending on local wildlife and environmental issues, additional topics or more in-depth coverage of listed topics, might be needed. Appendix C outlines the training requirements for airport personnel who carry out an airport's Wildlife Hazard Management Plan. Initial and recurrent training must be at least 8 hours in length.

§139.337(f) does not prohibit holders of Airport Operating Certificates from using a "train-the-trainer" approach when providing the requisite training, provided the trainers receive and successfully complete their initial and recurrent training from a qualified airport wildlife biologist.

Remember, holders of Airport Operating Certificates issued under Part 139 are required to make and keep records of all training for airport personnel involved in controlling wildlife hazards [§139.303(d)].



David L. Bennett
Director, Office of Airport Safety and Standards

Appendix A.

U.S. Office of Personnel Management Qualification Standards for GS-0486 Series Wildlife Biologists.

To be qualified as a GS-0486 series wildlife biologist, a candidate must have the following:

1. A degree in biological science that includes—
   a. At least 9 semester hours in such wildlife subjects as mammalogy, ornithology, animal ecology, and wildlife management or research courses in the field of wildlife biology; **and**
   b. At least 12 semester hours in zoology in such subjects as general zoology, invertebrate zoology, vertebrate zoology, comparative anatomy, physiology, genetics, ecology, cellular biology, parasitology, and entomology or research courses in these subjects (excess courses in wildlife biology may be used to meet the zoology requirements where appropriate); **and**
   c. At least 9 semester hours in botany or the related plant sciences; **or**
2. A combination of education and experience equivalent to a major in biological science (i.e., at least 30 semester hours), with at least 9 semester hours in wildlife subjects, 12 semester hours in zoology, and 9 semester hours in botany or related plant science, as shown in “a” above, plus appropriate experience or additional education.

Appendix B.

1. Curriculum Outline for an Airport Wildlife Hazard Management Course, Acceptable to the FAA Administrator, for Personnel Conducting Wildlife Hazard Assessments, or Providing Training to Personnel Actively Involved in Implementing FAA Approved Wildlife Hazard Management Plans.

A list of training program providers acceptable to the FAA Administrator can be found at the FAA's wildlife strike web page: http://wildlife-mitigation.tc.faa.gov.

Links to the most recent versions of FAA regulations, FAA Advisory Circulars, Certalerts, and other documents relevant to wildlife hazard management issues can be found at http://www.faa.gov/airports_airtraffic/airports/ and http://wildlife-mitigation.tc.faa.gov/.

Those proposing to establish a program to train qualified airport wildlife biologist to meet the requirements of Title 14, Code of Federal Regulations, §139.337 must submit a complete training syllabus and instructor vita to the FAA. The syllabus must include all lesson plans, student handouts, and graphic presentations. Submit the material to:

FAA Staff Wildlife Biologist, AAS-300
Office of Airport Safety and Standards
Federal Aviation Administration,
800 Independence Ave. SW.
Washington, DC 20591

The goal of the training must be to provide the knowledge, skills, and abilities needed by a GS-0486 wildlife biologist to conduct Wildlife Hazard Assessments [§139.337(c)], and to conduct wildlife hazard training [§139.337(f)(7)]. To be acceptable to the FAA, the course must be at least 24 hours in length and include the agenda items below.

2. Instructor Qualifications.

The lead instructor for the training should have the following qualifications:

a. Be a qualified airport wildlife biologist

b. Academic credits in education or instructor/teaching experience

c. A minimum of 2 years experience in all aspects of managing hazardous wildlife on or near airports

3. Training Curriculum Outline.

a. Training goals and process

b. Airport familiarization

(1) Introduction to the National Plan of Integrated Airport Systems

(2) Airport design and layout

(3) Navigation aids and Air Traffic Control

(4) Airport operations and safety

(5) Signs, marking, and lighting

(6) Ground vehicle operator communication

c. Aircraft familiarization

(1) Physics of a strike

(2) Aircraft nomenclature

(3) Civil aviation aircraft categories

(4) Aircraft engines

(a) Reciprocating

(b) Turbo

(5) Aircraft certification standards

d. Preview of wildlife hazards to aviation

(1) History of major strikes

(2) Aviation losses

(a) Worldwide

(b) United States

e. Controlling laws, regulations and policies

(1) Migratory Bird Treaty Act of 1918, as amended

(2) Animal Damage Control Act of 1931, as amended

(3) Bald Eagle Protection Act of 1940, as amended

(4) Federal Insecticide, Fungicide, and Rodenticide Act of 1948, as amended

(5) National Environmental Policy Act of 1969, as amended

(6) Endangered Species Act of 1973, as amended

(7) Title 14, Code of Federal Regulation, Part 139, Certification of Airports

(8) Title 40, Code of Federal Regulations, Part 258, Criteria for Municipal Solid Waste Landfills

(9) Title 50, Code of Federal Regulations, Parts 1–199, Wildlife Management

(10) Wendell H. Ford Aviation Investment and Reform Act for the 21st Century, Pub. L. No. 106–181 (April 5, 2000), "Structures Interfering with Air Commerce," section 503

(11) Applicable FAA ACs in the 150/5200 series about Airport Wildlife Hazard Management

(12) Applicable FAA Office of Airports Certalerts

(13) Applicable state and local laws, regulations, and ordinances

f. Department of Defense requirements and perspective on military/civilian joint-use airports

g. Other Federal and State agency roles and responsibilities
   (1) U.S. Department of Interior, Fish and Wildlife Service
      (a) Role and responsibilities related to managing problem wildlife
      (b) Migratory Bird Depredation Permits
      (c) Salvage Permits
   (2) U.S. Department of Agriculture, Wildlife Services
      (a) Role and responsibilities related to managing problem wildlife
   (3) Other agencies
      (a) U.S. Environmental Protection Agency
         i. Siting landfills
         ii. Pesticide registration and use
      (b) U.S. Army Corps of Engineers
         i. Wetlands mitigation
   (4) Multi-Federal Agency Memorandum of Agreement
   (5) Applicable state wildlife regulations
h. FAA National Wildlife Aircraft Strike Database
   (1) Strike reporting
   (2) Species identification and feather identification
   (3) Database access
i. Environmental issues—working with Federal and State agencies
   (1) National Environmental Policy Act
   (2) U.S. Army Corps of Engineers (wetland loss and mitigation issues)
j. Initial consultations and Wildlife Hazard Assessments (WHA)
   (1) Triggering events for WHA
   (2) Duration and contents of WHA
   (3) Wildlife surveys at airports to assess wildlife hazards
   (4) Data analysis and presentation of results
   (5) Writing a WHA
k. FAA review of WHA and determination of need for Wildlife Hazard Management Plan (WHMP)
l. Drafting and carrying out integrated WHMP
   (1) Contents of WHMP
   (2) FAA review of WHMP

(3) Endangered Species Act compliance

(4) National Environmental Policy Act review

m. Integrated wildlife hazard management for airports; survey of basic control strategies and tactics

(1) Flight schedule modification

(2) Habitat modification and exclusion

(3) Wildlife dispersal techniques

(4) Wildlife population management

n. Addressing off-airport attractants and community planning and involvement

o. Outline of field trip (to conduct a “mini” WHA)

p. Field trip/site visit

q. Final exam

r. Post exam review

s. Course evaluation

t. Presentation of certificates

4. Recommendations.

a. Exams or tests may be oral, written, practical demonstrations, or a combination of all three.

b. Passing grade/evaluation should be recorded and retained as instructor’s records.

c. Instructors should retain course attendance records for a period of three years.

Appendix C.

1. Training curriculum outline for airport personnel actively involved in implementing FAA approved Wildlife Hazard Management Plans.

The goal of the training course must be to provide the knowledge, skills, and abilities needed by airport personnel to safely and accurately implement relevant portions of an FAA approved Wildlife Hazard Management Plan. To be acceptable to the FAA, initial and recurrent training must be at least 8 hours in length and include the agenda items:

a. General survey of wildlife hazards to aviation based on the most recent annual FAA National Wildlife Strike Database Serial Report.

b. Review of wildlife strikes, control actions, and observations at the airport over at least the past 12 months.

c. Review of the airport's Wildlife Hazard Assessment, (conducted by a qualified airport wildlife biologist), to include—

(1) Existing wildlife hazards and trends in wildlife abundance.

(2) Status of any open or unresolved recommended action items for reducing identified wildlife hazards to air carrier operations within the past 12 months.

d. Review of the airport's Wildlife Hazard Management Plan, to include —

(1) Airport-specific wildlife attractants, including man-made and natural features, and habitat management practices of the last 12 months.

(2) Review of the airport's wildlife permits (local, State, and Federal).

(3) Review of other airport-specific items:

(a) Wildlife hazard management strategies, techniques, and tools —

(i) Flight schedule modification.

(ii) Habitat modification, exclusion.

(iii) Repelling methods.

(iv) Wildlife population management.

(b) Responsibilities of airport personnel for —

(i) Reporting wildlife strikes, control actions, and wildlife observations.

(ii) Communicating with personnel who conduct wildlife control actions or who see wildlife hazards and air traffic control tower personnel and others who may require notification, such as airport operations or maintenance departments.

(iii) Documenting and reporting wildlife hazards seen during patrols and inspections, and follow-up control efforts.

(iv) Documenting and reporting when no hazards are seen during patrols and inspections.

e. Basic bird and mammal identification, stressing local hazardous and rare or endangered species of concern.

f. For any airport personnel using pyrotechnic launchers or firearms, training on the following topics from a qualified individual[2]:

(1) Safety, parts, and operation of firearms and pyrotechnic launchers.

(2) Fundamentals of using ammunition and pyrotechnics.

(3) Personnel protective equipment.

(4) Cleaning, storage, and transport of firearms and pyrotechnic launchers.

(5) Applicable local, State, and Federal regulations on firearms, pyrotechnic launchers, and pyrotechnics.

(6) Live fire training with firearms and pyrotechnic launchers.

g. Any other training required by local, State, or Federal regulations.

2. Recommendations.

a. Exams or tests may be oral, written, practical demonstrations, or a combination of all three.

b. The Trainer should retain passing grades/evaluations records.

c. The Trainer should retain course attendance records for a period of three years.

d. Airport personnel charged with responsibility for the airport's wildlife hazard management program should retain records of those to whom instruction in airport wildlife hazard management has been given for the period of time during which the employee conduct hazardous wildlife management activity on the airport and for six months after termination of employment.

[2] State Certificated Hunter Safety Instructors, police officers, and firearms instructors should be qualified to teach firearms safety and possibly the safe use of pyrotechnic launchers. Pyrotechnics are classified as high explosives by the Bureau of Alcohol Tobacco and Firearms (ATF) and as Division 1.4 explosives by the U.S. Department of Transportation. There are numerous regulations, security considerations, and ATF licensing requirements that apply to pyrotechnics.

U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: REPORTING WILDLIFE AIRCRAFT STRIKES	**Date:** 12/22/04 **Initiated by:** AAS-300	**AC No:** 150/5200-32A **Change:**

1. Purpose:

This Advisory Circular (AC) explains the importance of reporting collisions between aircraft and wildlife, more commonly referred to as wildlife strikes. It also examines recent improvements in the Federal Aviation Administration's (FAA) Bird/Other Wildlife Strike Reporting system; how to report a wildlife strike; what happens to the wildlife strike report data; how to access the FAA National Wildlife Aircraft Strike Database; and the FAA's Feather Identification program.

2. Background:

The FAA has long recognized the threat to aviation safety posed by wildlife strikes. Worldwide, wildlife strikes cost civil aviation an estimated $1.2 billion annually. Each year in the U.S., wildlife strikes to U.S. civil aircraft cause about $500 million in damage to aircraft and about 500,000 hours of civil aircraft down time. For the period 1990—2004, over 63,000 wildlife strikes were reported to the FAA. About 97 percent of all wildlife strikes reported to the FAA involve birds, almost 3 percent involve mammals and less than 1 percent involved reptiles. Waterfowl (ducks and geese), gulls, and raptors (mainly hawks and vultures) are the bird species that cause the most damage to civil aircraft in the United States. Vultures and waterfowl cause the most losses to U.S. military aircraft.

The FAA has initiated several programs to address this important safety issue, including the collection, analysis, and dissemination of wildlife strike data. The FAA actively encourages the voluntary reporting of wildlife strikes.

3. How to Report a Wildlife Aircraft strike:

A wildlife strike has occurred when:

1. A pilot reports striking 1 or more birds or other wildlife;
2. Aircraft maintenance personnel identify aircraft damage as having been caused by a wildlife strike;
3. Personnel on the ground report seeing an aircraft strike 1 or more birds or other wildlife;
4. Bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified; and
5. An animal's presence on the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal) (Transport Canada, Airports Group, *Wildlife Control Procedures Manual*, Technical Publication 11500E, 1994).

Pilots, airport operations, aircraft maintenance personnel, or anyone else who has knowledge of a strike is encouraged to report it to the FAA. Wildlife strikes may be reported to the FAA using the paper FAA Form 5200-7 Bird/Other Wildlife Strike Report, or electronically at the *Airport Wildlife Hazard Mitigation* web site: http://wildlife-mitigation.tc.faa.gov. The FAA's Bird/Other Wildlife Strike Report Form can be downloaded or printed from the same web site. Paper copies of Form 5200-7 may also be obtained from the appropriate Airports District Offices (ADO), Flight Standards District Offices (FSDO), and Flight Service Stations (FSS). Copies of the Bird/Other Wildlife Strike Report form are also found in the Airman's Information Manual (AIM).

Paper forms are pre-addressed to the FAA. No postage is needed if the form is mailed in the United States. It is important to include as much information as possible on the strike report.

The FAA National Wildlife Strike Database Manager edits all strike reports to insure consistent, error-free data before entering the report into the database. This information is supplemented with non-duplicated strike reports from other sources. About every 6 weeks, an updated version of the database is posted on the web site. Annually, a current version of the database is forwarded to the International Civil Aviation Organization (ICAO) for incorporation into ICAO's Bird Strike Information System Database.

Analyses of data from the FAA National Wildlife Aircraft Strike Database has proved invaluable in determining the nature and severity of the wildlife strike problem. The database provides a scientific basis for identifying risk factors; justifying, implementing and defending corrective actions at airports; and for judging the effectiveness of those corrective actions. The database is invaluable to engine manufacturers and aeronautical engineers as they develop new technologies for the aviation industry. Each wildlife strike report contributes to the accuracy of and effectiveness of the database. Moreover, each report contributes to the common goal of increasing aviation safety.

4. Access to the FAA National Wildlife Aircraft Strike Database:

In order to expedite the dissemination of this important information, the FAA has developed procedures for searching the database on line at: http://wildlife-mitigation.tc.faa.gov. The public may access the database without a password and retrieve basic information on the number of strikes by year, by state, and by species of wildlife.

Access for airport operators, airline operators, engine manufactures, air frame manufactures, and certain other governmental agencies requires a password to access the database and allows retrieval of more detailed wildlife strike information for their specific area of concern. An airport operator's access is limited to strike information for incidents occurring on its particular airport. Airlines may only access strike records involving aircraft owned or operated by them. Comparisons among individual airports and airlines are not made.

Airline and airport operators, airframe and engine manufactures, or governmental agencies may gain access to the FAA National Wildlife Aircraft Strike Database by writing the FAA Staff Wildlife Biologist. All written requests should follow the guidelines provided below:

1. On Company Letterhead, request access to the FAA National Wildlife Aircraft Strike Database. Include:
    a. Your preferred password. (The FAA does not assign passwords. The password should be no more than 8 characters, alphanumeric, and case sensitive.)
    b. Your contact information. (Title, mailing address, phone number, and e-mail address.)
2. Submit the request to:

    FAA Staff Wildlife Biologist, AAS-300

    Federal Aviation Administration,

    800 Independence Ave. SW.

    Washington, DC. 20591.
3. When the FAA receives the request for access to the database, the request and the password will be entered into the system. Upon completion of the process, the requestor will be notified by e-mail.

The database is accessible from the *Airport Wildlife Hazard Mitigation* web page (http://wildlife-mitigation.tc.faa.gov):

5. Bird Identification:

Accurate species identification is critical for bird-aircraft strike reduction programs. Wildlife biologists must know what species of animal they are dealing with in order to make proper management decisions. The FAA, the U.S. Air Force, and the U.S. Department of Agriculture – Wildlife Services are working closely with the Feather Identification Lab at the Smithsonian Institution, Museum of Natural History, to improve the understanding and prevention of bird-aircraft strike hazards. Bird strike remains that cannot be identified by airport personnel or by a local biologist can be sent (with FAA Form 5200-7) to the Smithsonian Museum for identification.

Feather identification of birds involved in bird-aircraft strikes will be provided free of charge to all U.S. airport operators, all U.S. aircraft owners/operators (regardless of where the strike happened), or to any foreign air carrier if the strike occurred at a U.S. airport.

Please observe the following guidelines for collecting and submitting feathers or other bird/wildlife remains for species identification. These guidelines help maintain species identification accuracy, reduce turn-around time, and maintain a comprehensive FAA National Wildlife Aircraft Strike Database.

1. Collect and submit remains as soon as possible.
2. Provide complete information regarding the incident
    a. Fill out FAA Form 5200-7 – Bird/Other Wildlife Strike Report.
        i. A copy of Form 5200-7 can be downloaded and or printed from: http://wildlife-mitigation.tc.faa.gov/T.
    b. Mail report with feather material (see address below).
    c. Provide your contact information if you wish to be informed of the species identification.
3. Collect as much material as possible in a clean plastic/ziplock bag. (Please, do not send whole birds).
    a. Pluck/pick a variety of feathers from the wings, tail and body.
    b. **Do not** cut off feathers. This removes the downy region needed to aid in identification.
    c. Include any feathers with distinct colors or patterns.
    d. Include any downy “fluff”.
    e. Include beaks, feet, and talons if possible.
    f. Where only a small amount of material is available, such as scrapings from an engine or smears on wings or windshields, send all of it.
    g. **Do not** use any sticky substance such as tape or post-it notes to attach feathers.
4. Mail the Bird/Other Wildlife Strike Report and collected material to the Smithsonian’s Feather Identification Lab. They will forward the report to the FAA Staff Wildlife Biologist at the FAA’s Office of Airport Safety and Standards.

For Material Sent via Express Mail Service:	For Material Sent via US Postal Service:
Feather Identification Lab	Feather Identification Lab
Smithsonian Institution	Smithsonian Institution
NHB, E610, MRC 116	PO Box 37012
10th & Constitution Ave. NW	NHB, E610, MRC 116
Washington, D.C. 20560-0116	Washington, D.C. 20013-7012
(This can be identified as “safety investigation material”)	(Not recommended for priority cases.)

The species identification turn around time is usually 24 hours from receipt. Once processed, the reports and species identification information are sent to the database Manager for entry into the FAA National Wildlife Aircraft Strike Database. Persons wishing to be notified of the species identification must include contact information (e-mail, phone, etc.) on the report.

For more information contact The FAA Staff Wildlife Biologist [(202) 267-3389], or the Smithsonian's Feather Identification Lab [(202) 633-0801].

for David L. Bennett
Director of Airport Safety and Standards

Memorandum of Agreement Between
the Federal Aviation Administration,
the U.S. Air Force,
the U.S. Army,
the U.S. Environmental Protection Agency,
the U.S. Fish and Wildlife Service, and
the U.S. Department of Agriculture
to Address Aircraft-Wildlife Strikes

PURPOSE

The signatory agencies know the risks that aircraft-wildlife strikes pose to safe aviation.

This Memorandum of Agreement (MOA) acknowledges each signatory agency's respective missions. Through this MOA, the agencies establish procedures necessary to coordinate their missions to more effectively address existing and future environmental conditions contributing to aircraft-wildlife strikes throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety, while protecting the Nation's valuable environmental resources.

BACKGROUND

Aircraft-wildlife strikes are the second leading causes of aviation-related fatalities. Globally, these strikes have killed over 400 people and destroyed more than 420 aircraft. While these extreme events are rare when compared to the millions of annual aircraft operations, the potential for catastrophic loss of human life resulting from one incident is substantial. The most recent accident demonstrating the grievous nature of these strikes occurred in September 1995, when a U.S. Air Force reconnaissance jet struck a flock of Canada geese during takeoff, killing all 24 people aboard.

The Federal Aviation Administration (FAA) and the United States Air Force (USAF) databases contain information on more than 54,000 United States civilian and military aircraft-wildlife strikes reported to them between 1990 and 1999[1]. During that decade, the FAA received reports indicating that aircraft-wildlife strikes, damaged 4,500 civilian U.S. aircraft (1,500 substantially), destroyed 19 aircraft, injured 91 people, and killed 6 people. Additionally, there were 216 incidents where birds struck two or more engines on civilian aircraft, with damage occurring to 26 percent of the 449 engines involved in these incidents. The FAA estimates that during the same decade, civilian U.S. aircraft sustained $4 billion worth of damages and associated losses and 4.7 million hours of aircraft downtime due to aircraft-wildlife strikes. For the same period,

[1] FAA estimates that the 28,150 aircraft-wildlife strike reports it received represent less than 20% of the actual number of strikes that occurred during the decade.

USAF planes colliding with wildlife resulted in 10 Class A Mishaps[2], 26 airmen deaths, and over $217 million in damages.

Approximately 97 percent of the reported civilian aircraft-wildlife strikes involved common, large-bodied birds or large flocks of small birds. Almost 70 percent of these events involved gulls, waterfowl, and raptors (Table 1).

About 90 percent of aircraft-wildlife strikes occur on or near airports, when aircraft are below altitudes of 2,000 feet. Aircraft-wildlife strikes at these elevations are especially dangerous because aircraft are moving at high speeds and are close to or on the ground. Aircrews are intently focused on complex take-off or landing procedures and monitoring the movements of other aircraft in the airport vicinity. Aircrew attention to these activities while at low altitudes often compromises their ability to successfully recover from unexpected collisions with wildlife and to deal with rapidly changing flight procedures. As a result, crews have minimal time and space to recover from aircraft-wildlife strikes.

Increasing bird and wildlife populations in urban and suburban areas near airports contribute to escalating aircraft-wildlife strike rates. FAA, USAF, and Wildlife Services (WS) experts expect the risks, frequencies, and potential severities of aircraft-wildlife strikes to increase during the next decade as the numbers of civilian and military aircraft operations grow to meet expanding transportation and military demands.

SECTION I.

SCOPE OF COOPERATION AND COORDINATION

Based on the preceding information and to achieve this MOA's purpose, the signatory agencies:

A. Agree to strongly encourage their respective regional and local offices, as appropriate, to develop interagency coordination procedures necessary to effectively and efficiently implement this MOA. Local procedures should clarify time frames and other general coordination guidelines.

B. Agree that the term "airport" applies only to those facilities as defined in the attached glossary.

C. Agree that the three major activities of most concern include, but are not limited to:

1. airport siting and expansion;

[2] See glossary for the definition of a Class A Mishap and similar terms.

2. development of conservation/mitigation habitats or other land uses that could attract hazardous wildlife to airports or nearby areas; and

3. responses to known wildlife hazards or aircraft-wildlife strikes.

D. Agree that "hazardous wildlife" are those animals, identified to species and listed in FAA and USAF databases, that are most often involved in aircraft-wildlife strikes. Many of the species frequently inhabit areas on or near airports, cause structural damage to airport facilities, or attract other wildlife that pose an aircraft-wildlife strike hazard. Table 1 lists many of these species. It is included solely to provide information on identified wildlife species that have been involved in aircraft-wildlife strikes. It is <u>not</u> intended to represent the universe of species concerning the signatory agencies, since more than 50 percent of the aircraft-wildlife strikes reported to FAA or the USAF did not identify the species involved.

E. Agree to focus on habitats attractive to the species noted in Table 1, but the signatory agencies realize that it is imperative to recognize that wildlife hazard determinations discussed in Paragraph L of this section may involve other animals.

F. Agree that not all habitat types attract hazardous wildlife. The signatory agencies, during their consultative or decisionmaking activities, will inform regional and local land use authorities of this MOA's purpose. The signatory agencies will consider regional, local, and site-specific factors (e.g., geographic setting and/or ecological concerns) when conducting these activities and will work cooperatively with the authorities as they develop and implement local land use programs under their respective jurisdictions. The signatory agencies will encourage these stakeholders to develop land uses within the siting criteria noted in Section 1-3 of FAA Advisory Circular (AC) 150.5200-33 (Attachment A) that do not attract hazardous wildlife. Conversely, the agencies will promote the establishment of land uses attractive to hazardous wildlife outside those siting criteria. Exceptions to the above siting criteria, as described in Section 2.4.b of the AC, will be considered because they typically involve habitats that provide unique ecological functions or values (e.g., critical habitat for federally-listed endangered or threatened species, ground water recharge).

G. Agree that wetlands provide many important ecological functions and values, including fish and wildlife habitats; flood protection; shoreline erosion control; water quality improvement; and recreational, educational, and research opportunities. To protect jurisdictional wetlands, Section 404 of the Clean Water Act (CWA) establishes a program to regulate dredge and/or fill activities in these wetlands and navigable waters. In recognizing Section 404 requirements and the Clean Water Action Plan's goal to annually increase the Nation's net wetland acreage by 100,000 acres through 2005, the signatory agencies agree to resolve aircraft-wildlife conflicts. They will do so by

avoiding and minimizing wetland impacts to the maximum extent practicable, and will work to compensate for all associated unavoidable wetland impacts. The agencies agree to work with landowners and communities to encourage and support wetland restoration or enhancement efforts that do not increase aircraft-wildlife strike potentials.

H. Agree that the: U.S. Army Corps of Engineers (ACOE) has expertise in protecting and managing jurisdictional wetlands and their associated wildlife; U.S. Environmental Protection Agency (EPA) has expertise in protecting environmental resources; and the U.S. Fish and Wildlife Service (USFWS) has expertise in protecting and managing wildlife and their habitats, including migratory birds and wetlands. Appropriate signatory agencies will cooperatively review proposals to develop or expand wetland mitigation sites, or wildlife refuges that may attract hazardous wildlife. When planning these sites or refuges, the signatory agencies will diligently consider the siting criteria and land use practice recommendations stated in FAA AC 150/5200-33. The agencies will make every effort to undertake actions that are consistent with those criteria and recommendations, but recognize that exceptions to the siting criteria may be appropriate (see Paragraph F of this section).

I. Agree to consult with airport proponents during initial airport planning efforts. As appropriate, the FAA or USAF will initiate signatory agency participation in these efforts. When evaluating proposals to build new civilian or military aviation facilities or to expand existing ones, the FAA or the USAF, will work with appropriate signatory agencies to diligently evaluate alternatives that may avoid adverse effects on wetlands, other aquatic resources, and Federal wildlife refuges. If these or other habitats support hazardous wildlife, and there is no practicable alternative location for the proposed aviation project, the appropriate signatory agencies, consistent with applicable laws, regulations, and policies, will develop mutually acceptable measures, to protect aviation safety and mitigate any unavoidable wildlife impacts.

J. Agree that a variety of other land uses (e.g., storm water management facilities, wastewater treatment systems, landfills, golf courses, parks, agricultural or aquacultural facilities, and landscapes) attract hazardous wildlife and are, therefore, normally incompatible with airports. Accordingly, new, federally-funded airport construction or airport expansion projects near habitats or other land uses that may attract hazardous wildlife must conform to the siting criteria established in the FAA Advisory Circular (AC) 150/5200-33, Section 1-3.

K. Agree to encourage and advise owners and/or operators of non-airport facilities that are known hazardous wildlife attractants (See Paragraph J) to follow the siting criteria in Section 1-3 of AC 150/5200-33. As appropriate, each signatory agency will inform proponents of these or other land uses about the land use's potential to attract hazardous species to airport areas.

The signatory agencies will urge facility owners and/or operators about the critical need to consider the land uses' effects on aviation safety.

L. Agree that FAA, USAF, and WS personnel have the expertise necessary to determine the aircraft-wildlife strike potentials of various land uses. When there is disagreement among signatory agencies about a particular land use and its potential to attract hazardous wildlife, the FAA, USAF, or WS will prepare a wildlife hazard assessment. Then, the appropriate signatory agencies will meet at the local level to review the assessment. At a minimum, that assessment will:

1. identify each species causing the aviation hazard, its seasonal and daily populations, and the population's local movements;

2. discuss locations and features on and near the airport or land use attractive to hazardous wildlife; and

3. evaluate the extent of the wildlife hazard to aviation.

M. Agree to cooperate with the airport operator to develop a specific, wildlife hazard management plan for a given location, when a potential wildlife hazard is identified. The plan will meet applicable FAA, USAF, and other relevant requirements. In developing the plan, the appropriate agencies will use their expertise and attempt to integrate their respective programmatic responsibilities, while complying with existing laws, regulations, and policies. The plan should avoid adverse impacts to wildlife populations, wetlands, or other sensitive habitats to the maximum extent practical. Unavoidable impacts resulting from implementing the plan will be fully compensated pursuant to all applicable Federal laws, regulations, and policies.

N. Agree that whenever a significant aircraft-wildlife strike occurs or a potential for one is identified, any signatory agency may initiate actions with other appropriate signatory agencies to evaluate the situation and develop mutually acceptable solutions to reduce the identified strike probability. The agencies will work cooperatively, preferably at the local level, to determine the causes of the strike and what can and should be done at the airport or in its vicinity to reduce potential strikes involving that species.

O. Agree that information and analyses relating to mitigation that could cause or contribute to aircraft-wildlife strikes should, whenever possible, be included in documents prepared to satisfy the National Environmental Policy Act (NEPA). This should be done in coordination with appropriate signatory agencies to inform the public and Federal decision makers about important ecological factors that may affect aviation. This concurrent review of environmental issues will promote the streamlining of the NEPA review process.

P. Agree to cooperatively develop mutually acceptable and consistent guidance, manuals, or procedures addressing the management of habitats attractive to

hazardous wildlife, when those habitats are or will be within the siting criteria noted in Section 1-3 of FAA AC 5200-33. As appropriate, the signatory agencies will also consult each other when they propose revisions to any regulations or guidance relevant to the purpose of this MOA, and agree to modify this MOA accordingly.

SECTION II.
GENERAL RULES AND INFORMATION

A. Development of this MOA fulfills the National Transportation Safety Board's recommendation of November 19, 1999, to form an inter-departmental task force to address aircraft-wildlife strike issues.

B. This MOA does not nullify any obligations of the signatory agencies to enter into separate MOAs with the USFWS addressing the conservation of migratory birds, as outlined in Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, dated January 10, 2001 (66 *Federal Register*, No. 11, pg. 3853).

C. This MOA in no way restricts a signatory agency's participation in similar activities or arrangements with other public or private agencies, organizations, or individuals.

D. This MOA does not alter or modify compliance with any Federal law, regulation or guidance (e.g., Clean Water Act; Endangered Species Act; Migratory Bird Treaty Act; National Environmental Policy Act; North American Wetlands Conservation Act; Safe Drinking Water Act; or the "no-net loss" policy for wetland protection). The signatory agencies will employ this MOA in concert with the Federal guidance addressing wetland mitigation banking dated March 6, 1995 (60 *Federal Register*, No. 43, pg. 12286).

E. The statutory provisions and regulations mentioned above contain legally binding requirements. However, this MOA does not substitute for those provisions or regulations, nor is it a regulation itself. This MOA does not impose legally binding requirements on the signatory agencies or any other party, and may not apply to a particular situation in certain circumstances. The signatory agencies retain the discretion to adopt approaches on a case-by-case basis that differ from this MOA when they determine it is appropriate to do so. Such decisions will be based on the facts of a particular case and applicable legal requirements. Therefore, interested parties are free to raise questions and objections about the substance of this MOA and the appropriateness of its application to a particular situation.

F. This MOA is based on evolving information and may be revised periodically without public notice. The signatory agencies welcome public comments on this MOA at any time and will consider those comments in any future revision of this MOA.

G. This MOA is intended to improve the internal management of the Executive Branch to address conflicts between aviation safety and wildlife. This MOA does not create any right, benefit, or trust responsibility, either substantively or procedurally. No party, by law or equity, may enforce this MOA against the United States, its agencies, its officers, or any person.

H. This MOA does not obligate any signatory agency to allocate or spend appropriations or enter into any contract or other obligations.

I. This MOA does not reduce or affect the authority of Federal, State, or local agencies regarding land uses under their respective purviews. When requested, the signatory agencies will provide technical expertise to agencies making decisions regarding land uses within the siting criteria in Section 1-3 of FAA AC 150/5200-33 to minimize or prevent attracting hazardous wildlife to airport areas.

J. Any signatory agency may request changes to this MOA by submitting a written request to any other signatory agency and subsequently obtaining the written concurrence of all signatory agencies.

K. Any signatory agency may terminate its participation in this MOA within 60 days of providing written notice to the other agencies. This MOA will remain in effect until all signatory agencies terminate their participation in it.

SECTION III. PRINCIPAL SIGNATORY AGENCY CONTACTS

The following list identifies contact offices for each signatory agency.

Federal Aviation Administration
Office Airport Safety and Standards
Airport Safety and
Compliance Branch (AAS-310)
800 Independence Ave., S.W.
Washington, D.C. 20591
V: 202-267-1799
F: 202-267-7546

U.S. Air Force
HQ AFSC/SEFW
9700 Ave., G. SE, Bldg. 24499
Kirtland AFB, NM 87117
V: 505-846-5679
F: 505-846-0684

U.S. Army
Directorate of Civil Works
Regulatory Branch (CECW-OR)
441 G St., N.W.
Washington, D.C. 20314
V: 202-761-4750
F: 202-761-4150

U.S. Environmental Protection Agy.
Office of Water
Wetlands Division
Ariel Rios Building, MC 4502F
1200 Pennsylvania Ave., SW
Washington, D.C. 20460
V: 202-260-1799
F: 202-260-7546

U.S. Fish and Wildlife Service
Division of Migratory Bird Management
4401 North Fairfax Drive, Room 634
Arlington, VA 22203
V: 703-358-1714
F: 703-358-2272

U.S. Department of Agriculture
Animal and Plant Inspection Service
Wildlife Services
Operational Support Staff
4700 River Road, Unit 87
Riverdale, MD 20737
V: 301-734-7921
F: 301-734-5157

Signature Page

Associate Administrator for Airports,
Federal Aviation Administration

12/17/02
Date

Chief of Safety,
U. S. Air Force

27 May 2003
Date

Acting Assistant Secretary of the Army
(Civil Works)
Department of the Army

December 9, 2002
Date

Assistant Administrator, Office of Water,
U.S. Environmental Protection Agency

1/17/03

Assistant Director, Migratory Birds
and State Programs,
U.S. Fish and Wildlife Service

7/29/03
Date

Acting Deputy Administrator, Wildlife Services
U.S. Department of Agriculture

09 January 2003
Date

GLOSSARY

This glossary defines terms used in this MOA.

Airport. All USAF airfields or all public use airports in the FAA's National Plan of Integrated Airport Systems (NPIAS). Note: There are over 18,000 civil-use airports in the U.S., but only 3,344 of them are in the NPIAS and, therefore, under FAA's jurisdiction.

Aircraft-wildlife strike. An aircraft-wildlife strike is deemed to have occurred when:

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

(Source: *Wildlife Control Procedures Manual*, Technical Publication 11500E, 1994).

Aircraft-wildlife strike hazard. A potential for a damaging aircraft collision with wildlife on or near an airport (14 CFR 139.3).

Bird Sizes. Title 40, Code of Federal Regulations, Part 33.76 classifies birds according to weight:

small birds weigh less than 3 ounces (oz).
medium birds weigh more than 3 oz and less than 2.5 lbs.
large birds weigh greater than 2.5 lbs.

Civil aircraft damage classifications. The following damage descriptions are based on the *Manual on the International Civil Aviation Organization Bird Strike Information System*:

Minor: The aircraft is deemed airworthy upon completing simple repairs or replacing minor parts and an extensive inspection is not necessary.

Substantial: Damage or structural failure adversely affects an aircraft's structural integrity, performance, or flight characteristics. The damage normally requires major repairs or the replacement of the entire affected component. Bent fairings or cowlings; small dents; skin punctures; damage to wing tips, antenna, tires or brakes, or engine blade damage not requiring blade replacement are specifically excluded.

Destroyed: The damage sustained makes it inadvisable to restore the aircraft to an airworthy condition.

Significant Aircraft-Wildlife Strikes. A significant aircraft-wildlife strike is deemed to have occurred when any of the following applies:

1. a civilian, U.S. air carrier aircraft experiences a multiple aircraft-bird strike or engine ingestion;
2. a civilian, U.S. air carrier aircraft experiences a damaging collision with wildlife other than birds; or
3. a USAF aircraft experiences a Class A, B, or C mishap as described below:

    A. **Class A Mishap:** Occurs when at least one of the following applies:
        1. total mishap cost is $1,000,000 or more;
        2. a fatality or permanent total disability occurs; and/or
        3. an Air Force aircraft is destroyed.
    B. **Class B Mishap:** Occurs when at least one of the following applies:
        1. total mishap cost is $200,000 or more and less than $1,000,000; and/or
        2. a permanent partial disability occurs and/or 3 or more people are hospitalized;
    C. **Class C Mishap:** Occurs when at least one of the following applies:
        1. cost of reported damage is between $20,000 and $200,000;
        2. an injury causes a lost workday (i.e., duration of absence is at least 8 hours beyond the day or shift during which mishap occurred); and/or
        3. an occupational illness causing absence from work at any time.

Wetlands. An ecosystem requiring constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or

near the surface and the presence of physical, chemical, and biological features indicating recurrent, sustained inundation, or saturation. Common diagnostic wetland features are hydric soils and hydrophytic vegetation. These features will be present, except where specific physiochemical, biotic, or anthropogenic factors have removed them or prevented their development.

(Source the 1987 Delineation Manual; 40 CFR 230.3(t)).

Wildlife. Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring there of (50 CFR 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this MOA, "wildlife" includes feral animals and domestic animals while out of their owner's control (14 CFR 139.3, *Certification and Operations: Land Airports Serving CAB-Certificated Scheduled Air Carriers Operating Large Aircraft (Other Than Helicopters)*)

Table 1. Identified wildlife species, or groups, that were involved in two or more aircraft-wildlife strikes, that caused damage to one or more aircraft components, or that had an adverse effect on an aircraft's flight. Data are for 1990-1999 and involve only civilian, U.S. aircraft.

Birds	No. reported strikes
Gulls (all spp.)	874
Geese (primarily, Canada geese)	458
Hawks (primarily, Red-tailed hawks)	182
Ducks (primarily Mallards.)	166
Vultures (primarily, Turkey vulture)	142
Rock doves	122
Doves (primarily, mourning doves)	109
Blackbirds	81
European starlings	55
Sparrows	52
Egrets	41
Shore birds (primarily, Killdeer & Sandpipers)	40
Crows	31
Owls	24
Sandhill cranes	22
American kestrels	15
Great blue herons	15
Pelicans	14
Swallows	14
Eagles (Bald and Golden)	14
Ospreys	13
Ring-necked pheasants	11
Herons	11
Barn-owls	9
American robins	8
Meadowlarks	8
Buntings (snow)	7
Cormorants	6
Snow buntings	6
Brants	5
Terns (all spp.)	5
Great horned owls	5
Horned larks	4
Turkeys	4
Swans	3
Mockingbirds	3
Quails	3
Homing pigeons	3
Snowy owls	3
Anhingas	2

Ravens	2
Kites	2
Falcons	2
Peregrine falcons	2
Merlins	2
Grouse	2
Hungarian partridges	2
Spotted doves	2
Thrushes	2
Mynas	2
Finches	2
Total known birds	2,612

Mammals	**No. reported strikes**
Deer (primarily, White-tailed deer)	285
Coyotes	16
Dogs	10
Elk	6
Cattle	5
Bats	4
Horses	3
Pronghorn antelopes	3
Foxes	2
Raccoons	2
Rabbits	2
Moose	2
Total known mammals	340

Ring-billed gulls were the most commonly struck gulls. The U.S. ring-billed gull population increased steadily at about 6% annually from 1966-1988. Canada geese were involved in about 90% of the aircraft-goose strikes involving civilian, U.S. aircraft from 1990-1998. Resident (non-migratory) Canada goose populations increased annually at 13% from 1966-1998. Red-tailed hawks accounted for 90% of the identified aircraft-hawk strikes for the 10-year period. Red-tailed hawk populations increased annually at 3% from 1966 to 1998. Turkey vultures were involved in 93% of he identified aircraft-vulture strikes. The U.S. Turkey vulture populations increased at annually at 1% between 1966 and 1998. Deer, primarily white-tailed deer, have also adapted to urban and airport areas and their populations have increased dramatically. In the early 1900's, there were about 100,000 white-tailed deer in the U.S. Current estimates are that the U.S. population is about 24 million.

U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports	**Date:** 01/31/2012 **Initiated by:** AAS-300	**AC No:** 150/5200-36A **Change:**

1. Purpose.

This Advisory Circular (AC) has two purposes. First, this AC describes the qualifications for wildlife biologists who conduct Wildlife Hazard Assessments (WHA) for airports certificated under Title 14, Code of Federal Regulations, Part 139 (14 CFR Part 139), and at non-certificated airports funded by a Federal Aviation Administration (FAA) Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) Program. We recommend that airports, at a minimum, consult with a qualified airport wildlife biologist when developing a Wildlife Hazard Management Plan (WHMP). However, airports are not required to do so.

Second, this AC addresses the minimum wildlife hazard management curriculum for the initial and recurrent training of airport personnel who implement an FAA-approved WHMP.

2. Applicability.

The standards and practices in this AC for public-use airports and for those who conduct Wildlife Hazard Assessments and conduct required training are:

a. Mandatory for airports certificated under Title 14, Code of Federal Regulations, Part 139 (14 CFR Part 139).

b. Mandatory for airports that have accepted AIP or the Passenger Facility Charge (PFC) Program funds.

c. Highly recommended for all other airports that independently fund Wildlife Hazard Assessments.

See Grant Assurance No. 34, Policies, Standards, and Specifications, and PFC Assurance No. 9, Standards and Specifications.

3. Cancellation.

This AC cancels AC 150/5200-36, Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports, dated June 28, 2006.

4. Background.

Wildlife biologists conducting Wildlife Hazard Assessments or training airport personnel actively involved in implementing FAA-approved Wildlife Hazard Management Plans at certificated airports must have professional training and experience in wildlife hazard management at airports [§139.337(c) and (f)(7)]. Airport personnel actively involved in overseeing or implementing FAA-approved Wildlife Hazard Management Plans must receive initial training and recurrent training every 12 consecutive months [§139.303(c) and (e) (Personnel)].

5. Related Reading Material.

Please review the most recent versions of the following documents:

a. FAA AC 150/5200-18, Airport Safety Self-Inspection.

b. FAA AC 150/5200-32, Reporting Wildlife Aircraft Strikes.

c. FAA AC 150/5200-33, Hazardous Wildlife Attractions On or Near Airports.

d. FAA AC 150/5200-34, Construction or Establishment of Landfills Near Public Airports.

e. FAA AC 150/5210-20 Ground Vehicle Operations on Airports

f. FAA AC 150/5220-25 Airport Avian Radar Systems

g. FAA AC 150/5300-13 Airport Design

h. FAA AC 150/5340-1K Standards for Airport Markings

i. FAA AC 150/5340-18F Standards for Airport Sign Systems

j. FAA Office of Safety and Standards, Certalert no. 98-05, Grasses Attractive to Hazardous Wildlife.

k. FAA Office of Safety and Standards, Certalert no. 04-09, Relationship Between FAA and WS.

l. FAA Office of Safety and Standards, Certalert no. 04-16, Deer Hazard to Aircraft and Deer Fencing.

m. Cleary, E. C. and Archie Dickey. 2010. Guidebook for Addressing Aircraft/Wildlife Hazards at General Aviation Airports. Airport Cooperative Research Program Report #32.

n. Cleary, E. C. and R. A. Dolbeer. 2005. Wildlife Hazard Management at Airports: A Manual for Airport Personnel. 2nd Ed. FAA, Office of Airport Safety and Standards, Washington, DC.

o. Dolbeer, R. A., S. E. Wright, J.R. Weller and M.J. Begier. 2009. Wildlife Strikes to Civil Aircraft in the United States, 1990 – 2008. FAA National Wildlife Aircraft Strike Database Serial Report #15.

p. Dolbeer, R. A. et al. Ranking the Hazard Level of Wildlife Species to Civil Aviation in the United States: Update #1. Special Report for the Federal Aviation Administration, July 2, 2003.

q. Report to Congress: Potential Hazards to Aircraft by Locating Waste Disposal Sites in the Vicinity of Airports, April 1996, DOT/FAA/AS/96-1.

r. Title 14, Code of Federal Regulation, Part 139, Certification of Airports.

s. Title 40, Code of Federal Regulation, Part 258, Criteria for Municipal Solid Waste Landfills.

t. FAA Grant Assurance No. 34, Policies, Standards, and Specifications

u. FAA Passenger Facility Charge (PFC) Assurance No. 9, Standards and Specifications

v. Aeronautical Information Manual (AIM)

Some of these documents and other information on wildlife management, including FAA Certalerts and guidance on siting hazardous wildlife attractants such as landfills, are available on the FAA website at http://www.faa.gov/airports/ and http://wildlife.faa.gov/.

6. Professional Qualifications of Wildlife Biologists Conducting Wildlife Hazard Assessments and Wildlife Hazard Management Training at FAA Certificated Airports.

a. Wildlife biologists conducting airport Wildlife Hazard Assessments must meet certain education, training, and experience standards.

> §139.337(c) reads: Wildlife Hazard Assessment required in paragraph (b) of this section shall 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.

b. Airports with a FAA-approved Wildlife Hazard Management Plan must provide employees the training needed to carryout the Plan.

> §139.337(f)(7) reads: A training program conducted by a qualified wildlife damage management biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the Wildlife Hazard Management Plan required by paragraph (d) of this section.

c. To meet the requirements of §139.337(c) and (f)(7), a wildlife damage management biologist (from now on referred to as a "qualified airport wildlife biologist") must:

(1) Have the necessary academic coursework from accredited institutions and work experience to meet the qualifications of a GS-0486 series wildlife biologist as defined by the U.S. Office of Personnel Management classification standards (Appendix A) **or** be designated as a Certified Wildlife Biologist by The Wildlife Society (http://www.wildlife.org) **and,**

(2) Have taken and passed an airport wildlife hazard management training course acceptable to the FAA Administrator (Appendix C), **and**;

(3) While working under the direct supervision of a qualified airport wildlife biologist, have conducted at least one Wildlife Hazard Assessment acceptable to the FAA Administrator (as described in §139.337(c)). **and,**

(4) Have successfully completed at least one of the following within five years of their initial FAA approved airport wildlife hazard management training course, and every five years thereafter:

(i) An airport wildlife hazard management training course that is acceptable to the FAA Administrator (Appendix C) **or**,

(ii) Attendance, as a registered participant, at a joint Bird Strike Committee–USA/Bird Strike Committee–Canada annual meeting **or**,

(iii) Other training acceptable to the FAA Administrator.

d. Individuals who work under the direct supervision of a qualified airport wildlife biologist are allowed to conduct Wildlife Hazard Assessments if the airport sponsor and the qualified airport wildlife biologist agree in writing to determine how the qualified airport wildlife biologist will:

(1) Supervise how the individual(s) will conduct the Wildlife Hazard Assessment; and

(2) Report progress of the Wildlife Hazard Assessment; and

(3) Supervise the Wildlife Hazard Assessment report production.

e. Certificate Holders or Airport Sponsors must obtain documentation verifying the qualifications outlined in c (1) – (3) above of any person(s) conducting wildlife hazard assessments or providing requisite training

7. Initial and Recurrent Training for Airport Personnel Actively Involved in Managing Hazardous Wildlife On or Near Airports.

a. Personnel actively involved in implementing FAA-approved Wildlife Hazard Management Plans are subject to the requirements of 14 CFR Part 139.303. §139.303 requires a specific training regimen for all airport personnel. §139.303(c) and (e) require the holder of an Airport Operating Certificate issued under Part 139 to provide initial training and, every 12 months thereafter, recurrent training in wildlife hazard management to airport personnel actively involved in implementing FAA-approved Wildlife Hazard Management Plans. The required training must include "Any additional subject areas required under … §139.337" [§139.303(c)(5)] and, "As appropriate, comply with the following training requirements of this part … §139.337, Wildlife Hazard Management" [§139.303(e)(5)].

b. Appendix D outlines the minimum training requirements for airport personnel who carry out an airport's Wildlife Hazard Management Plan. Depending on local wildlife and environmental issues, additional topics or more in-depth coverage of listed topics might be needed.

c. §139.337(f)(1) requires the Wildlife Hazard Management Plan to include a list of the individuals having authority and responsibility for implementing each aspect of the plan. This list identifies the individuals who must complete the required training.

d. §139.337(f) does not prohibit holders of Airport Operating Certificates from using a "train-the-trainer" approach when providing the requisite training, provided the trainers receive and successfully complete their initial and recurrent training from a qualified airport wildlife

biologist. Trainers who are not qualified airport wildlife biologists are limited to providing training to their airport employees.

e. Holders of Airport Operating Certificates issued under Part 139 are required to make and keep records of all training for airport personnel involved in controlling wildlife hazards for at least 24 consecutive calendar months.[§139.301(b)(1) and §139.303(d)].

Michael J. O'Donnell
Director, Office of Airport Safety and Standards

Appendix A.

U.S. Office of Personnel Management Qualification Standards for GS-0486 Series Wildlife Biologists.

To be qualified as a GS-0486 series wildlife biologist, a candidate must have the following:

1. A degree in biological science that includes—

a. At least nine semester hours in such wildlife subjects as mammalogy, ornithology, animal ecology, and wildlife management or research courses in the field of wildlife biology; **and**

b. At least 12 semester hours in zoology in such subjects as general zoology, invertebrate zoology, vertebrate zoology, comparative anatomy, physiology, genetics, ecology, cellular biology, parasitology, and entomology or research courses in these subjects (excess courses in wildlife biology may be used to meet the zoology requirements where appropriate); **and**

c. At least nine semester hours in botany or the related plant sciences; **or**

2. A combination of education and experience equivalent to a major in biological science (i.e., at least 30 semester hours), with at least nine semester hours in wildlife subjects, 12 semester hours in zoology, and nine semester hours in botany or related plant science, as shown in Paragraph 1 above, plus appropriate experience or additional education; **or**

3. Be designated as a Certified Wildlife Biologist by The Wildlife Society (http://www.wildlife.org).

Appendix B.

Training Resource Requirements and Instructor Qualifications.

The following training resource requirements and instructor qualifications are for any individual wishing to:

- Provide an airport wildlife hazard management course acceptable to the FAA Administrator, for personnel conducting Wildlife Hazard Assessments; or

- Provide training to airport personnel actively involved in implementing FAA approved Wildlife Hazard Management Plans.

1. Training Resources and Requirements.

a. A list of training program providers acceptable to the FAA Administrator can be found on the FAA's wildlife strike website: http://wildlife.faa.gov/.

b. Links to the most recent versions of FAA regulations, FAA Advisory Circulars, Certalerts, and other documents relevant to wildlife hazard management issues can be found at http://www.faa.gov/airports/ and http://wildlife.faa.gov/.

c. Those proposing to establish a program to train qualified airport wildlife biologists to meet the requirements of 14 CFR §139.337 must submit a complete training syllabus and instructor resume to the FAA. The syllabus must include all lesson plans, student handouts, and graphic presentations that include as a minimum all curriculum provided in Appendix C. Submit the materials to:

FAA National Wildlife Biologist, AAS-300
Office of Airport Safety and Standards
Federal Aviation Administration,
800 Independence Ave SW
Washington DC 20591

d. The goal of the training must be to provide the knowledge, skills, and abilities needed by a GS-0486 wildlife biologist to conduct Wildlife Hazard Assessments [§139.337(c)] and to conduct wildlife hazard training [§139.337(f)(7)]. To be acceptable to the FAA, the course must be at least 24 hours in length and include the curriculum items listed in Appendix C.

2. Instructor Qualifications.

The lead instructor for the training should:

a. Be a qualified airport wildlife biologist.

b. Have academic credits in education or instructor/teaching experience.

c. Have a minimum of 2 years experience in all aspects of managing hazardous wildlife on or near airports.

Appendix C.

Training Curriculum Outline for Any Individual Wishing to Provide an Airport Wildlife Hazard Management Course Acceptable to the FAA Administrator, for Personnel Conducting Wildlife Hazard Assessments.

1. Training Curriculum Outline.

The goal of the training must be to provide the knowledge, skills, and abilities needed by a GS-0486 wildlife biologist to conduct Wildlife Hazard Assessments [§139.337(c)] and to conduct wildlife hazard training [§139.337(f)(7)]. To be acceptable to the FAA, the course must be at least 24 hours in length and include the curriculum items listed below.

- **a.** Training goals and process
- **b.** Airport familiarization
  - (1) Introduction to the National Plan of Integrated Airport Systems
  - (2) Airport design and layout (AC 150/5300-13 Airport Design)
  - (3) Navigation aids and Air Traffic Control (Aeronautical Information Manual [AIM])
  - (4) Airport operations and safety (AIM)
  - (5) Signs, marking, and lighting (AC 150/5340-1K Standards for Airport Markings and AC 150/5340-18F Standards for Airport Sign Systems)
  - (6) Ground vehicle operator communication (AC 150/5210-20 Ground Vehicle Operations on Airports)
- **c.** Aircraft familiarization
  - (1) Physics of a strike
  - (2) Aircraft nomenclature
  - (3) Civil aviation aircraft categories
  - (4) Aircraft engines
    - (a) Reciprocating
    - (b) Turbo
  - (5) Aircraft certification standards
- **d.** Preview of wildlife hazards to aviation
  - (1) History of major strikes
  - (2) Aviation losses
    - (a) Worldwide
    - (b) United States
- **e.** Controlling laws, regulations, and policies
  - (1) Migratory Bird Treaty Act of 1918, as amended

(2) Animal Damage Control Act of 1931, as amended

(3) Bald Eagle Protection Act of 1940, as amended

(4) Federal Insecticide, Fungicide, and Rodenticide Act of 1948, as amended

(5) National Environmental Policy Act of 1969, as amended

(6) Endangered Species Act of 1973, as amended

(7) Title 14, Code of Federal Regulation, Part 139, Certification of Airports

(8) Title 40, Code of Federal Regulations, Part 258, Criteria for Municipal Solid Waste Landfills

(9) Title 50, Code of Federal Regulations, Parts 1–199, Wildlife Management

(10) Wendell H. Ford Aviation Investment and Reform Act for the 21st Century, Pub. L. No. 106–181 (April 5, 2000), "Structures Interfering with Air Commerce," section 503

(11) Applicable FAA ACs in the 150/5200 series about Airport Wildlife Hazard Management

(12) Applicable FAA Airport Certalerts

(13) Applicable state and local laws, regulations, and ordinances

f. Department of Defense requirements and perspective on military/civilian joint-use airports

g. Other Federal and State agency roles and responsibilities

(1) U.S. Department of Interior, Fish and Wildlife Service

(a) Role and responsibilities related to managing problem wildlife

(b) Migratory Bird Depredation Permits

(c) Salvage Permits

(2) U.S. Department of Agriculture, Wildlife Services

(a) Role and responsibilities related to managing problem wildlife

(3) Other agencies

(a) U.S. Environmental Protection Agency

(i) Siting landfills

(ii) Pesticide registration and use

(b) U.S. Army Corps of Engineers

(i) Wetlands mitigation

(4) Multi-Federal Agency Memorandum of Agreement

(5) Applicable State wildlife regulations

h. FAA National Wildlife Aircraft Strike Database

(1) Strike reporting

(2) Species identification and feather identification

(3) Database access

i. Environmental issues—working with Federal and State agencies

(1) National Environmental Policy Act

(2) U.S. Army Corps of Engineers (wetland loss and mitigation issues)

j. Initial consultations and Wildlife Hazard Assessments (WHAs)

(1) Triggering events for WHAs

(2) Duration and contents of WHAs

(3) Wildlife surveys at airports to assess wildlife hazards

(4) Data analysis and presentation of results

(5) Writing a WHA

k. FAA review of a WHA and determination of need for a Wildlife Hazard Management Plan (WHMP)

l. Drafting and carrying out integrated WHMPs

(1) Contents of WHMPs

(2) FAA review of WHMPs

(3) Endangered Species Act compliance

(4) National Environmental Policy Act review

m. Integrated wildlife hazard management for airports; survey of basic control strategies and tactics

(1) Flight schedule modification

(2) Habitat modification and exclusion

(3) Wildlife dispersal techniques

(4) Wildlife population management

n. Addressing off-airport attractants and community planning and involvement

o. Outline of field trip (to conduct a “mini” WHA)

p. Field trip/site visit

q. Final exam

r. Post exam review

s. Course evaluation

t. Presentation of certificates

2. Recommendations.

a. Exams or tests may be oral, written, practical demonstrations, or a combination of each.

b. Passing grade/evaluation should be recorded and retained as instructor's records.

c. Instructors should retain course attendance records for a period of three years.

Appendix D.

Training Curriculum Outline for Airport Personnel Actively Involved in Implementing FAA-Approved Wildlife Hazard Management Plans.

1. Training Curriculum Outline.

The goal of the training course must be to provide the knowledge, skills, and abilities needed by airport personnel to safely, accurately, and effectively implement relevant portions of an FAA-approved Wildlife Hazard Management Plan. To be acceptable to the FAA, initial and recurrent training must include the following agenda items:

a. General survey of wildlife hazards to aviation based on the most recent annual FAA National Wildlife Strike Database Serial Report

b. Review of wildlife strikes, control actions, and observations at the airport over at least the past 12 months

c. Review of the airport's Wildlife Hazard Assessment is to include—

(1) Existing wildlife hazards and trends in wildlife abundance

(2) Status of any open or unresolved recommended action items for reducing identified wildlife hazards to air carrier operations within the past 12 months

d. Review of the airport's Wildlife Hazard Management Plan, to include the following:

(1) Airport-specific wildlife attractants, including man-made and natural features and habitat management practices of the last 12 months.

(2) Review of the airport's wildlife permits (local, State, and Federal)

(3) Review of other airport-specific items:

(a) Wildlife hazard management strategies, techniques, and tools:

(i) Flight schedule modification

(ii) Habitat modification, exclusion

(iii) Repelling methods

(iv) Wildlife population management

(b) Responsibilities of airport personnel for—

(i) Reporting wildlife strikes, control actions, and wildlife observations

(ii) Communicating with personnel who conduct wildlife control actions or who see wildlife hazards and air traffic control tower personnel and others who may require notification, such as airport operations or maintenance departments

(iii) Documenting and reporting wildlife hazards seen during patrols and inspections and follow-up control efforts

(iv) Documenting and reporting when no hazards are seen during patrols and inspections

e. Basic bird and mammal identification, stressing local hazardous and rare or endangered species of concern

f. For any airport personnel using pyrotechnic launchers or firearms, training on the following topics from a qualified individual[2]:

(1) Safety, parts, and operation of pyrotechnic launchers

(2) Fundamentals of using pyrotechnics to safely and effectively disperse wildlife

(3) Personnel protective equipment

(4) Cleaning, storage, and transport of firearms and pyrotechnic launchers

(5) Applicable local, State, and Federal regulations on firearms, pyrotechnic launchers, and pyrotechnics[3]

(6) Live fire training with pyrotechnic launchers including strategies for dispersing wildlife away from runways and aircraft movement corridors

(7) For any airport personnel using firearms, live fire training. This training is highly recommended from a qualified individual but not a requirement for this training program[2].

g. Any other training required by local, State, or Federal regulations

2. Recommendations.

a. Exams or tests may be oral, written, practical demonstrations, or a combination of all three.

b. The Trainer should retain passing grades/evaluations records.

c. The Trainer should retain course attendance records for a period of three years.

d. Airport personnel responsible for the airport's wildlife hazard management program should retain records of those to whom instruction in airport wildlife hazard management has been given for the period of time during which the employees conduct hazardous wildlife management activity on the airport and for six months after termination of employment.

---

[2] State Certificated Hunter Safety Instructors, police officers, firearms instructors and other personnel who have been professionally trained in firearms safety should be qualified to teach firearm safety and possibly the safe use of pyrotechnic launchers. Pyrotechnics are classified as high explosives by the Bureau of Alcohol Tobacco and Firearms (ATF) and as Division 1.4 explosives by the U.S. Department of Transportation. There are numerous regulations, security considerations, and ATF licensing requirements that apply to pyrotechnics.

[2] Airport personnel actively involved with the use of firearms for the mitigation of wildlife hazards should receive and maintain current firearms training from either a licensed National Rifle Association (NRA) instructor or other qualified individual. This training should include type and caliber of weapon used at the airport.

[3] Bureau of Alcohol, Tobacco and Firearms provides information on Federal explosive requirements for explosive pest control devices at: http://www.atf.gov/explosives/how-to/documents/epcd-flyer.pdf.

Appendix B

Annual Assessment Review Form

ANNUAL ASSESSMENT REVIEW FORM

This appendix describes a system (modified from Seubert 1994[1]) for objectively assessing the implementation of wildlife hazard management plans at civil airports. Five assessment categories, each with a list of elements to be evaluated, are used to indicate how well airport wildlife hazard management plans are being implemented.

Category 1. Management functions related to wildlife hazards on or in the vicinity of the airport.

Category 2. Bird control on or in the vicinity of the airport.

Category 3. Mammal control on or in the vicinity of the airport.

Category 4. Management of habitat and food sources on airport property related to wildlife hazards.

Category 5. Land uses and food sources off of airport potentially related to wildlife hazards on airport.

The elements described in Categories 1-4 are assessed as to the degree that management programs are being implemented. The elements in Category 5 are rated as to the degree of hazard posed. Elements within each category are not intended to cover every possibility – they can be modified or expanded to meet situations unique to an airport.
During an assessment, each element in Categories 1-4 is examined and classified as one of the following:

S = Satisfactory. If an assessor finds that an airport has initiated action to reduce a wildlife hazard according to plan and is on schedule, the action would be considered “satisfactory”.

U = Unsatisfactory. If no measures have been taken or inappropriate measures taken, the assessment would be “unsatisfactory”.

NA = Not applicable. If it is apparent that certain listed techniques or items are not applicable to the airport, the assessment would be “not applicable”.

If an assessment is “U”, a comment by an assessor is required on the Assessment Summary Form (first page). Examples of assessments requiring comments are as follows:

[1] Seubert 1994

Category 1. Management functions related to wildlife hazards on or in the vicinity of

the airport.
If permits have not been obtained (Code 1.1) for shooting or trapping birds or mammals, the assessment would be “U”.

Category 2. Bird control on or in the vicinity of airports.
If bioacoustics are not being used (Code 2.2), the assessment would be “U”.
If the installation of wires (Code 2.9) over an airport pond is behind schedule, the assessment could be “U”, depending on the degree of potential hazard.
If raptors are not being trapped and relocated (Code 2.22), the assessment would be “U”.

Category 3. Mammal control on or in the vicinity of airports.
If rodenticides (Code 3.12) are not being used to control a rodent population attracting raptors, the assessment would be “U”.

Category 4. Management of habitat and food sources on airport property related to wildlife hazards.
If trees used as a roost site (Code 4.3) are not being eliminated or thinned to be made unattractive, the assessment would be “U”.
Categories 1-4 focus on actions that can be taken on the airport to reduce wildlife hazards.

Category 5. Land uses and food sources off of airport potentially related to wildlife hazards on airport.
This provides a list of off-airport land uses and food sources that may be attractive to birds or other wildlife. The assessor should review this list and score each element on a scale of 0 to 3:
0 = land use or food source not present;
1 = present but no wildlife problems noted or anticipated;
2 = site attracts some hazardous wildlife creating possible or potential problem, site should be monitored;
3 = site creates significant wildlife hazard for airport, action should be taken.
Wildlife hazards at airports frequently are attributable to these off-site attractants, but airport managers have no authority over the use of private property. However, airport managers can initiate programs to reduce the hazards of these off-airport wildlife attractants (e.g., garbage dumps, certain agricultural activities) by informing local jurisdictions and landowners of the hazards, and suggesting ways of alleviating them (Code 1.12).

Airport	Date	Assessment Page 1 of 6
SUMMARY FORM (Wildlife Hazard Assessment): Comments are required for all elements in Categories 1-4 assessed as “Unsatisfactory” or as “Needs Improvement” or with a score of 2 or 3 in Category 5.		
Wildlife Coordinator:		Phone:
		Fax:
		Email:
Wildlife Biologist:		Phone:
		Fax:
		Email:
Assessor’s comments for elements in Categories 1-4 assessed as “Unsatisfactory” or as “Needs Improvement” or with a score of 2 or 3 in Category 5.		
Element Code	Assessment Symbol	Comments
Assessor’s general comments (use back if needed):		

Airport	Date	Assessment Page 2 of 6

CATEGORY 1. Management functions related to wildlife hazards on or in the vicinity of the airport.

CODE	ITEMS	ASSESSMENT		
		S	U	NA
1.1	Acquiring wildlife control permits from federal, state, and local agencies			
1.2	Arranging for wildlife hazard assessments and other studies, as needed, to evaluate hazard potential for wildlife attracted by habitats, land uses, and food sources on or in vicinity of airport.			
1.3	Developing Wildlife Hazard Management Plan based on Wildlife Hazard Assessment and other studies and factors.			
1.4	Defining and delegating authority and responsibility for Wildlife Hazard Management Plan.			
1.5	Supervising, implementing, and coordinating airport Wildlife Hazard Management Plan.			
1.6	Evaluating Wildlife Hazard Management Plan at least once per year.			
1.7	Training personnel responsible for implementing airport Wildlife Hazard Management Plan, especially field personnel.			
1.8	Operating wildlife patrol system with a trained field staff, conducting surveillance/inspections of critical airport areas, and effecting wildlife control when needed or requested.			
1.9	Establishing a communication capability between wildlife control and ATC personnel.			
1.10	Maintaining a system for warning pilots about wildlife hazards (e.g., NOTAMS, ATC, Radar observations).			
1.11	Ensuring that airport habitats are managed to reduce or eliminate wildlife attractions.			
1.12	Ensuring that airport policy prohibits feeding of wildlife and exposure of food wastes.			
1.13	Interacting with local jurisdictions and landowners about zoning, land use, and the resolution of wildlife hazard problems in vicinity of airport.			
1.14	Maintaining log book with daily record of wildlife control activities, wildlife activity, and reported wildlife strikes and wildlife remains found on runways identified by species.			
1.15	Reporting all wildlife strikes to FAA.			

S = Satisfactory; U = Unsatisfactory; NA = Not Applicable

Airport	Date	Assessment Page 3 of 6

CATEGORY 2. Bird control on or in the vicinity of the airport.

CODE	ITEMS	ASSESSMENT		
		S	U	NA
DISPERSE, DETER, EXCLUDE, REPEL				
2.1	Bird patrols in vehicle			
2.2	Bioacoustics (distress calls)			
2.3	Electronically generated noise			
2.4	Propane canons			
2.5	Pyrotecnics			
2.6	Shooting to scare			
2.7	Netting hanger rafters, ponds, etc.			
2.8	Perching deterrents (e.g., stainless steel needles)			
2.9	Overhead wires for ponds, ditches, roofs, etc.			
2.10	Chemical repellents			
2.11	Falconry			
2.12	Dogs			
2.13	Radio-controlled aircraft			
2.14	Thinning or eliminating roosting trees and shrubs			
2.15	Grass management			
2.16	Scarecrows			
2.17	Dead bird effigies			
REMOVE				
2.18	Chemical capture (alpha chloralose)			
2.19	Nest and egg destruction			
2.20	Poisoning			
2.21	Predators to remove eggs (foxes, pigs, etc.)			
2.22	Shooting			
2.23	Trapping and relocation (e.g., raptors)			

S = Satisfactory; U = Unsatisfactory; NA = Not Applicable

Airport	Date	Assessment Page 4 of 6

CATEGORY 3. Mammal control on or in the vicinity of the airport.

CODE	ITEMS	ASSESSMENT		
		S	U	NA
DISPERSE, DETER, EXCLUDE, REPEL				
3.1	Cattle guards			
3.2	Fencing			
3.3	Vehicle patrols			
3.4	Propane cannons			
3.5	Pyrotechnics			
3.6	Rodent-resistant sheathing on electrical cables			
REMOVE				
3.7	Controlled hunting (e.g., deer)			
3.8	Den destruction (e.g., coyotes)			
3.9	Fumigants (e.g., woodchucks)			
3.10	Kill trapping (e.g., beavers, muskrats)			
3.11	Live trapping and relocation or euthanasia (e.g., dogs)			
3.12	Rodenticides (e.g., mice, ground squirrels)			
3.13	Shooting (e.g., deer, woodchucks, hares)			

S = Satisfactory; U = Unsatisfactory; NA = Not Applicable

Airport	Date	Assessment Page 5 of 6

CATEGORY 4. Management of habitat and food sources on airport property related to wildlife hazards.

CODE	ITEMS	ASSESSMENT		
		S	U	NA
AGRICULTURE/VEGETATION MANAGEMENT				
4.1	Agricultural crops (especially cereal grains and sunflowers)			
4.2	Plowing, mowing, harvesting (rodents, insects, worms)			
4.3	Landscaping (fruits & roost sites attractive to birds)			
4.4	Brush, shrubs, wood lots (cover, browse for deer)			
4.5	Misc. nesting sites (e.g., trees) for egrets, raptors, etc.			
WASTE MANAGEMENT/SANITATION				
4.6	Feeding birds and mammals (by people)			
4.7	Food waste storage (e.g., cafeterias, catering services)			
4.8	Garbage dumps			
4.9	Litter			
4.10	Sewage treatment ponds/lagoons/outfalls			
4.11	Weeds, construction debris, junk yards			
4.12	Animal carcasses (dead livestock, bird strike remains)			
WATER SOURCES				
4.13	Aquatic vegetation			
4.14	Canals, ditches, creeks, waterways			
4.15	Low areas on pavement/ground that collect water			
4.16	Retention ponds (water, de-icing fluid)			
4.17	Water fountains			
MISCELLANEOUS ATTRACTANTS				
4.18	Earthworms along runways			
4.19	Insects hatches from vegetation or soil			
4.20	Seed-producing vegetation			
4.21	Flat roofs (e.g., gull nesting and loafing sites)			
4.22	Structures (hangers, towers, signs, poles, etc.)			

S = Satisfactory; U = Unsatisfactory; NA = Not Applicable

Airport	Date	Assessment Page 6 of 6

CATEGORY 5. Land uses and food sources off airport potentially related to wildlife hazards on airport.

CODE	ITEMS	Score[a]	COMMENTS
	AGRICULTURE		
5.1	Agricultural crops (especially grains)		
5.2	Aquaculture facilities		
5.3	Livestock feedlots		
5.4	Grain storage or grain mills		
	COMMERCIAL/RECREATIONAL LAND USES		
5.5	Drive-in theaters, amusement parks etc.		
5.6	Restaurants (esp. outdoor eating areas)		
5.7	Picnic areas, parks		
5.8	Marinas		
5.9	Golf courses		
5.10	Flat roofs (gull nesting sites)		
	WASTE MANAGEMENT		
5.11	Garbage barges		
5.12	Garbage dumps		
5.13	Garbage transfer stations		
5.14	Fish processing plants		
5.15	Sewage lagoons, outfalls		
	WATER SOURCES		
5.16	Retention ponds (water, feedlots, etc.)		
5.17	Canals, creeks, ditches		
5.18	Reservoirs, lakes, natural ponds		
	NESTING/LOAFING/FEEDING AREAS		
5.19	Wildlife refuges/nature preserves		
5.20	Misc. nesting sites (egrets, raptors, etc.)		
5.21	Roosting trees (starlings, egrets, etc.)		
5.22	Marshes, swamps, mud flats		

a
0 = not present;
1 = present but no wildlife problems noted or anticipated
2 = site attracts some hazardous wildlife creating possible or potential problem, site should be monitored;
3 = site creates a significant wildlife hazard for airport, action should be taken.

Appendix C
Forms

Form Approved OMB No. 2120-0009

U.S. Department of Transportation
Federal Aviation Administration

BIRD/OTHER WILDLIFE STRIKE REPORT

1. Name of Operator

2. Aircraft Make/Model

3. Engine Make/Model

4. Aircraft Registration

5. Date of Incident ____/____/____ Month Day Year

6. Local Time of Incident ☐ Dawn ☐ Dusk ___ HR ___ MIN ☐ Day ☐ Night ☐ AM ☐ PM

7. Airport Name

8. Runway Used

9. Location if En Route *(Nearest Town/Reference & State)*

10. Height *(AGL)*

11. Speed *(IAS)*

12. Phase of Flight

- ☐ A. Parked
- ☐ B. Taxi
- ☐ C. Take-off Run
- ☐ D. Climb
- ☐ E. En Route
- ☐ F. Descent
- ☐ G. Approach
- ☐ H. Landing Roll

13. Part(s) of Aircraft Struck or Damaged

	Struck	Damaged		Struck	Damaged
A. Radome	☐	☐	H. Propeller	☐	☐
B. Windshield	☐	☐	I. Wing/Rotor	☐	☐
C. Nose	☐	☐	J. Fuselage	☐	☐
D. Engine No. 1	☐	☐	K. Landing Gear	☐	☐
E. Engine No. 2	☐	☐	L. Tail	☐	☐
F. Engine No. 3	☐	☐	M. Lights	☐	☐
G. Engine No. 4	☐	☐	N. Other:	☐	☐

(Specify, if "N. Other" is checked)

14. Effect on Flight

- ☐ None
- ☐ Aborted Take-Off
- ☐ Precautionary Landing
- ☐ Engines Shut Down
- ☐ Other: *(Specify)*

15. Sky Condition

- ☐ No Cloud
- ☐ Some Cloud
- ☐ Overcast

16. Precipitation

- ☐ Fog
- ☐ Rain
- ☐ Snow
- ☐ None

17. Bird/Other Wildlife Species

18. Number of birds seen and/or struck

Number of Birds	Seen	Struck
1	☐	☐
2-10	☐	☐
11-100	☐	☐
more than 100	☐	☐

19. Size of Bird(s)

- ☐ Small
- ☐ Medium
- ☐ Large

20. Pilot Warned of Birds ☐ Yes ☐ No

21. Remarks *(Describe damage, injuries and other pertinent information)*

DAMAGE / COST INFORMATION

22. Aircraft time out of service: _____ hours

23. Estimated cost of repairs or replacement *(U.S. $)*: $

24. Estimated other cost *(U.S. $) (e.g. loss of revenue, fuel, hotels)*: $

Reported by *(Optional)*

Title

Date

Paperwork Reduction Act Statement: The information collected on this form is necessary to allow the Federal Aviation Administration to assess the magnitude and severity of the wildlife-aircraft strike problem in the U.S. The information is used in determining the best management practices for reducing the hazard to aviation safety caused by wildlife-aircraft strikes. We estimate that it will take approximately 5 minutes to complete the form. If you wish to make any comments concerning the accuracy of this burden estimate and any suggestions for reducing this burden, send those comments to the Federal Aviation Administration, Management Staff, ARP-10, 800 Independence Avenue, SW, Washington, DC 20591. The information collected is voluntary. Please note that an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection is 2120-0045.

U.S. Department
of Transportation

Federal Aviation Administration

800 Independence Ave., S.W.
Washington, D C 20591

Official Business
Penalty for Private Use, $300

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 12438 WASHINGTON D.C.

POSTAGE WILL BE PAID BY THE FEDERAL AVIATION ADMINISTRATION

Federal Aviation Administration
Office of Airport Safety and Standards, AAS-310
800 Independence Avenue, SW
WASHINGTON, DC 20591

Directions for FAA Form 5200-7 Bird/Other Wildlife Strike Report

1. Name of Operator - This can be an airline (abbreviations okay - UAL, AAL, etc.), business (Coca Cola), government agency (Police Dept., FAA) or if a private pilot, his or her name.
2. Aircraft Make/Model - Abbreviations are okay, but try to include the model (e.g., B737-200).
3. Engine Make/Model - Abbreviations are allowed (e.g., PW 4060, GECT7, LYC 580).
4. Aircraft Registration - This means the N# (for USA registered aircraft).
5. Date of Incident - Give the local date, not the ZULU or GMT date.
6. Local Time of Incident - Check the appropriate light conditions and fill in the hour and minute local time and check AM or PM or use the 24 clock and skip AM/PM.
7. Airport Name - Use the airport name or 3 letter code if a US airport. If a foreign airport, use the full name or 3 letter code and location (city/country).
8. Runway used - Self explanatory.
9. Location if En Route - Put the name of the nearest city and state.
10. Height AGL - Put the feet above ground level at the time of the strike (if you don't know, use MSL and indicate this). For take-off run and landing roll, it must be 0.
11. Speed (IAS) - Speed at which the aircraft was traveling when the strike occurred.
12. Phase of Flight - Phase of flight during which the strike occurred. Take-off run and landing roll should both be 0 AGL.
13. Part(s) of Aircraft Struck or Damaged - Check which parts were struck and damaged. If a part was damaged but not struck, indicate this with a check on the damaged column only and indicate in comments (#21) why this happened (e.g., the landing gear might be damaged by deer strike, causing the aircraft to flip over and damage parts not struck by deer).
14. Effect on Flight - You can check more than one and if you check "Other", please explain in Comments (#21).
15. Sky Condition - Check the one that applies.
16. Precipitation - You may check more than one.
17. Bird/Other Wildlife Species - Try to be accurate. If you don't know, put unknown and some description. Collect feathers or remains for identification for damaging strikes.
18. Number of birds seen and/or struck - Check the box in the Seen column with the correct number if you saw the birds/other wildlife before the strike and check the box in the Struck column to show how many were hit. The exact number, can be written next to the box.
19. Size of Bird(s)- Check what you think is the correct size (e.g. sparrow = small, gulls = medium and geese = large).

Pilot Warned of Birds - Check the correct box (even if it was an ATIS warning or NOTAM).

20. Remarks - Be as specific as you can. Include information about the extent of the damage, injuries, anything you think would be helpful to know. (e.g., number of birds ingested).
21. Aircraft time out of service - Record how many hours the aircraft was out of service.
22. Estimated cost of repairs or replacement - This may not be known immediately, but the data can be sent at a later date or put down a contact name and number for this data.
23. Estimated other cost - Include loss of revenue, fuel, hotels, etc. (see directions for #23).

Reported by - Although this is optional, it is helpful if questions arise about the information on the form (a phone number could also be included).

Title - This can be Pilot, Tower, Airport Operations, Airline Operations, Flight Safety, etc.

Date - Date the form was filled out.

Appendix D
Permits

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

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USD 703-712

REGULATIONS
50 CFR Part 13
50 CFR 21.41

1. PERMITTEE

SAN FRANCISCO INT'L AIRPORT
AIRPORT OPERATIONS SERVICES - AIRFIELD
PO BOX 8097
SAN FRANCISCO, CA 94128

3. NUMBER
MB709934-0

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
06/24/2014	05/31/2015

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
R. DRAKE POSTON
OPERATIONS SUPT.

9. TYPE OF PERMIT
DEPREDATION AT AIRPORTS

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
Airprot Operations Area
San Francisco International Airport

11. CONDITIONS AND AUTHORIZATIONS:

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

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

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

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

(1) The following may be lethally taken:

100 each: California Gull, Western Gull, Cliff Swallow, Western Meadowlark, Mourning Dove,
50 each: Red-tailed Hawk, American Coot, Barn Swallow, Canada Goose, Horned Lark, Killdeer, Western Sandpiper
25 each: American Kestrel, Gadwall, Mallard, Ring-billed Gull, Least Sanpiper, Ruddy Duck
10 each: Barn Owl, Burrowing Owl, Great Blue Heron, Great Egret, Herring Gull, Turkey Vulture, Double-crested Cormorant, Dunlin, American Pipit, Black-bellied Plover
2 each: Brown Pelican

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE: 01/31
You must submit a report to your Regional Migratory Bird Permit Office even if you had no activity. Report form is at www.fws.gov/forms/3-202-9.pdf.

ISSUED BY	TITLE	DATE
	WILDLIFE BIOLOGIST, REGION 8	06/24/2014

Appendix E

Wildlife Species Table

Appendix E

Quarterly Wildlife Abundance by Group and Species (if known) at SFO, June 1, 2010 – May 31, 2011

Species	# Observations	# Individuals	% of All Birds	Jun-Aug	% of Group /Qtr	Sep-Nov	% of Group /Qtr	Dec-Feb	% of Group /Qtr	Mar-May	% of Group /Qtr
Brewer's blackbird	14	91	0.2%	45	49%	15	16%	18	20%	13	14%
European starling	106	3445	5.7%	144	4%	601	17%	2142	62%	558	16%
Red-winged blackbird	14	79	0.1%					26	33%	53	67%
Blackbirds and starlings	**134**	**3615**	**6.0%**	**189**	**5%**	**616**	**17%**	**2186**	**60%**	**624**	**17%**
American crow	33	90	0.1%	6	7%	35	39%	34	38%	15	17%
Common raven	20	23	<0.1%	4	17%	10	43%	5	22%	4	17%
Crows and ravens	**53**	**113**	**0.2%**	**10**	**9%**	**45**	**40%**	**39**	**35%**	**19**	**17%**
California gull	18	116	0.2%	12	10%	13	11%	48	41%	43	37%
Caspian tern	8	63	0.1%	1	2%					62	98%
Forster's tern	29	103	0.2%	35	34%	45	44%			23	22%
Ring-billed gull	9	142	0.2%					83	58%	59	42%
Unidentified gull	253	4030	6.7%	341	8%	1139	28%	2262	56%	288	7%
Unidentified tern	18	86	0.1%	6	7%	40	47%	31	36%	9	10%
Western gull	23	123	0.2%	24	20%	2	2%	27	22%	70	57%
Gulls and terns	**358**	**4663**	**7.7%**	**419**	**9%**	**1239**	**27%**	**2451**	**53%**	**554**	**12%**
Anna's hummingbird	1	1	<0.1%			1	100%				
Hummingbirds	**1**	**1**	**<0.1%**			**1**	**100%**				
American coot	29	277	0.5%	23	8%	14	5%	231	83%	9	3%
American wigeon	9	36	0.1%			1	3%	17	47%	18	50%
Black-crowned night-heron	5	6	<0.1%	1	17%	5	83%				
Brown pelican	31	73	0.1%	12	16%	32	44%	28	38%	1	1%

Species	# Observations	# Individuals	% of All Birds	Jun-Aug	% of Group /Qtr	Sep-Nov	% of Group /Qtr	Dec-Feb	% of Group /Qtr	Mar-May	% of Group /Qtr
Bufflehead	90	3916	6.5%			995	25%	2584	66%	337	9%
Canada goose	69	1071	1.8%	252	24%	14	1%	295	28%	510	48%
Canvasback	11	183	0.3%					173	95%	10	5%
Cattle egret	1	7	<0.1%	7	100%						
Common goldeneye	13	65	0.1%			18	28%	43	66%	4	6%
Double-crested cormorant	108	1078	1.8%	292	27%	379	35%	262	24%	145	13%
Eared grebe	2	2	<0.1%							2	100%
Gadwall	3	6	<0.1%							6	100%
Great blue heron	21	27	<0.1%	10	37%	13	48%	3	11%	1	4%
Great egret	41	85	0.1%	27	32%	25	29%	8	9%	25	29%
Greater scaup	64	1377	2.3%	3	<0.1%	49	4%	741	54%	584	42%
Greater white-fronted goose	1	5	<0.1%							5	100%
Green-winged teal	1	4	<0.1%					4	100%		
Horned grebe	3	3						3			
Mallard	52	338	0.6%	22	7%	83	25%	156	46%	77	23%
Northern shoveler	20	414	0.7%			43	10%	315	76%	56	14%
Pied-billed grebe	3	3	<0.1%			1	33%	2	67%		
Ring-necked duck	2	5	<0.1%	3	60%			2	40%		
Ruddy duck	8	25	<0.1%			1	4%	12	48%	12	48%
Snowy egret	19	51	0.1%			26	51%	12	24%	13	25%
Surf scoter	12	124	0.2%			65	52%	47	38%	12	10%
Unidentified cormorant	1	4	<0.1%					4	100%		
Unidentified scaup	40	1501	2.5%	4	0.3%			462	31%	1035	69%
Unidentified waterfowl	44	6805	11.3%			300	4%	5854	86%	651	10%
Western grebe	131	1117	1.8%	425	38%	300	27%	223	20%	169	15%
Large waterbirds	**834**	**18608**	**30.8%**	**1081**	**5.8%**	**2364**	**13%**	**11481**	**62%**	**3682**	**20%**
Black phoebe	18	20	<0.1%	8	40%	5	25%	5	25%	2	10%
Chestnut-backed chickadee	1	3	<0.1%							3	100%
Dark-eyed junco	1	1	<0.1%	1	100%						
Grasshopper sparrow	3	4	<0.1%	2	50%	2	50%				
Horned lark	2	11	<0.1%					11	100%		

Species	# Observations	# Individuals	% of All Birds	Jun-Aug	% of Group /Qtr	Sep-Nov	% of Group /Qtr	Dec-Feb	% of Group /Qtr	Mar-May	% of Group /Qtr
House finch	35	438	0.7%	10	2.3%	227	52%	94	21%	107	24%
House sparrow	3	5	<0.1%	2	40%					3	60%
Lesser goldfinch	1	15	<0.1%			15	100%				
Northern mockingbird	10	12	<0.1%	4	33%	1	8%	1	8%	6	50%
Savannah sparrow	17	48	0.1%	10	21%	16	33%	7	15%	15	31%
Unidentified passerine	8	117	0.2%	3	2.6%	62	53%	50	43%	2	2%
Unidentified sparrow	7	15	<0.1%	10	67%	5	33%				
Western meadowlark	19	120	0.2%			58	48%	36	30%	22	
White-crowned sparrow	6	71	0.1%			16	23%	27	38%	28	39%
Yellow-rumped warbler	10	127	0.2%			53	42%	74	58%		
Passerines	**141**	**1007**	**1.7%**	**50**	**5%**	**460**	**46%**	**305**	**30%**	**192**	**19%**
Mourning dove	2	21	<0.1%	1	4.8%	20	95%				
Rock pigeon	41	209	0.3%	7	3.3%	65	31%	56	27%	39	
Pigeons and doves	**43**	**230**	**0.4%**	**8**	**3.5%**	**85**	**37%**	**56**	**24%**	**81**	**35%**
American kestrel	29	29	<0.1%	4	14%	12	41%	10	34%	3	10%
Burrowing owl	1	1	<0.1%							1	100%
Northern harrier	1	1	<0.1%			1	100%				
Osprey	3	3	<0.1%			1	33%	2	67%		
Peregrine falcon	1	1	<0.1%					1	100%		
Red-shouldered hawk	3	3	<0.1%	2	67%	1	33%				
Red-tailed hawk	64	78	0.1%	5	6.4%	50	64%	17	22%	6	8%
Turkey vulture	9	13	<0.1%	6	46%	4	31%	3	23%		
White-tailed kite	14	16	<0.1%	3	19%	9	56%	3	19%	1	6%
Raptors	**125**	**145**	**0.2%**	**20**	**14%**	**78**	**54%**	**36**	**25%**	**11**	**8%**
American avocet	17	1462	2.4%			210	14%	1180	81%	72	5%
American golden-plover	1	1	<0.1%							1	100%
Black oystercatcher	5	7	<0.1%	3	43%	1	14%	2	29%	1	14%
Black-bellied plover	18	1278	2.1%	326	26%	435	34%	405	32%	112	9%
Black-necked stilt	13	352	0.6%	4	1%	246	70%	102	29%		

Species	# Observations	# Individuals	% of All Birds	Jun-Aug	% of Group /Qtr	Sep-Nov	% of Group /Qtr	Dec-Feb	% of Group /Qtr	Mar-May	% of Group /Qtr
Dunlin	19	1612	2.7%			555	34%	792	49%	265	16%
Greater yellowlegs	2	2	<0.1%					1	50%	1	50%
Killdeer	37	105	0.2%	17	16%	36	34%	25	24%	27	26%
Long-billed curlew	5	112	0.2%			62	55%	50	45%		
Long-billed dowitcher	3	200	0.3%			50	25%	150	75%		
Marbled godwit	19	1287	2.1%	64	5%	468	36%	252	20%	503	39%
Ruddy turnstone	2	2	<0.1%	2	100%						
Short-billed dowitcher	1	50	0.1%			50	100%				
Unidentified dowitcher	2	30	<0.1%					30	100%		
Unidentified shorebird	58	19066	32%	970	5%	2867	15%	11119	58%	4110	22%
Western sandpiper	17	3591	5.9%			600	17%	1929	54%	1062	30%
Whimbrel	4	53	0.1%	50	94%					3	6%
Willet	49	2735	4.5%	265	9.7%	629	23%	1440	53%	401	15%
Shorebirds	**272**	**31,942**	**53%**	**1701**	**5.3%**	**6,209**	**19%**	**17,477**	**55%**	**6,558**	**21%**
Barn swallow	18	49	0.1%	35	71%	5	10%			9	18%
Cliff swallow	1	10	<0.1%	10	100%						
Tree swallow	7	42	0.1%	12	29%					30	71%
Unidentified swallow	2	15	<0.1%	5	33%	10	67%				
Violet-green swallow	4	29	<0.1%							29	100%
Swallows	**32**	**145**	**0.2%**	**62**	**43%**	**15**	**10%**			**68**	**47%**
Total	**1993**	**60,469**		**3540**	**5.9%**	**11,112**	**18%**	**34,031**	**56%**	**11,789**	**19%**

Appendix F

Technical Memorandum: Vegetation Mapping in Support of the SFO Wildlife Hazard Management Plan

Technical Memorandum
Vegetation Mapping in support of the SFO Wildlife Hazard Management Plan

Prepared For:
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Contact: Danielle LeFer
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Prepared By:
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San Francisco, CA 94121
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415-391-1000

July 17, 2009

Table of Contents

1.0 INTRODUCTION

This technical memorandum describes the methods and results of a vegetation mapping effort that was conducted by May & Associates, Inc. in support of the San Francisco International Airport (SFO) Wildlife Hazard Plan currently being prepared by ICF Jones & Stokes. The vegetation mapping will be used by Jones & Stokes to evaluate the potential for better management of wildlife hazards at SFO.

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2.0 METHODS

May & Associates, Inc. President and Senior Biologist Loran May conducted the vegetation mapping of the SFO Wildlife Hazard Plan study area on July 5, 9, and 10, 2009. Using aerial photographs and a vegetation classification system provided by ICF Jones & Stokes, May & Associates Inc's biologist mapped undeveloped land cover types on SFO property (referred to in this report as the Primary Zone), and undeveloped lands within a 2-mile radius of SFO property (referred to in the report as the Secondary Zone).

Vegetation mapping was performed as follows. Aerial photographs at a scale of 1 inch equals 500 feet (1:6,000) dated June 15, 2006 were visually assessed to locate undeveloped lands that could possibly support natural vegetation. These areas were targeted for assessment during the field investigation.

A vegetation classification system was developed by ICF Jones & Stokes. This vegetation classification system is largely based on the California Native Plant Society's Manual of California vegetation (Sawyer and Keeler-Wolf 1995), with minor adaptations to fit the habitats in the vicinity of the airport.

The following types of habitats were initially included in the classification system:

Grassland Habitats

- California Annual Grassland (Non-Native Annual Grassland)

Woodland Habitats

- Conifer Woodland
- Mixed Evergreen/Oak woodland
- Oak Woodland
    - Central Coast Live Oak Woodland
- Riparian Woodland and Forest
    - Willow Scrub
    - Central Coast Live Oak Riparian woodland
- Nonnative Woodlands/Ornamental Woodland

Scrub/Shrub Habitats

- Coastal Scrub

Vegetated Wetland Habitats

- Perennial Freshwater Marsh (Emergent Aquatic Wetland)
- Tidal Marsh
- Seasonal Wetland
    - Seasonal Wetland (Saline)

Unvegetated Open Water Habitats

- Open Water (Bay/Salt Water)

- Open Water (Freshwater)
- Ponds
    - Natural Ponds
    - Artificial Pond Impoundments (Cement Lined Ponds)
- Quarry Pond
- Reservoir
- Riverine
- Ditch

Agricultural Lands
- Cultivated Cropland
- Orchard
- Vineyard

Developed Lands
- Parks, Golf Courses, Landscaped Recreational Areas
- Ornamental Nonnative Woodlands
- Landfill/Solid Waste facilities

Other
- Rock Outcrops
- Disturbed/ Ruderal Lands
- Rip-Rap
- Sandy Beach, Sand Spit

A minimum mapping polygon size of 0.25 acre was used for the project. All undeveloped lands that were visible on aerial photographs were investigated in the field from public roadways and other public access points. Vegetation was classified based on the observed dominant plant species present, as compared to the CNPS California vegetation classification system (Sawyer and Keeler-Wolf 1995). Habitat types on lands that were not visible from public roads were mapped based on aerial photographic similarity to lands that were observable from public roads.

Mapping Limitations and Areas Excluded from Mapping

Areas excluded from mapping included the following. Individual planted landscaping street trees and linear rows of landscaped trees less than 0.5 acres in size were not mapped as part of this exercise. Lands immediately adjacent and to the west of SFO adjacent to the highway that were part of the BART expansion project were not mapped as part of this project because this area has been substantively altered from the 2006 aerial photographic imagery that was used in this analysis.

3.0 RESULTS

The project area was divided into a primary zone which encompasses SFO-owned lands, and a secondary zone which occur with a 2-mile radius of SFO-owned lands.

Refer to Figure 1 (Maps 1-7) for the locations of habitats described below.

The Primary Zone.
The Primary Zone (Maps 3 and 5) encompasses the following types of habitats in undeveloped areas:

- **California Annual Grassland, Non-Native Annual Grasslands (Ruderal**). Areas mapped as non-native annual grasslands (ruderal) appear to have been disturbed by past and possibly current management practices (graded, mowed, etc). They are typically dominated by non-native grasses and forbs, including wild oat (*Avena fatua, A. barbata*), brome (*Bromus diandrus, B. hordeaceus*), wild barley (*Hordeum murinum, H. marinum*), Italian ryegrass (*Lolium multiflorum*), and annual fescue (*Vulpia microstachys, V. myuros*). In addition to the non-native annual grasses, several common weedy forb species are found in this mapping unit, including Italian thistle (*Carduus pycnocephalus*), plantain (*Plantago* spp), fennel (*Foeniculum vulgare),* yellow star thistle (*Centaurea solstitialis),* wild radish *(Raphanus* sp.), Lotus (*Lotus* sp.), and filaree (*Erodium spp*). This habitat was found in linear swatches adjacent to the runway strips and in fallow or unused undeveloped areas.

- **Ornamental Non-Native Woodlands**. Within the Primary Zone, this habitat was most commonly found around buildings, and included planted street trees such as Monterey pine *(Pinus radiata),* Monterey cypress *(Cupressus macrocarpa),* eucalyptus *(Eucalyptus* spp.), liquid amber *(Liquidambar styraciflua),* ornamental plum tree (*Prunus* sp.), Pittosporum (*Pittosporum* spp.), London plane tree (*Platanus* × hybrid), and several others.

- **Open Water.** There are several cement-lined artificial impoundment ponds (Open Water- Artificial Pond) on the airport property that were mapped as open water. There were also a few linear drainage features leading to the bay that had an unvegetated saltwater open water component (Open Water -Bay/Salt Water).

- **Rip-Rap.** This is an artificially-created habitat type found along the shoreline. Rip rap consists of unvegetated rocks and cement blocks used to stabilize the shoreline.

- **Sand Spit.** There is a small unvegetated sand spit that was mapped on the airport property. At low tide, a small sand beach is exposed that attracts a variety of seabirds.

- **Seasonal Wetland (Saline).** There are a few small depressions on the airport property that appear to pond water for a portion of the year, and support hydrophytic (water-loving) and salt-tolerant species. Plants observed in this mapping unit included

pickleweed (*Salicornia virginica),* marsh gumplant (*Grindelia maritima*), alkali heath (*Frankenia salina*), rabbit's foot grass (*Polypogon maritima*), birdsfoot trefoil (*Lotus corniculatus*), and bristly ox-tongue (*Picris echioides*).

- **Tidal Marsh.** This habitat was found immediately adjacent to the water's edge in shallow areas such as mudflats that are tidally influenced. Plant species observed in this mapping unit included Pacific cordgrass (*Spartina* foliosa) and possibly hybrid smooth cordgrass (*S.foliosa* X *alterniflora*), pickleweed (*Salicornia virginica*), marsh lavender (*Limonium californicum*), marsh gumplant (*Grindelia maritima*), salty Susan (*Jaumea carnosa*), alkali heath (*Frankenia salina*), coastal rabbit's foot grass (*Polypogon maritima*), birdsfoot trefoil (*Lotus corniculatus*), and bristly ox-tongue (*Picris echioides*).

The Secondary Zone.

The Secondary Zone (Maps 1-7) encompasses the following types of habitats in undeveloped areas:

- **California Annual Grassland, Non-Native Annual Grasslands (Ruderal**). Areas mapped as Non-Native Annual grasslands appear to have been disturbed by past and possibly current management practices (graded, mowed, etc). They are typically dominated by non-native grasses and forbs, including wild oat (*Avena fatua, A. barbata*), brome (*Bromus diandrus, B. hordeaceus*), wild barley (*Hordeum murinum, H. marinum*), Italian ryegrass (*Lolium multiflorum*), and annual fescue (*Vulpia microstachys, V. myuros*). In addition to the non-native annual grasses, several common weedy forb species are also found in this mapping unit, including Italian thistle (*Carduus pycnocephalus*), prickly ox tongue *(Picris echioides),* plantain (*Plantago* spp), fennel (*Foeniculum vulgare),* yellow star thistle (*Centaurea solstitialis),* wild radish *(Raphanus* sp.), Lotus (*Lotus* sp.), and filaree (*Erodium spp*). This habitat was very common throughout the secondary zone.

- **Central Coast Live Oak Woodland.** This habitat was most commonly found on undisturbed hillslopes, along creek corridors, and occasionally as remnant woodland stands in residential neighborhoods. Plants observed in this mapping unit included coast live oak (*Quercus agrifolia*), with occasional California bay *(Umbelluria californica),* and California buckeye (*Aesculus californicus*). This habitat type often intergraded with areas mapped as Ornamental Nonnative Woodlands, and therefore many of the nonnative trees that are described in the ornamental nonnative woodland section were also found in this habitat type, including Monterey pine *(Pinus radiata),* Monterey cypress *(Cupressus macrocarpa),* eucalyptus (*Eucalyptus* spp.),and acacia *(Acacia* spp.). This habitat was very common throughout the secondary zone.

- **Coastal Scrub (Ruderal).** The secondary zone encompassed some small remnant stands of coastal scrub which appear to have been substantially disturbed (graded, scraped) in the past. Plants observed in this habitat type include native shrubs such as coyote brush

(*Baccharis pilularis)* and California sagebrush (*Artemisia californica),* along with weedy annual grassland species such as fennel (*Foeniculum vulgare),* prickly ox tongue *(Picris echioides),* yellow star thistle (*Centaurea solstitialis),* wild radish *(Raphanus* sp.), and Lotus (*Lotus* sp.).

- **Developed Areas (Landscaped Golf Courses, Urban Parks).** This mapping unit was reserved for ballparks, play fields, bike and walking paths, golf courses and their associated non-native woodlands, dog parks, and other landscaped and maintained areas that were planted with mostly cultivated landscape species and lawns.

- **Ornamental Non-Native Woodlands.** This habitat was found in abundance throughout the secondary zone, most often found on ridgelines, along creeks, along streets and near buildings. This habitat type included planted street trees such as Monterey pine *(Pinus radiata),* Monterey cypress *(Cupressus macrocarpa),* eucalyptus (*Eucalyptus* spp.), Acacia *(Acacia* spp.), liquid amber (*Liquidambar styraciflua),* ornamental plum tree (*Prunus* sp.), Pittosporum *(Pittosporum* spp.), London plane tree (*Platanus* × hybrid), and several others. Ornamental Nonnative Woodland intergrades with Central Coast Live Oak Woodland, and therefore can also encompass native trees such as coast live oak (*Quercus agrifolia*), California bay *(Umbelluria californica),* and California buckeye (*Aesculus californicus*). This habitat was very common throughout the secondary zone.

- **Open Water.** There are a few linear drainage features leading to the bay that had an unvegetated open water component (Open Water – Bay/Salt Water).

- **Rip-Rap.** This is an artificially created habitat type found all along the shoreline. Rip rap consists of unvegetated rocks and cement blocks used to stabilize the shoreline.

- **Rock Outcrops.** Rock outcrops are mostly unvegetated areas that have a natural rocky substrate.

- **Ruderal.** This mapping unit was reserved for areas that had been recently or repeatedly disturbed (plowed, mowed, scraped) to the point that they no longer supported natural vegetation, or only supported remnant vegetation that could not be classified or mapped as another habitat type.

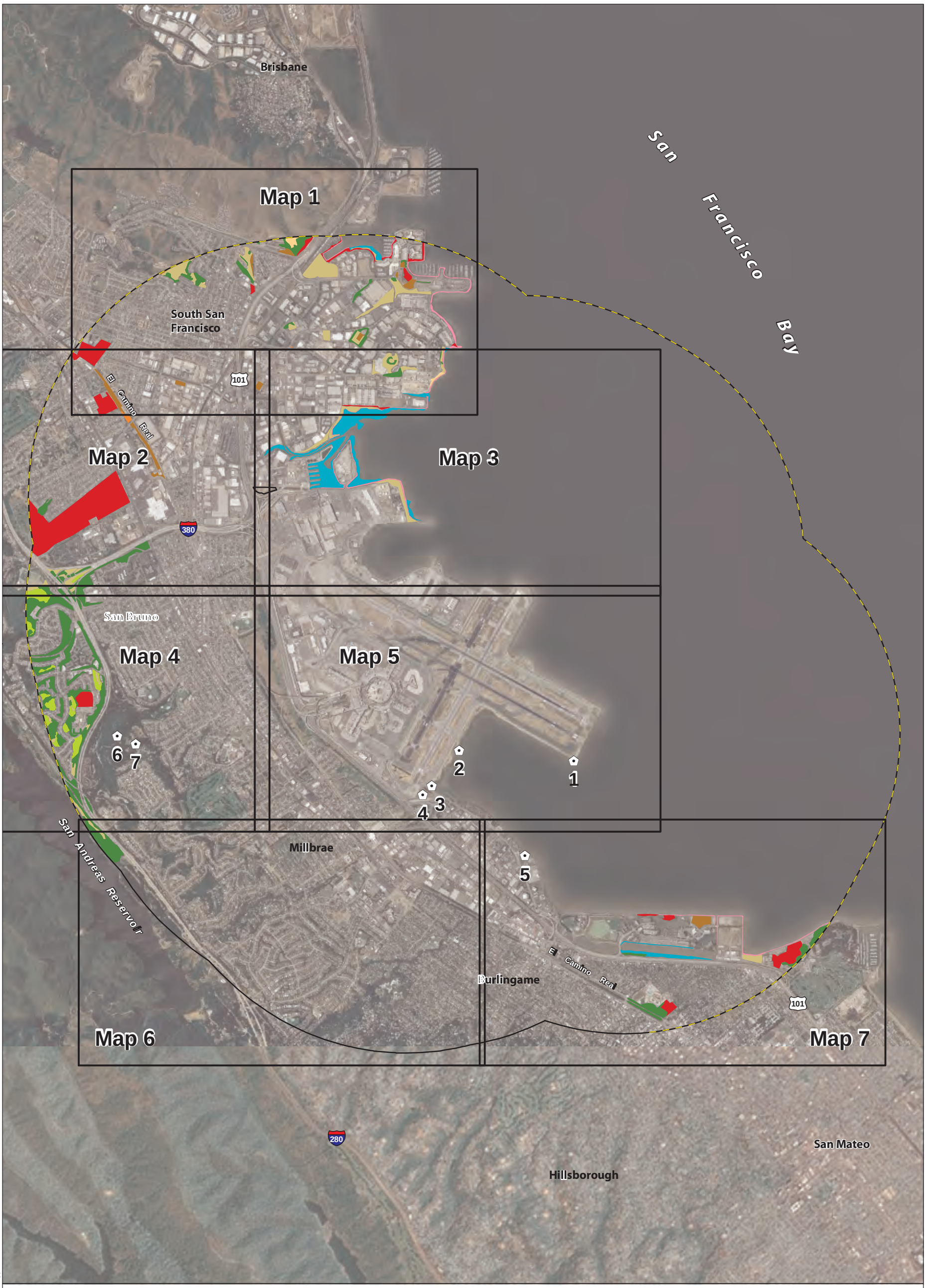
- **Tidal Marsh.** This habitat was found immediately adjacent to the water's edge in shallow areas such as mudflats that are tidally influenced. Plant species observed in this mapping unit included Pacific cordgrass (*Spartina* foliosa and possibly *S.foliosa* X *alterniflora* (hybrid smooth cordgrass), pickleweed (*Salicornia virginica*), marsh lavender (*Limonium californicum*), marsh gumplant (*Grindelia maritima*), salty Susan (*Jaumea carnosa*), alkali heath (*Frankenia salina*), rabbit's foot grass (*Polypogon*

maritima), birdsfoot trefoil (*Lotus corniculatus*), and bristly ox-tongue (*Picris echioides*).

- **Willow Scrub.** A few areas that supported willows (*Salix* spp) were mapped in the secondary zone, mostly near some source of standing water such as a drainage overflow, railroad track impoundment, or along a remnant of a natural creek system. This habitat was mapped separately due to its importance to certain wildlife species.

4.0 REFERENCES

Sawyer, J.O. and T. Keeler-Wolf. 1995. A manual of California vegetation. In cooperation with The Nature Conservancy and the California Department of Fish and Game. California Native Plant Society. Sacramento, California.



Habitat Type

Aquatic
- Fresh Water

Wetland
- Tidal Marsh

Grassland
- Non-native Annual Grassland

Shore
- Sandy Beach/Sandy Spit
- Riprap

Scrub
- Coastal Scrub
- Willow Scrub

Woodland
- Oak Woodland

Developed
- Ruderal
- Ornamental Woodland
- Bare Ground
- Developed Open Space

- Primary Zone
- Secondary Zone
- West of Bayshore Property
- Aerial Map Coverage Areas
- Photo Location

Figure 1
Land Cover Types in SFO's Primary and Secondary Zones

N

0 0.25 0.5 1
Miles

Q:\Projects\SFO\00307_09\mapdoc\Figures\Figure1_LandCoverTypes.mxd

APPENDIX A. PHOTOGRAPHS

Photo 1. Sand Spit

Photo 2. Rip-Rap and Tidal Marsh

Photo 3. Open Water with plastic balls to prevent bird use.

Photo 4. Seasonal Wetland (Saline)

Photo 5. Large Expanse of Tidal Marsh

Photo 6. Nonative Annual Grassland (ruderal) (foreground) and Central Coast Live Oak Woodland (background)

Photo 7. Cultivated Non-Native Forest with Acacia (foreground), Eucalyptus, and Monterey Pine (background).

Appendix G

SFO Personnel Certified

SFO Personnel Certified

The following SFO Airfield Operations staff have attended a wildlife control and firearm safety workshop, and have had AOA/ramp training. Airfield Operations staff should receive a minimum of 8 hours of training every 12 months. The wildlife coordinator will maintain a recorded log of certified personnel.

Name	Wildlife Control (Date)	AOA/Ramp (Date)

Appendix H

Threatened and Endangered Species with Potential to Occur at SFO

Appendix H

Special-Status Species with Potential to Occur within 10,000 feet of SFO
San Francisco International Airport, San Mateo County, California

Prepared by LSA Associates, Inc.

Species	Status* (Federal/State/ Other)	Habitat	Potential for Occurrence
Plants			
Allium peninsulare var. *franciscanum* Franciscan onion	–/–/1B	Cismontane woodland, valley and foothill grassland, clay soils, often on serpentine, dry hillsides.	None: Clay/soils not present.
Amsinckia lunaris Bent-flowered fiddleneck	–/–/1B	Coastal bluff scrub, cismontane woodland, valley and foothill grassland.	None: Scrub and woodland not present. Infield grasslands on airfield too disturbed.
Collinsia multicolor San Francisco collinsia	–/–/1B	On decomposed shale (mudstone) mixed with humus in closed-cone coniferous forest or coastal scrub.	None: Coniferous forest or coastal scrub not present.
Dirca occidentalis Western leatherwood	–/–/1B	On brushy slopes, mesic sites; mostly in mixed evergreen and foothill woodland communities; broadleaved upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, northern coast coniferous forest, riparian forest, riparian woodland.	None: Woodland or forested habitats not present.
Fritillaria biflora var. *ineziana* Hillsborough chocolate lily	–/–/1B	Cismontane woodland, valley and foothill grassland; serpentine soils.	None: No serpentine soils in project area.
Hemizonia congesta ssp. *congesta* Congested-headed hayfield tarplant	–/–/1B	Valley and foothill grassland, sometimes on roadsides.	None: Tarplants not known to occur on airfield due to lack of suitable habitat.
Horkelia marinensis Point Reyes horkelia	–/–/1B	Sandy flats and dunes near coast, in grassland or scrub plant communities.	None: Sandy soils not present.

Species	Status* (Federal/State/ Other)	Habitat	Potential for Occurrence
Pentachaeta bellidiflora White-rayed pentachaeta	FE/SE/–	Open dry rocky slopes in grassland, often on slopes derived from serpentine bedrock.	None: Rocky, serpentine slopes not present.
Triphysaria floribunda San Francisco owl's-clover	–/–/1B	Coastal prairie, coastal scrub, valley and foothill grassland; usually on serpentine soils.	None: Serpentine soils not present. Surveys conducted at Bayfront Park in 2000 did not find this species (URS, 2001).
Invertebrates			
Icarica icarioides missionensis Mission blue butterfly	FE/–/–	Coastal grassland and chaparral between 210 and 360 m elevation. Known colonies range from Fort Baker (Marin Co.) to Sweeny Ridge (San Mateo Co.). Larval host plants include *Lupinusalbifrons*, *L. formosus*, and *L. variicolor*).	None: Coastal grassland and chaparral not present. Project area too low in elevation.
Speyeria callippe callippe Callippe silverspot butterfly	FE/–/–	Grassy hilltops and ridges at San Bruno Mountain and Sign Hill (San Mateo Co.), in the hills near Pleasanton (Alameda Co.), at Sears Point (Sonoma Co.), and in the hills between Vallejo and Cordelia.	None: Project area outside known range of species.
Fish			
Spirinchus thaleichthys Longfin smelt	–/ST/–	Anadromous: found in California's bay, estuary, and near shore environments, including the San Francisco Bay Estuary.	May occur: Ranges widely within southern and central San Francisco Bay (Moyle, 2002), and therefore may occur in San Francisco Bay waters adjacent to SFO.
Amphibians			
Rana draytonii California red-legged frog	FT/–/CSC	Ponds, streams, drainages and associated uplands.	Known to occur: Only found on West-of-Bayshore property west of U.S. Highway (U.S. 101) but has never been observed nor is expected to occur east of U.S. 101 due to significant physical barriers to dispersal and lack of suitable aquatic/upland habitat.

Species	Status* (Federal/State/ Other)	Habitat	Potential for Occurrence
Reptiles			
Thamnophis sirtalis tetrataenia San Francisco garter snake	FE/SE/CFP	Freshwater marshes, ponds, and slow-moving streams in San Mateo County and extreme northern Santa Cruz County; prefers dense cover and water depths of at least 1 foot.	Known to occur: Only found on West-of-Bayshore property west of U.S. 101 but has never been observed nor is expected to occur east of U.S. 101 due to significant physical barriers to dispersal and lack of suitable aquatic/upland habitat.
Birds			
Falco peregrinus anatum American peregrine falcon	–/–/CFP	Open country, mountains, and sea coasts; nests on high cliffs, bridges, and buildings.	Known to occur: Nesting and individuals have been observed at SFO.
Rallus obsoletus obsoletus Ridgway's rail	FE/SE/CFP	Tidal salt marshes with sloughs and cordgrass (*Spartina* sp.).	Known to occur: LSA heard four individuals calling in tidal marsh southeast of Runway 1R on October 12, 2010. Field surveys conducted for the San Francisco Estuary Invasive Spartina Project detected individuals in same marsh in 2007, 2008, 2009, and 2015 (Spautz, 2007; McBroom, 2008, 2009).
Pelicanus occidentalis Brown pelican	–/–/CFP	Southern and western estuaries and coastal marine habitats. Rarely seen inland.	Known to occur: Individuals commonly observed at SFO.
Elanus leucurus White-tailed kite	–/–/CFP	Savanna, open woodlands, marshes, desert grassland, partially cleared lands, and cultivated fields.	Known to occur: Individuals commonly observed at SFO.
Mammals			
Corynorhinus townsendii Townsend's big-eared bat	–/SCT/CSC	Riparian woodlands, wetlands, forest edges, and open woodlands; roosts in caves, mines, and old buildings.	None: Suitable roost sites not present.

Status Codes:
FE: Federally endangered
FT: Federally threatened
SE: State endangered
ST: State threatened
SCT: State candidate threatened
1B: California Rare Plant Rank 1B: plants rare or endangered in California and elsewhere
2: California Rare Plant Rank 2: plants rare or endangered in California but more common elsewhere

Notes:

CSC: California Species of Special Concern

CFP: California Fully Protected Species
DPS = distinct population segment

Appendix I

WHMP Approval and Review History

WHMP Approval and Review History

The WHMP is reviewed annually or following a triggering event and is updated as needed, by request from the FAA, or every 5 years.

Action	Completion Date	FAA Approval Date
WHMP Update	January 2010	January 4, 2012
Wildlife Hazard Assessment	October 2012	August 1, 2014
WHMP Review	April 2015	None (internal)
WHMP Update	April 2015	