



U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: PROTOCOL FOR THE
CONDUCT AND REVIEW OF WILDLIFE
HAZARD SITE VISITS, WILDLIFE
HAZARD ASSESSMENTS, AND WILDLIFE
HAZARD MANAGEMENT PLANS

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Change:

1. Purpose.

This Advisory Circular (AC) defines the minimum acceptable standards for the conduct and preparation of Wildlife Hazard Site Visits (Site Visit), Wildlife Hazard Assessments (Assessments) and Wildlife Hazard Management Plans (Plans). This AC provides guidelines that define when a Site Visit should be conducted and when an Assessment must be conducted. It also defines minimum standards for conducting Site Visits and Assessments, as well as developing Plans. The AC further defines and explains continual monitoring programs. This AC also provides checklists to help people evaluate Site Visits, Assessments and Plans.

2. Applicability.

Airports that hold Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D, must use the standards, practices and recommendations contained in this AC to comply with the wildlife hazard management requirements in 14 C.F.R. §139.337. All other airports that have received Federal assistance and/or that have authority to impose and/or use a Passenger Facility Charge must use the standards practices and recommendations contained in this AC during the conduct and preparation of Site Visits, Assessments and Plans. The FAA also recommends the guidance in this AC for Qualified Airport Wildlife Biologists (Biologist), land-use planners and developers of projects, facilities, and activities on or near airports.

3. Background.

Title 14 Code of Federal Regulations, part 139.337, *Wildlife Hazard Management*, prescribes the specific reasons why an Assessment must be conducted and what subject matter is minimally required. Minimal standards have been unclear or absent for preferred methodologies that assess wildlife populations and wildlife hazard attractants. These disparities have resulted in non-standardized, wide ranging methodologies to obtain wildlife and habitat data.

An Assessment, defined as an ecological study in part 139.337 (a), conducted by a Biologist, provides the scientific basis for the development, implementation, and refinement of a Plan. Though parts of the Assessment may be incorporated directly in the Plan, they are two separate documents. Part of the Plan can be prepared by the Biologist who conducts the Assessment. However, some parts can be prepared only by the airport. For example, airport management assigns airport personnel responsibilities, commits airport funds, and purchases equipment and supplies. Site Visits also must be conducted by a Qualified Airport Wildlife Biologist. The intent of a Site Visit is to provide an abbreviated analysis of an airport's wildlife hazards, determine if an Assessment is warranted, and if necessary, provide actionable information that allows the airport to expedite the mitigation of these hazards.

Information about the risks posed to aircraft by certain wildlife species has increased 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 most hazardous bird and mammal species or groups as to relative hazard to aircraft in airport environments (i.e., ≤500 ft [152 m] above ground level), based on a composite ranking of strikes with civil aircraft in the USA 1990-2009.

These hazard rankings can help focus hazardous wildlife management efforts on those species or groups that represent the greatest threats to safe air operations in the airport environment. Used in conjunction with a site-specific Assessment that will determine the relative abundance and use patterns of wildlife species, these rankings can help airport operators better understand the general threat level (and consequences) of certain wildlife species and can assist with the creation of a "zero-tolerance" list of hazardous species that warrant immediate attention.

Table 1. Ranking of 77 bird and mammal species or groups (1 = most hazardous) as to relative hazard to aircraft in airport environments (i.e., ≤500 ft [152 m] above ground level), based on a composite rank. The composite rank reflects 3 variables: the percentage of total strikes (for that species–group) that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft, and the percentage of total strikes that caused an effect on flight (EOF). Strike data are from the Federal Aviation Administration National Wildlife Strike Database, for strikes that occurred in the United States from 1990 to 2009¹.

Species²	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Mule deer (<i>Odocoileus hemionus</i>)	47	96	38	83	1	1	1	1	100
White-tailed deer (<i>Odocoileus virginianus</i>)	814	87	36	68	2	2	3	2	88
Domestic dog	21	53	26	75	4	4	2	3	71
Other geese	20	68	32	32	3	3	8	4	61
Canada goose (<i>Branta canadensis</i>)	776	51	16	34	7	9	7	5	46
Turkey vulture (<i>Cathartes aura</i>)	159	46	16	34	10	7	6	5	44
Other ducks	77	49	24	30	8	5	11	7	48
Great horned owl (<i>Bubo virginianus</i>)	29	52	16	27	6	8	17	8	44
Double-crested cormorant (<i>Phalacrocorax auritus</i>)	24	52	13	29	5	13	13	8	43
Brown pelican (<i>Pelecanus occidentalis</i>)	31	35	13	38	14	14	5	10	40
Wild turkey (<i>Meleagris gallopavo</i>)	38	37	6	43	13	28	4	11	40
Sandhill crane (<i>Grus canadensis</i>)	66	43	10	28	11	19	15	11	37
Glaucous-winged gull (<i>Larus glaucescens</i>)	27	48	9	28	9	21	16	13	39
Bald eagle (<i>Haliaeetus leucocephalus</i>)	74	40	7	30	12	25	10	14	36
Great black-backed gull (<i>Larus marinus</i>)	20	26	21	22	18	6	23	14	32
Osprey (<i>Pandion haliaetus</i>)	77	32	12	26	16	15	19	16	32
Great blue heron (<i>Ardea herodias</i>)	132	32	8	28	15	23	14	17	31
Ring-necked pheasant (<i>Phasianus colchicus</i>)	45	26	14	22	20	10	26	18	29
Herring gull (<i>Larus argentatus</i>)	291	25	13	24	23	12	21	18	29
Snowy owl (<i>Bubo scandiacus</i>)	28	23	12	26	24	17	20	20	28
Mallard (<i>Anas platyrhynchos</i>)	221	31	11	21	17	18	28	21	29
Great egret (<i>Ardea alba</i>)	24	26	4	29	21	32	12	22	28
Red-tailed hawk (<i>Buteo jamaicensis</i>)	534	26	8	21	19	24	27	23	25
California gull (<i>Larus californicus</i>)	23	14	14	20	33	11	30	24	22
Cattle egret (<i>Bubulcus ibis</i>)	112	17	6	27	32	27	18	25	23
Ring-billed gull (<i>Larus delawarensis</i>)	362	21	8	20	26	22	33	26	23
Franklin's gull (<i>Larus pipixcan</i>)	26	9	9	23	41	20	22	27	19
Raccoon (<i>Procyon lotor</i>)	23	18	12	14	28	16	40	28	20
Species²	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score

Coyote (<i>Canis latrans</i>)	231	14	3	31	36	41	9	29	22
Rock dove (<i>Columba livia</i>)	1,035	18	6	19	29	26	34	30	20
Swainson's hawk (<i>Buteo swainsoni</i>)	24	17	4	20	31	33	31	31	19
Other hawks	34	14	4	22	34	37	25	32	18
Laughing gull (<i>Larus atricilla</i>)	106	14	4	21	35	34	29	33	18
Mew gull (<i>Larus canus</i>)	21	25	0	16	22	52	37	34	19
Peregrine falcon (<i>Falco peregrinus</i>)	44	18	5	7	30	29	53	35	14
Laysan albatross (<i>Phoebastria immutabilis</i>)	29	22	0	17	25	53	35	36	18
Rabbits (Leporidae)	78	11	3	15	37	39	39	37	13
Upland sandpiper (<i>Bartramia longicauda</i>)	32	8	4	16	43	36	36	37	13
Short-eared owl (<i>Asio flammeus</i>)	58	10	4	11	39	35	43	39	12
Black-bellied plover (<i>Pluvialis squatarola</i>)	20	18	0	16	27	54	38	40	15
Red fox (<i>Vulpes vulpes</i>)	31	8	0	22	42	55	24	41	14
American crow (<i>Corvus brachyrhynchos</i>)	141	10	3	13	40	40	41	41	12
Spotted dove (<i>Streptopelia chinensis</i>)	46	7	4	10	48	31	45	43	10
Barn owl (<i>Tyto alba</i>)	174	11	3	9	38	38	49	44	11
Mourning dove (<i>Zenaida macroura</i>)	1,313	7	3	13	45	42	42	45	10
Blackbirds	976	7	2	10	44	46	44	46	9
European starling (<i>Sturnus vulgaris</i>)	1,408	7	2	10	47	43	46	47	9
Bats (Chiroptera)	44	5	5	8	55	30	51	47	8
Killdeer (<i>Charadrius vociferus</i>)	553	6	1	7	51	48	52	49	7
American kestrel (<i>Falco sparverius</i>)	536	4	1	7	57	47	55	50	6
Zebra dove (<i>Geopelia striata</i>)	54	4	2	6	56	44	59	50	5
Snow bunting (<i>Plectrophenax nivalis</i>)	84	1	0	20	66	66	32	52	10
Common myna (<i>Acridotheres tristis</i>)	21	6	0	6	50	58	56	52	6
Bank swallow (<i>Riparia riparia</i>)	49	5	0	9	54	61	50	54	6
Meadowlarks	361	3	2	6	61	45	60	55	5
Woodchuck (<i>Marmota monax</i>)	41	7	0	3	46	56	68	56	5
Horned lark (<i>Eremophila alpestris</i>)	372	3	1	6	60	49	61	56	4
Sparrows	1,799	3	0	6	62	51	58	58	4
Northern harrier (<i>Circus cyaneus</i>)	24	5	0	5	52	59	62	59	5
American robin (<i>Turdus migratorius</i>)	159	2	0	10	64	65	47	60	5
Burrowing owl (<i>Athene cunicularia</i>)	20	6	0	0	49	57	73	61	3
Barn swallow (<i>Hirundo rustica</i>)	486	2	0	3	65	50	69	62	2
Wrens	28	4	0	4	58	62	66	63	3
Species²	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Terns	45	5	0	0	53	60	74	64	2
Finches	55	0	0	10	71	71	48	65	4

Chimney swift (<i>Chaetura pelagica</i>)	34	0	0	6	70	70	57	66	3
Common nighthawk (<i>Chordeiles minor</i>)	38	3	0	0	59	63	75	66	1
Pacific golden-plover (<i>Pluvialis apricaria</i>)	204	1	0	4	67	67	64	68	2
Purple martin (<i>Progne subis</i>)	57	2	0	2	63	64	72	69	2
Western sandpiper (<i>Calidris mauri</i>)	31	0	0	7	76	76	54	70	3
Cliff swallow (<i>Petrochelidon pyrrhonota</i>)	164	1	0	2	68	68	71	71	1
Skunks (Mephitidae)	30	0	0	4	74	74	63	72	2
Nutmeg mannikin (<i>Lonchura punctulata</i>)	26	0	0	4	72	72	67	72	2
Chestnut manikin (<i>Lonchura malacca</i>)	28	0	0	0	69	69	76	74	0
Wood warblers	30	0	0	4	77	77	65	75	2
Tree swallow (<i>Tachycineta bicolor</i>)	109	0	0	2	75	75	70	76	1
Opossum (<i>Didelphis virginiana</i>)	25	0	0	0	73	73	77	77	0

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

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

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SECTION 1.

PROTOCOL FOR THE CONDUCT OF A WILDLIFE HAZARD SITE VISIT (SITE VISIT)

1.1. INTRODUCTION. A Site Visit has three parts: Gathering airport information, field observations, and a final report with recommendations. Airports use a Site Visit to quickly evaluate and mitigate potential hazards on airports. An airport can also use a Site Visit to determine whether an Assessment is necessary. If an airport already has a Plan, airport management can use a Site Visit to investigate wildlife strikes to aircraft or to see if the Plan needs to be updated.

During the Site Visit, the Biologist collects and compiles information on the airport's wildlife hazard history, documented and suspected wildlife hazards, habitat attractants, control activities, airport operations procedures, communications of hazards through ATC and pilots, aircraft operations and scheduling. A Site Visit is typically conducted over a period of one to three days during which a Biologist evaluates the habitat on and surrounding the airport and records direct or indirect wildlife observations; and reviews the current Plan, current wildlife management activities and airport wildlife strike data.

A Qualified Airport Wildlife Biologist must conduct Site Visits. Standards for becoming a Qualified Airport Wildlife Biologist are found in AC 150/5200-36A, *Qualifications for Wildlife Qualified Airport Wildlife Biologists Conducting Wildlife Hazard Assessments and Training Curriculum for Airport Personnel Involved in Controlling Wildlife Hazards on Airports*.

1.2. APPLICABLE AIRPORT INFORMATION. The airport operator shall provide the Biologist the following information, if available:

- a. Personnel and departments responsible for airport operations
- b. Number of aircraft movements per year
- c. Type of movements (i.e., % private, civil, and military)
- d. Recent airport improvements or upgrades
- e. Past and present land management practices
- f. Records of strikes and damage, flight delays, injuries, and fatalities due to strikes. Wildlife strike data may help determine hazardous species on an airport. Data on reported wildlife strikes are available through the FAA National Wildlife Strike Database (available at <http://faa.gov/go/wildlife>). Airports may maintain their own local database which can be compared with the National Database. A Site Visit should include an analysis of wildlife strike records. If possible, include summaries of strike data by species, time of day, on and off-site airport locations, and weather conditions. A minimum wildlife strike analysis should include, if available:
 - (1) Bird and mammal species involved
 - (2) Frequency distribution by month and year

- (3) Number per 10,000 aircraft movements
- (4) Location on the airfield
- g. Previous wildlife hazard management efforts – Records of past management may be helpful during this initial consultation. Attempts to exclude, deter, or remove wildlife from the airport should be noted. If not already in place, a wildlife log should be created and maintained by airport operations to document all wildlife activity observed on the airport.
- h. Description of current wildlife hazard threats or concerns
- i. Any current Federal and State depredation/ wildlife control permits and annual permit reports
- j. Current U.S. Geological Survey (USGS) topographic maps, airport maps, and/ or aerial photographs
- k. Other pertinent information present in airport records

Airport records may be incomplete or may not exist. Interviews with airport personnel often yield useful information that is missing from written records. The history of wildlife hazard problems at the airport should be discussed with the airport manager and staff. The control tower supervisor and chief of operations may also provide useful background information on the severity and frequency of the problem.

1.3. OBSERVATIONS. Qualified Airport Wildlife Biologists should make observations from a variety of locations to ensure complete visual coverage of the airport. Minimum coverage shall include observations of the airport's Airport Operations Area (AOA). These observations should be brief and are not as rigorous as a full Assessment. At a minimum, the observations should include:

- a. *Birds* – Record bird species present and note abundance, activity, location, type of habitat used, time and date of observations. Note evidence of bird activity such as fecal material and regurgitated pellets (boluses) under structures used for perching.
- b. *Mammals* – Document mammals observed and evidence of mammal activity such as scats, tracks, runs, and burrows and include time and date of observations, activity, location, and type of habitat used. Estimate relative abundance, activity, and habitat use.
- c. *Habitat Attractants* – Assess habitats and man-made attractants on and around airport property. Note potential wildlife attractants. Review maps and aerial photographs, noting waste management facilities, wildlife refuges, water bodies, agriculture, stock yards, picnic areas, restaurants, and other features or habitats that may attract wildlife within a five mile radius around the airport.
- d. *Wildlife/Habitat Relationship* – Observe and record how the wildlife observed is using the habitat on the airport.

- e. *Wildlife Interactions with Aircraft Operations* – Assess the potential for wildlife interactions with aircraft operations in the AOA, traffic patterns, approach and departure airspace, and surrounding areas. Evaluate aircraft movements to see if these operations increase the risk of wildlife strikes. Review airport hazard advisories to see if they are specific to the hazards at the airport.

1.4. SITE VISIT REPORT. The Qualified Airport Wildlife Biologist must provide the airport manager with a letter report summarizing field data and any management recommendations following the Site Visit. The FAA Regional office should receive a copy of this report from the Airport Manager. The FAA will review the site visit report and determine if a full Wildlife Hazard Assessment is required. Copies of the report should be filed and made a part of the historical record for the airport. The Site Visit report should contain:

- a. List of wildlife species (or wildlife sign- e.g., deer tracks) observed during the visit, with a statement that the list is not a complete record of species using the airport
- b. Federal and State status of the species observed
- c. Habitat features that may encourage wildlife to use the airport
- d. Natural and man-made wildlife attractants on or near the airport
- e. Strike data analysis
- f. Recommendations to:
 - (1) Reduce wildlife hazards identified (if data is available to substantiate your conclusions)¹
 - (2) Conduct an Assessment, if warranted
 - (3) Modify an existing Plan, if warranted
 - (4) Improve communications and hazard advisories between Air Traffic Control, pilots, airlines, airport operations, and other airport users
 - (5) Provide for potential alteration of aircraft operations including locations and scheduling of flights to avoid identified hazardous wildlife concentrations
 - (6) No action required, if applicable

¹ Reduce wildlife hazards through the use of habitat management, exclusion/repulsion techniques, active harassment, population control, and operational considerations.

SECTION 2.

PROTOCOL FOR THE CONDUCT OF A WILDLIFE HAZARD ASSESSMENT (ASSESSMENT)

2.1. INTRODUCTION. The first step in preparing an airport Plan is to conduct an Assessment. The Assessment, conducted by a Qualified Airport Wildlife Biologist, provides the scientific basis for the development, implementation, and refinement of a Plan. Though parts of the Assessment may be incorporated directly into the Plan, they are two separate documents.

The objective of an Assessment is to provide a baseline of data and understanding of wildlife species considered hazardous on or near an airport and of attractants that provide food, water, and shelter. The Assessment also identifies wildlife trends at the airport (location of wildlife hazards and seasonality of wildlife) and how these fluctuations in behavior and abundance may affect aviation safety, with particular emphasis to wildlife strikes to aircraft. It promotes the use of an integrated approach for wildlife mitigation to effectively modify the environment (e.g., mowing and drainage clearance), exclude wildlife (e.g., install fences and perch excluders), implement harassment procedures (e.g., pyrotechnics and propane cannons), remove wildlife (e.g., lethal and capture/relocate methodologies), communicate wildlife hazard advisories (e.g., through Air Traffic Control voice communications, ATIS, PIREPS, NOTAMS), direct pilot responses to identified hazards, report strikes or hazardous situations, and potentially alter flight routes, traffic patterns, or schedules to avoid locations and times of identified wildlife hazards.

The Assessment provides baseline data for an airport to evaluate the efficacy of its wildlife hazard management program (e.g., determine redundancy of species-specific wildlife hazards, monitor reduction of onsite damaging strikes, monitor wildlife program communication and response efficiency, and improve the overall wildlife program through annual review). Better information regarding wildlife hazards and their attractants should result in better use of resources.

2.2. REQUIREMENTS FOR WILDLIFE HAZARD ASSESSMENTS. Title 14 CFR 139.337(b)(1–4) requires that, in a manner authorized by the Administrator, each certificate holder must ensure that an Assessment is conducted when any of the following events occurs on or near the airport:

- a. An air carrier aircraft experiences multiple wildlife strikes
- b. An air carrier aircraft experiences substantial damage from striking wildlife
- c. An air carrier aircraft experiences an engine ingestion of wildlife
- d. Wildlife of a size, or in numbers, capable of causing an event described in paragraph (b)(1), (2), or (3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

The following provides a point-by-point comment on the regulations concerning the events that trigger a Wildlife Hazard Assessment.

14 CFR 139.337	Clarifications
(b) In a manner authorized by the Administrator, each certificate holder shall ensure that a Wildlife Hazard Assessment is conducted when any of the following events occurs on or near the airport.	A wildlife hazard assessment, conducted by a Qualified Airport Wildlife Biologist, must be conducted if—
(b) (1) An air carrier aircraft experiences a multiple wildlife strike	Aircraft strikes more than one animal (geese, starlings, bats, deer, coyotes, etc.).
(b) (2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component	The definition of substantial damage is taken directly from the International Civil Aviation Organization (ICAO) <i>Manual on the International Civil Aeronautics Organization Bird Strike Information System</i> .
(b) (3) An air carrier aircraft experiences an engine ingestion of wildlife; or	Wildlife is ingested into a turboprop, turbofan, or turbojet engine. Engine damage does not have to result from the ingestion.
(b) (4) Wildlife of a size, or in numbers, capable of causing an event described in paragraph (b)(1), (2), or (3) of this section is observed to have access to any airport flight pattern or aircraft movement area.	Airports with a standing Notice to Airmen (NOTAM), announcements on their Automatic Terminal Information Service (ATIS), or comments in Airport/Facility Directory (A/FD) warning pilots of wildlife hazards on or near the airport meet this condition. Permanent or blanket generic advisories should not be issued without actionable mitigation measures provided.

2.3. NECESSARY ELEMENTS OF A WILDLIFE HAZARD ASSESSMENT. Title 14 CFR 139.337 (c)(1–5) provides specific guidance as to what facts must be addressed in a Wildlife Hazard Assessment. The following is a point-by-point comment on each section of the regulations concerning the factors to be addressed in a Wildlife Hazard Assessment.

14 CFR 139.337	Clarifications
(c) The Wildlife Hazard Assessment ... shall be conducted by Qualified Airport Wildlife Biologist... having training or experience in wildlife hazard management at airports ... or working under the direct supervision ...	The Assessment is to be conducted by someone having met the requirements defined in the most recent version of AC 150/ 5200-36 " <i>Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports</i> "
(c) cont. ... the Wildlife Hazard Assessment shall contain:	
(c) (1) Analysis of the event or circumstances that prompted the assessment.	Who, what, when, where, why of the situation prompting the Assessment.
(c) (2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.	What wildlife species have access to the airport? What are their legal status, movement patterns, and seasonal patterns?
(c) (3) Identification and location of features on and near the airport that attract wildlife.	Wildlife are attracted to an airport because something exists on or near the airport that they desire. Wood lots near the AOA and large open areas provide relatively safe loafing, nesting and feeding locations. Food and water sources can be highly variable (dependent on hazardous species), seasonal or ephemeral. These attractants and others, such as easily accessible travel corridors, should be analyzed.
(c) (4) A description of wildlife hazards to air carrier operations.	This is a judgment call best made by the Qualified Airport Wildlife Biologist trained in dealing with airport issues. Hitting 3-4 swallows is much less hazardous than hitting one 12-pound Canada goose.
(c) (5) Recommended actions for reducing identified wildlife hazards to air carrier operations.	The Qualified Airport Wildlife Biologist preparing the Assessment must provide prioritized recommendations for mitigating the hazardous wildlife and their attractants as well as recommendations for Operations (e.g., ATC, air carriers, pilots, etc.)

2.4. NECESSARY ELEMENTS OF A WILDLIFE HAZARD ASSESSMENT REPORT. Elements within 14 CFR 139.337 (c) (1-5) must be discussed in the final Assessment report. If there was no event or circumstance that prompted the Assessment then 14 CFR 139.337 (c) (1) may be omitted. Although there are many acceptable formats to present the findings of an Assessment, there are certain key components that must be provided. The required components include sections summarizing methodologies, results and recommendations (if there are any).

Assessment techniques such as point counts, trapping indices, vehicle routes, and avian radar should be conducted and locations described that allows future duplication for consistent, continued monitoring or comparison to previous findings. Maps, imagery and/or detailed descriptions should be incorporated whenever location information is necessary (e.g., Assessment techniques, wildlife hazard attractants, airport layout).

Wildlife strike data should be evaluated regardless of an event or circumstance that may have prompted the Assessment. The National Wildlife Strike Database (<http://faa.gov/go/wildlife>) is available to the public and is the primary repository for wildlife strikes to civil aircraft in the U.S., although strike records may be available from other sources such as the airport, airlines and engine manufacturers. When available, key strike data such as species, number struck, phase of flight, altitude, time of day, time of year, and damage (if any) should be summarized in the Assessment.

Recommended actions for reducing identified wildlife hazards may include detailed, task specific objectives or general measures. Attention should be given both to proactive mitigation such as habitat modification and exclusion techniques and reactive measures that involve harassment, dispersal and removal procedures. When applicable, airports should be strongly encouraged to maintain Federal and State depredation permits.

2.5. MINIMUM NUMBER OF WILDLIFE SURVEYS REQUIRED AND DURATION OF WILDLIFE HAZARD ASSESSMENT. In conducting a Wildlife Hazard Assessment 14 CFR Part 139.337 (c)(2) requires the *“identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.”* In most cases, this requirement dictates that a 12-month Assessment be conducted so the seasonal patterns of birds and other wildlife using the airport and surrounding area during an annual cycle can be properly documented. Most regions of the USA have dramatic seasonal differences in numbers and species of migratory birds. Even for non-migratory wildlife, such as deer and resident Canada geese, behavior and movement patterns can change significantly throughout the seasons. Observations of wildlife at an airport and surrounding areas limited to a few days in a single season generally cannot adequately assess hazardous wildlife issues and associated habitat attractants.

In order to adequately identify wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences, the Biologist may choose from several objective procedures that will adequately assess avian and mammalian species. These standardized survey procedures will insure that quality, representative data can

be consistently collected for hazardous wildlife species in the airport environment and that these procedures can be repeated in future years for comparative purposes.

Various wildlife species are active throughout all hours of the day and night. Inventory and monitoring techniques should account for these movement dynamics. Birds should be surveyed diurnally in the morning, midday, and evening hours while appropriate nocturnal surveys and/or tracking indices are incorporated to sample mammals.

a. Avian Surveys

- (1) Minimum of twelve months data collection
- (2) Minimum of two randomly selected sampling trips/month
- (3) Minimum of two survey samples/month for each of the survey points during the diurnal periods of morning, midday and evening²

b. Mammalian Surveys

- (1) Minimum of twelve months data collection
- (2) Minimum of one randomly selected sampling trip/month

c. Data from Other Sources

- (1) Published data
- (2) University studies
- (3) Federal and State studies
- (4) NEPA documents
- (5) Radar studies
- (6) ATC and airport “event logs” or wildlife management, patrol, monitoring logs
- (7) Other acceptable data sources

2.6. BASIC WILDLIFE SURVEY TECHNIQUES FOR WILDLIFE HAZARD ASSESSMENTS. Not all species are equally detectable but an Assessment should strive to assess the presence/absence of known or suspected hazardous species on or near the airport, especially those documented within the facility’s strike database. Hazardous avian species on or near airports are typically medium to large birds that exhibit either solitary or flocking behavior or small birds that congregate in large flocks.

² It may be beneficial to increase avian surveys during spring and fall migrations.

- a. North American Breeding Bird Survey.** One objective procedure for assessing bird populations, based on North American Breeding Bird Survey (BBS) methodology, is the establishment of standardized survey points about ½ mile apart throughout the airport. Assigning each bird or bird flock observed during a point count to a grid location can be useful in further refining spatial distributions of birds on the airport. Additional survey points should be established in nearby off-airport areas (e.g., wetlands, open water impoundments, taxicab lot, golf course, City Park, etc.) suspected of attracting hazardous birds that move across the AOA.

Use of this design provides a baseline estimate of bird species and numbers on the airport that can be compared with other airports and the same airport in the future. Data on species and numbers are collected from established observation points along a survey route. A survey is defined as one visit to all observation points along a survey route. A survey day consists of one or more independent (i.e., replicated) surveys conducted during one day.

In many cases, observation points in forested areas on airport property are less critical for identifying hazardous avian species yet important for the systematic or ancillary identification of mammals. Although forested areas can provide attractive perching/roosting locations for some hazardous avian species (e.g., raptors, blackbirds), woodland interior birds are usually of limited concern unless they frequent open habitats which will be surveyed. Data relating to forested areas may also be collected by general observations.

The number of observation points required to obtain adequate coverage of the sample area will depend on the size, complexity, and physical features of the airport. The combined area covered by observation points (about 50 ha/point) should exceed 10% of the airport land area.

To conduct a survey, an observer starts at one end of the survey route and stops the vehicle at each observation point. After turning off the motor and exiting the vehicle, the observer records the numbers and species of all birds heard at any distance and all birds detected visually (with or without binoculars) within a 0.4 km (1/4-mi.) radius (i.e., 50 ha), for a 3-minute period. During the survey, significant birds (e.g., a flock of geese; an endangered species) observed outside the 0.4 km (1/4-mi.) radii around observation points or outside the 3-minute periods (e.g., while driving between stops) should be noted on a separate data form and reported under general observations.

It also may be useful to develop a coding procedure on the data sheet (or a separate data sheet) to record birds observed actually on or over a runway during the 3-minute observation periods. By knowing the percent of total airport runway area covered by the 0.4 km (1/4 mi.) radius observation points, an estimate of the number of birds on or crossing the runways per hour could be estimated. For example, if 10 observation points on an airport survey route covered 25% of the runway area and you recorded an average of 1.5 birds per 3-minute observation on or over a runway, then you would estimate that the airport averaged 120 birds on or crossing runways per hour.

For the area within a 0.4 km (1/4 mi.) radius of each avian observation point, a visual estimate should be made of the proportion of each major habitat type [e.g., pavement, short < 20 cm) grass, tall grass (>20 cm), water, shrub]. It may be useful to analyze data for certain species by observation point to associate that species with a certain habitat type or location on the airport. For example, if waterfowl are consistently observed at one observation point that has aquatic habitat, this should be stated in the analysis and presentation of results.

- b. General Observations.** In addition to the standardized survey, it is important to make general wildlife observations in areas outside the survey points. These observations can provide important information on significant bird hazards and/or zero tolerance species (e.g., Canada geese) and issues (e.g., endangered species) not fully covered by a standardized survey. Observations of wildlife use and movements around and within structures and other unique areas of the airport environment that are not covered in the standardized bird survey should still be recorded. In addition, observation points also should be established at selected areas of high wildlife use within 8 km (5 mi.) of the airport such as reservoirs, roosting sites, feedlots, landfills, and other potentially attractive sites. The FAA has established an 8 km (5 mi.) radius around the airport as the major area of concern.

Additional analysis may also be performed. Each airport is different, and may require special analysis to document bird activity. For example, if a certain flocking species is present in large numbers, some analysis of mean flock size might be presented. If a large number of birds migrate through the airport area over a two-week period, a graphic presentation showing numbers at two week intervals instead of monthly or seasonal intervals might be appropriate. In addition, the general bird observations made outside of the standardized survey need to be incorporated. For example, tables might list the number of goose flocks recorded on the airport by month, the mean number of gulls seen per observation by month at a trash transfer facility approximately 3.2 km (2 mi.) from the airport, or the mean number of pigeons seen in a hangar per observation by season. Descriptive summaries might be included of general observations about flight patterns of a certain species over the airport or the habitat use by another species on the airport.

- c. Data Recording.** An example of the form used for data recording and is similar to the BBS is located in Appendix F and may be used to record survey data. This data form has standardized codes for weather and time. Encoding data will facilitate data analysis and entry into a database. The use of bird species codes is recommended. The American Ornithologists' Union (AOU) has established a standard four letter alphabetic code for most bird species (<http://www.birdpop.org/alphacodes.htm>). You may have to develop bird codes for special situations. For example, in some situations you may not always be able to identify gulls to species and need a code for unknown gull ("UNGU").
- d. Data Analysis and Descriptive Statistics.** Appropriate data analysis and interpretation will provide much of the information necessary to accurately assess

hazards and make management recommendations. Data will also serve as a baseline from which the effectiveness of management actions can be measured.

For each survey, the total birds observed per species and the number of observation points recording the species (frequency of sightings on the airport) should be calculated. The number of birds observed provides a measure of species density on the airport. The frequency of sightings at each location indicates the distribution of the species on the airport. Surveys can then be grouped to calculate mean number and frequency of birds (by species) seen per survey by time of day, month, and season.

If desired, statistical tests used to identify significant differences among months or seasons can be conducted using analysis of variance (ANOVA) and chi-square calculations.

- e. **Seasonal Patterns.** Seasonal patterns or trends for species can be represented by graphing the mean number of birds and mean frequency of sightings per month or season as calculated above. The graph will provide a visual representation of obvious seasonal trends or patterns for each bird species observed in all habitat types (i.e., the entire airport). In many cases it will be useful to simplify presentations by combining species into groups/guilds (e.g., birds of prey, gulls, waterfowl) in these summary graphs, presenting the detailed data for individual species in a table or appendix.
- f. **Mammal Surveys.** The collection of data pertaining to mammal populations is often time consuming and labor intensive. However, these data often are a necessary part of an Assessment and wildlife hazard analysis. Whether to collect data for all or for selected mammal species found on an airport depends on past and present wildlife hazards and the judgment of the Biologist. The Biologist should collect data related to identified and suspected hazardous mammal species, including ungulates, canids, and if necessary, rodents.

A number of survey designs developed for mammal species rely upon trapping and marking animals (e.g., mark-recapture studies). Mark-recapture studies are usually time consuming, labor intensive, and costly. Typically, the Biologist should consider a combination of data collection procedures that best identify a specific airport's hazardous species. Systematic vehicle surveys, tracking indices, catch-per-unit-effort survey, and spot mapping are commonly used techniques. Vehicle surveys should provide adequate data on large mammals such as ungulates, canids, and lagomorphs. Various tracking indices can be used to assess relative abundance or to aid in the identification of mammals beyond the scope of vehicle surveys which have varying degrees of success dependent on method (e.g.,, spotlight, night vision or Forward-Looking Infra-Red [FLIR]). Relative abundance data for small mammals are collected by catch-per-unit-effort sampling (snap traps). Data related to miscellaneous mammals (canids, ungulates, raccoons) can also be collected by spot mapping.

(1) Vehicle Surveys. Vehicle surveys at night using a spotlight, night vision equipment, or FLIR unit are performed along predetermined routes. The survey can be one continuous route around the airport or several routes covering different areas. Survey routes should include areas near runways and habitat types where ungulates, predators, or other target species are suspected or known to occur. Routes should sample a minimum of 10% of the total area. Aerial photographs, topographic maps, and maps that contain airport roadway systems can help in establishing survey routes. Preliminary examinations will be helpful to establish appropriate night time survey routes without excessive obstructions that limit viewing. Survey routes should be established carefully and remain constant throughout the study. Coordination with Air Traffic Control is essential during spotlight surveys to ensure no aircraft are in the AOA or traffic pattern in the line of spotlight beams. Additionally, spotlight surveys should ideally be scheduled at times when aircraft operations are limited or not present. **Spotlights must not be pointed at aircraft, other vehicles or the airport tower.** At a minimum, the survey must be conducted at least one time per month for the duration of the study.

Observations may be performed starting one half hour after sunset and ending after two to three hours or delayed, dependent on times of limited scheduled aircraft operations. In general, the survey route(s) are run only once per night although multiple runs can be made if time permits. All mammals and birds observed should be recorded by species and location. The start and end time of each survey and total distance driven should be recorded so that numbers seen per hour and distance can be calculated. Wildlife surveys should be conducted in most types of weather according to schedule, but it may sometimes be necessary to postpone survey periods during severe weather. Surveys should not be conducted in excessive wind or heavy rain as mammal activity may be significantly affected by weather.

(2) Catch-Per-Unit-Effort (small mammals). Small mammal populations may be measured if birds of prey or mammalian predators occur in the strike record. As a general guideline, transects with 50 traps each should be placed in at least four habitats or locations on the airport. Each transect should have 50 traps placed at 10-m intervals in one line or 25 traps each in two parallel lines 30 m apart. Traps are set in daylight hours and checked 24 hours later. Transects should be run for two to four consecutive nights in spring and again in autumn.

When checking traps, the following data should be collected for each trap: status of trap (sprung or unsprung) and species, if any, captured. Trapping results are recorded, by species, as the number of animals caught per 100 adjusted trap nights.

(3) Spot Mapping. Spot mapping consists of plotting on a grid map the location, date, and time of mammal observations and provides a general overview of mammal activity on the airport. Often, airport operations officers, who are required to perform runway sweeps, can assist in collection of this data as can pilots or other airport personnel. Additionally, mammal observations made while performing designated bird and mammal surveys can be mapped and used to augment spot observations.

2.7. BASIC HABITAT SURVEYS FOR WILDLIFE HAZARD ASSESSMENTS.

Habitat evaluation is an essential part of an Assessment, and is required by 14 CFR Part 139.337 (c) (3). Many natural and artificial habitats are attractive to wildlife, and evaluation of these should provide the Biologist with information about the quantity, quality, and seasonal nature of their use. Wildlife exploit these habitats for food, water or cover, which may vary seasonally and/or throughout an animal's life cycle. Although they may be considered either a direct or indirect attractant³, it remains essential for safe air traffic operations to fully understand their influence.

Land-use practices that attract or sustain hazardous wildlife populations on or near airports, specifically those listed in AC No: 150/5200-33B *Hazardous Wildlife Attractants On or Near Airports* Section 2 can significantly increase the potential for wildlife strikes. 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).

The FAA recommends the minimum separation criteria outlined in AC No: 150/5200-33B Section 1 for land-use practices that attract hazardous wildlife to the vicinity of airports. This separation criterion provides predetermined boundaries of concern around airports to be considered while conducting comprehensive, detailed studies and evaluations of wildlife populations and attractants.

a. Pre-existing Habitat Data. Pre-existing habitat inventory and geospatial information can prove useful regarding soils, vegetative species, topography, geography, habitat type, location and size. This data may be found in various locations or with various agencies such as:

- (1) Airport Layout Plan
- (2) Airport Master Plan
- (3) Airport Environmental Assessment
- (4) Airport Environmental Impact Statement
- (5) U.S. Fish and Wildlife Service
- (6) U.S. Geological Survey
- (7) U.S. Army Corps of Engineers
- (8) USDA – Natural Resources Conservation Service
- (9) Department of Natural Resources (state)
- (10) Department of Transportation (state)

³ Direct attractants (i.e., favorable vegetation for foraging) or indirect attractants (e.g., brushy vegetation may result in increased rodent populations which attracts hazardous raptors) can create equally hazardous environment for safe air operations.

- b. Descriptive Habitat Data.** A general description of the study area needs to be included within the Assessment. This should describe natural and artificial attractants both on-site and off-site within the separation criteria defined in AC No: 150/5200-33B Section 1.
- (1) Natural⁴ Habitat Data.** This may include characteristics such as geographic location, topography, soils, climate, vegetation, agriculture, and wetlands/water features (drainages, ponds, lakes, rivers, and water impoundments).
- (2) Artificial⁵ Environment Data.** This may include items such as airport buildings, jet bridges, towers, antennas, runways, taxiways, ramp, hangars, waste disposal operations and waste containers)..
- c. Food.** Naturally occurring wildlife foods such as insect and other invertebrate populations should be noted with descriptions, time of year, weather conditions, and environmental factors such as soil type, vegetative cover, and drainage conditions. In addition, management practices that enhance the production of these natural foods should be documented. An evaluation of small mammal populations as a food source for predators can be addressed in the sampling strategy discussed previously.
- Plant seeds, fruits, and berries are other food attractants on airports for birds and mammals. Seasonal wildlife hazards may develop when seeds or fruits are abundant. Documentation of these food sources is an important component of the habitat analysis.
- Review environments within 3,048 m (10,000 ft.) radius of the airport, and record food sources that attract wildlife. Agricultural fields, grain elevators, food product industries, fast food restaurants, livestock operations, wildlife refuges and sanctuaries, and waste handling facilities may attract significant numbers of birds and/or mammals, increasing the hazard to human safety and aircraft. A Wildlife Hazard Assessment should contain information relative to these sites such as the names and locations, and a description of the attractant and the potential hazard.
- d. Vegetation.** Vegetation and cover requirements vary by species and time of year. Relationships between wildlife species and cover types provide information necessary to develop appropriate wildlife management strategies. In reviewing

⁴ Natural habitat is defined for this purpose as biotic habitats including vegetation (e.g., grass, forest, shrub scrub, wetland, agriculture, desert, etc.) and water features (e.g., ponds, rivers, lakes, marine, retention/detention ponds, drainages, etc.).

⁵ Artificial environment is defined for this purpose as man-made features (e.g., buildings, structures, towers, paved/hard surfaces, waste disposal operations, waste containers, etc.).

vegetative areas on an airport, it is important to record observations of species, management practices, seasonal growth, density, percent cover, and any noted wildlife associations. Use of specific areas by animals in the airport environment may assist the observer in identifying vegetative attractants.

- e. **Water.** Water sources are wildlife attractants, especially fresh water sources in coastal areas. Reservoirs, streams, ponds, drainage basins, seep areas, and ephemeral water sources should be identified and mapped. Gulls, waterfowl, shorebirds, and marsh birds may be attracted to the airport because of abundant food or drinking and resting sites available in existing water resources.
- f. **Structures.** Buildings, areas adjacent to buildings, and equipment on airports are readily used by some wildlife species, such as European starlings, pigeons, gulls, sparrows, crows, raptors, mice, rats, skunks, and woodchucks. Wildlife use of structures can present threats to human safety and aircraft, and may cause unsanitary working conditions or damage to structures.

The reasons for use of most structural features by wildlife are usually easily determined, while others are less obvious. For example, feral pigeons may loaf on just one ledge of a particular building because it provides shelter from the wind or protection from predators. The Qualified Airport Wildlife Biologist should determine what features are attractive to problem species, and why. A strategy can then be developed to reduce or eliminate the problem.

- g. **Soil.** The type(s) and fertility of soils present on an airport is a general indicator of biological productivity. Habitat quality is directly related to soil fertility and other soil conditions. The nutritive value, quantity, and attractiveness of plant and animal food organisms varies widely with soil types and conditions. For example, sandy, well-drained soils that dry quickly after rainfall generally produce less biomass and are less likely to harbor an abundant population of earthworms and other invertebrates.

Identification and documentation of soil types and conditions on the airport and vicinity should be an integral part of an overall assessment or study. In most states, information on soil types and conditions can be acquired from soil survey publications available from the USDA Natural Resource Conservation Service (NRCS) or the Cooperative Extension Service. These publications contain soil maps and descriptions, formations, morphology and soil classifications. However, on airports where large scale soil disturbance, such as grading, leveling, and filling, have been conducted, soil maps may be of limited value.

- h. **Spot Mapping.** Because attractants may vary seasonally and following precipitation, spot mapping the location and date of features such as fruit and seed bearing vegetation, ephemeral pools and temporary ponding of water or puddles throughout the AOA will help identify food sources, drainage problems and grade deficiencies.

2.8. Basic Assessment of Airport and Aircraft Operations. Assessment of airport and aircraft operational procedures is an essential part of an Assessment. Hazardous wildlife only presents a risk to aviation if aircraft and wildlife occupy the airspace or movement areas at the same time and location. Persons conducting Assessments must also gather general observation data and other information related to airport and aircraft operations regarding wildlife hazards. Biologists should monitor NOTAMs, ATIS advisories, and published Airport/Facilities Directory information to ensure specific information and not a blanket advisory is issued. Assessment of ATC's involvement in identifying potential hazards as observed or relayed by pilots or airport operations personnel should include determination that wildlife dispersal is coordinated with ATC such that hazards are not inadvertently increased by dispersing wildlife into the path of aircraft movements. ATC must provide wildlife control teams access to movement areas of the airfield, but also communicate with them during the implementation of mitigation measures to ensure dispersal paths are observed and de-conflicted with aircraft movements.

Biologists should also query users of the airport for their inputs on wildlife observed on and around the airport. For example, pilots should be interviewed about their experience in the local area as they have a perspective not available to ground-based personnel. Congregations of towering raptors or gulls over off-airport facilities such as landfills and food-processing plants are often detected this way as are major roost sites of blackbirds, starlings, vultures, or crows. Time should be dedicated to visit the pilots' lounge or to visit the local airline representative/facility agent for informal interviews. Fixed-base operators (FBO's) should also be visited and personnel interviewed for their experience with hazardous wildlife in the local area. Pilots, especially those operating non-commercial or private aircraft, must be aware that they have the discretion to delay takeoffs or departures, ask for wildlife dispersal action, or requires alternate runways, departure or approach paths to avoid identified hazards.

Airline and private maintenance personnel should similarly be interviewed for their perspective on local hazardous wildlife and their reporting procedures when strikes are detected on post-or pre-flight inspections of aircraft.

Other airport users must also be interviewed and included in the Assessment process. Aircraft Rescue and Fire Fighting (ARFF) and Airport Security Personnel are always present on airports during operations and have a unique view of the airfield. They must also be notified should major dispersal operations be conducted, such as with pyrotechnics, where the slight chance for grass fires or security concerns are present.

SECTION 3.

PROTOCOL FOR THE PREPARATION OF A WILDLIFE HAZARD MANAGEMENT PLAN (PLAN)

3.1. INTRODUCTION. When complete, the Assessment is submitted by the airport to the FAA for review and approval. The FAA will also use it to determine if the airport must do a Wildlife Hazard Management Plan. In reaching this decision, the FAA will consider the Assessment, the aeronautical activity at the airport, the views of the certificate holder and airport users, and any other pertinent information (14 CFR 139.337 (d)(1–6)).

The goal of an airport's 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 Plan accomplishes this through the identification of hazardous wildlife and their attractants, suitable proactive and reactive management techniques, necessary resources and supplies to successfully implement a wildlife hazard management program and personnel responsibilities and training requirements. Appropriate federal, state and possible local wildlife control permits should be identified as well as a schedule and methodology to evaluate and update the Plan.

3.2 WILDLIFE HAZARD MANAGEMENT PLAN REGULATORY REQUIREMENTS AND METHODOLOGY. 14 CFR 139.337 (f)(1–7) provides specific guidance as to what facts must be addressed in a Plan.

a. 14 CFR 139.337 (f)(1). *“A list of the individuals having authority and responsibility for implementing each aspect of the plan.”* This list shall assign or delegate specific responsibilities for various sections of the Plan to various airport departments and other interested federal, state or local agencies, such as:

- (1) Airport Director
- (2) Operations Dept.
- (3) Maintenance Dept.
- (4) Security Dept.
- (5) Planning Dept.
- (6) Finance Dept.
- (7) Wildlife Coordinator
- (8) Wildlife Hazards Working Group
- (9) Air Traffic Control
- (10) Airlines
- (11) Pilots
- (12) Fixed-base Operators

- (13) Air-side tenants
- (14) Land-side tenants
- (15) State Wildlife Agency
- (16) Local law enforcement authorities
- (17) U.S. Fish and Wildlife Service

- b. **14 CFR 139.337 (f)(2).** “A list prioritizing the following actions identified in the **ASSESSMENT and target dates for their initiation and completion.**” The Plan should provide a prioritized list of problem wildlife populations and wildlife attractants (food, cover, and water) identified in the Assessment, proposed mitigation actions, and target starting and completion dates. A list of completed wildlife population management projects and habitat modification projects designed to reduce the wildlife strike potential can be included to provide a history of work already accomplished. It is helpful to group attractants by areas and ownership.

AIRPORT PROPERTY	NON-AIRPORT PROPERTY
Air Operations Area (AOA)	Within 2 miles of AOA
Within 2 miles of AOA	Within 5 miles of AOA
Airport structures	

Wildlife mitigation techniques at commercial airports involve integrated and systematic methodologies that typically progress (based on necessity) from proactive measures to reactive measures. The reduction of wildlife threats at an airport is often the unintended or secondary consequence of ongoing habitat management such as mowing, tree removal, drainage reparations, out-of-grade surface restoration and the establishment or maintenance of perimeter fencing.

(1) 14 CFR 139.337 (f)(2)(i). Wildlife population management. Address species-specific population management plans (e.g., deer, gulls, geese, and coyotes). The progression of techniques employed to mitigate hazardous species include habitat modification and resource protection, exclusion devices, repellent / harassment measures, and removal.

- (a) Habitat Management
- (b) Exclusion (fencing, netting, anti-perch/ nesting devices)
- (c) Repellents (chemical, audio, visual)
- (d) Harassment (pyrotechnics, falconry, dogs, radio-controlled models, etc.)
- (e) Capture (chemical, live traps, lethal traps)
- (f) Toxicants (oral and contact); Fumigants
- (g) Shooting

When applicable, airports should identify resident or seasonal “zero-tolerance⁶” hazardous species based on historical strike records or recognized threat posed by such species at the facility. The ranking of hazard level for birds and terrestrial mammals in Table 1 should also be considered when an airport determines zero-tolerance species and subsequent management protocols. Ungulates (i.e., deer, elk), canids (i.e., coyotes, domestic dogs) and certain avian species (i.e., Canada geese, snow geese) are universal candidates for zero-tolerance management protocols but other hazardous species may require conditional zero-tolerance management. Flocking birds such as European starlings and gulls pose a significant and increasing hazard to aircraft as flock size increases. Therefore, an airport may choose to require zero-tolerance management protocol for these (or similar) species only when an unacceptable flock size has been reached. Determination of action based on flock size is often difficult and requires experienced consideration of variables such as hazard relative to species, airport operation type, and current aircraft activity.

(2) 14 CFR 139.337 (f)(2)(ii). Habitat modification. Address natural and artificial habitats that may provide a food, water or cover source to hazardous species to reduce their attractiveness. Advisory Circular 150/ 5200-33B (AC-33B) *Hazardous Wildlife Attractants On or Near the Airport* provides in-depth discussion on acceptable/unacceptable habitats and land-use practices on and near airports. Management of the vegetative/prey food items for hazardous species is often season or weather related and may include rodent control, garbage storage, landscaping, and management of standing water.

- (a)** Vegetative/prey food items for hazardous species
 - (i)** Prey items (rodents, earthworms, insects)
 - (ii)** Vegetative food items (grain/seeds, fruit, desirable grasses)
 - (iii)** Garbage (handling, storage)
 - (iv)** Handouts (feeding wildlife)
- (b)** Vegetation management may include:
 - (i)** AOA vegetation
 - (ii)** Drainage ditch vegetation
 - (iii)** Landscaping
 - (iv)** Agriculture
- (c)** Water management may include:
 - (i)** Permanent Water
 - (ii)** Wetlands

⁶ Zero-tolerance designation in the airport environment denotes wildlife species that represent an unacceptable high risk to safe aircraft operations. Their presence in the airport environment cannot be tolerated and warrants immediate management action to remove them from the AOA using appropriate techniques (i.e., harassment, lethal take, capture/ relocate, etc.).

- (iii) Canals / ditches / streams
- (iv) Holding ponds
- (v) Sewage (glycol) treatment ponds
- (vi) Ephemeral water
- (vii) Runways, taxiways, aprons
- (viii) Other wet areas

(d) Airport buildings may include:

- (i) Airfield structures
- (ii) Abandoned structures
- (iii) Terminal
- (iv) Airport construction
- (v) Leased facilities

(3) 14 CFR 139.337 (f)(2)(iii). Land use changes. Eliminate agricultural activities and standing water on the airport. When feasible, off-site attractants within the defined separation criteria such as agricultural activities, waste handling facilities that are not fully enclosed, surface mining, urban development, wildlife refuges and storm water management systems should be eliminated as well. See Advisory Circular 150/ 5200-33B for an in-depth discussion on acceptable/ unacceptable land-use practices on and near airports.

c. 14 CFR 139.337 (f) (3). “Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits.” Certain species of wildlife are protected at all levels of government—local, state, and federal. Address the specific species involved and their legal status in this section. Describe the wildlife management permitting requirements and procedures for all levels of government having jurisdiction.

- (1) Federal (50 CFR, Parts 1 to 199)
- (2) State (Fish and Game Code - or equivalent)
- (3) City and County ordinances
- (4) If pesticides are to be used, the following are also needed:
 - (a) Pesticide-use regulations and licensing requirements
 - (b) Federal regulations and licensing: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
 - (c) State regulations and licensing (varies by state)

For the purpose of the Plan, summaries are generally adequate. It is not necessary to quote chapter and verse of federal, state, and local laws and regulations.

d. 14 CFR 139.337 (f) (4). “Identification of resources that the certificate holder will provide to implement the plan.” Provide information identifying what resources the airport will supply in terms of personnel, time, equipment (e.g., radios, vehicles, guns, traps, propane cannons, etc.), supplies (e.g., pyrotechnics), pesticides (restricted/non-restricted use) and application equipment and supply sources for equipment and supplies.

e. 14 CFR 139.337 (f) (5) “Procedures to be followed during air carrier operations that at a minimum includes—“

(1) 14 CFR 139.337 (f) (5) (i) “Designation of personnel responsible for implementing the procedures.” This section corresponds with the aforementioned 14 CFR 139.337 (f)(1) and describes who is required for successful mitigation of wildlife hazards in the airport environment.

- (a) Wildlife Control Personnel
- (b) Wildlife Coordinator
- (c) Operations Dept.
- (d) Maintenance Dept.
- (e) Security Dept.
- (f) Air Traffic Control
- (g) Pilots
- (h) Airlines
- (i) Fixed-base Operators
- (j) Airside/landside tenants

(2) 14 CFR 139.337 (f) (5) (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.” This section provides a description of known or anticipated locations that should be monitored for successful mitigation of wildlife hazards in the airport environment.

- (a) Runway, taxiway
- (b) AOA
- (c) Perimeter fence
- (d) Other areas attractive to wildlife

(3) 14 CFR 139.337 (f) (5) (iii) “Wildlife hazard control measures.” This section corresponds to the aforementioned 14 CFR 139.337 (f)(2)(i) and details current or anticipated techniques that may be implemented for successful mitigation of wildlife hazards in the airport environment. Techniques discussed in this section typically represent an integrated approach and include exclusion, repellent, harassment, capture, lethal control or even relocation measures in specific instances. In addition, operational control measures such as scheduling of flights, air traffic control advisories, Pilot Reports (PIREPS), UNICOM advisories, avoidance procedures, delayed takeoffs and approaches, use of alternate runways or traffic direction, must be considered.

(4) 14 CFR 139.337 (f) (5) (iv) “Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower.” This section provides a description of regulated and site-specific protocols for the communication and/ or notification of wildlife control activities, identified and current wildlife hazards on or near the airport environment or imminent wildlife threats to aircraft operations on or near the airport. Protocols may include training in airport communication and the development of notification procedures for airport personnel and Air Traffic Control when wildlife control

procedures are implemented or in response to immediate wildlife threats to safe air operations to ensure dispersal activities do not inadvertently increase wildlife hazards. Communication and/ or notification procedures within the Plan should recognize pilot reports and ATC advisories and establish responsibilities for reporting wildlife strikes. This section may also provide equipment requirements that include radios, cellular phones, and lights and an official call list with numbers.

- f. **14 CFR 139.337 (f) (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:** At a minimum, the Plan should be reviewed once annually and anytime a triggering event occurs as defined in 139.337(b)(1–3). The review(s) should include representatives from all airport departments involved in wildlife hazard management efforts and the Biologist who did the original Assessment. It is often helpful for the airport manager to appoint a Wildlife Hazards Working Group that periodically reviews the airport’s Plan and the plan’s implementation to make recommendations for further refinements or modifications.
- (1) **14 CFR 139.337 (f) (6) (i) “The plans effectiveness in dealing with known wildlife hazards on and in the airport’s vicinity and:”** Input should be provided from all airport departments, Air Traffic Control, and the Biologist as to the effectiveness of the Plan. Good records are necessary to properly evaluate the effectiveness of a program.
- (2) **14 CFR 139.337 (f) (6) (ii) “Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated.”** For example—
- (a) Number of times wildlife seen on AOA
 - (b) Requests for wildlife dispersal from air traffic control, pilots, or others
 - (c) Increased number of strikes

Regulations 14 CFR 139.337 (f) (6) (i) and (ii) cannot be effectively implemented or evaluated without documentation of wildlife strikes. The effectiveness of a Plan to reduce wildlife hazards both on and near an airport and the reevaluation of all facets of damaging/nondamaging strikes from year to year requires accurate and consistent reporting. Therefore, every Plan should include a commitment to document all wildlife strikes that occur within the separation distances described in sections 1-2 and 1-3 of Advisory Circular 150/5200-33B *Hazardous Wildlife Attractants On or Near Airports* to better identify, understand and reduce threats to safe aviation.

- g. **14 CFR 139.337 Comments (f) (7) “A training program conducted by a Qualified Airport Wildlife 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.”** Recurrent training requirements as described in 14 CFR 139.303 should equip personnel actively involved in an airports wildlife hazard management program with sufficient resources needed to

comply with the requirements in their Airport Certification Manual and the requirements of 14 CFR 139.337. Personnel identified in 14 CFR 139.337 (f) (5) (i) should be considered for inclusion within this recurrent training. Pesticide user training and certification requires its own regulated training and certification schedule and should be closely followed.

3.3. FEDERAL AND STATE-LISTED THREATENED AND ENDANGERED SPECIES, AND SPECIES OF SPECIAL CONCERN. The Endangered Species Act (ESA) directs all Federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the Act. Section 7 of the Act, called "Interagency Cooperation," is the mechanism by which Federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. This section also describes procedures for responding to requests by state wildlife agencies to facilitate and encourage habitats for state-listed threatened and endangered species or species of special concern that occur on airports and may pose a threat to aviation safety.

The FAA's action in requiring an airport operator to develop, submit for approval, and implement a Plan is considered a Federal action, as defined in the Endangered Species Act, and therefore, subject to section 7 consultation with the U.S. Fish and Wildlife Service (USFWS).

a. Procedures for Federal Threatened and Endangered Species on Airports. Section 7 of the ESA, as amended, applies to Federal agency actions and sets forth requirements for consultation to determine if the proposed action "may affect" an endangered or threatened species. If an agency determines that an action "may affect" a threatened or endangered species, then Section 7(a)(2) requires each agency, generally the lead agency, to consult with the USFWS or the National Marine Fisheries Service (NMFS), as appropriate, to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any Federally listed endangered or threatened species or result in the destruction or adverse modification of critical habitat. (The effects on fish, wildlife, and plants include the destruction or alteration of habitat and the disturbance or elimination of fish, wildlife, or plant populations.) If the Secretary of the Interior has developed a recovery plan for an affected species pursuant to section 4(f) of the ESA, that plan should be reviewed by FAA NEPA practitioners to ensure that assessments of impacts from FAA actions consider the management actions and criteria for measuring recovery identified in the plan. If a species has been proposed for Federal listing as threatened or endangered, or a critical habitat has been proposed, section 7(a) (4) states that each agency shall confer with the Services. Refer to the FWS and NMFS *"Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act,"* March 1998.

Section 9 prohibits a Federal agency from taking, without an incidental take permit, any endangered species. Where a conservation plan has been developed pursuant to a section 10 permit (incidental take permit), the FAA NEPA practitioner should

ensure that the impact analysis contained in the NEPA document for the affected species is consistent with the predicted impacts described in the conservation plan. Under the Magnuson-Stevens Act, Federal agencies must consult with the NMFS with regard to any action authorized, funded, or undertaken that may adversely affect any essential fish habitat identified under the Act. The consultation procedures are generally similar to ESA consultation requirements.

Under Title 14, Code of Federal Regulations, part 139.337(e), the FAA may direct an airport operator to develop a Wildlife Hazard Management Plan or to update an existing plan. In these instances, the airport operator shall contact and request information from the local USFWS Ecological Services Field Office regarding the presence of Federally-listed or proposed species or designated or proposed critical habitat occurring on or near the airport.

(1) No Further Coordination is Required.

If the USFWS indicates there are no Federally-listed or proposed species or designated or proposed critical habitat occurring on or near the airport, no further action is required regarding the section 7 consultation.

(2) Further Coordination is Required.

If the USFWS indicates that Federally-listed or proposed species or designated or proposed critical habitat occur on or near the airport, the following additional actions must be taken.

(a) The airport operator shall take this information into consideration when developing its Wildlife Hazard Management Plan.

(i) The airport operator must prepare a Biological Assessment (50 CFR 402.13) assessing the effects of the Wildlife Hazard Management Plan on the Federally-listed or proposed species or designated or proposed critical habitat. The Biological Assessment must be submitted to FAA along with the draft plan.

(ii) The airport operator may request early consultation if it has reasons to believe some of the actions proposed under the Wildlife Hazard Management Plan may affect federally-listed or proposed species or designated or proposed critical habitat.

(b) When the plan is submitted to the FAA for review and approval, the FAA Regional Coordinator must contact the local USFWS Ecological Services Field Office responsible for section 7 consultations and request consultation on the plan.

(c) The section-7 consultation must be completed before the Wildlife Hazard

Management Plan is given final FAA approval and returned to the airport operator for inclusion in its Airport Certification Manual and implementation.

- (d) The signature level for both letters is at the discretion of the FAA Regional Office.

- b. **Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-Listed Threatened and Endangered Species and Species of Special Concern on Airports.** The airport's AOA is an artificial environment that has been created and maintained for aircraft operations. Because an AOA can be markedly different from the surrounding native landscapes, it may attract wildlife species that do not normally occur, or that occur only in low numbers in the area. Some of the grassland species attracted to an airport's AOA are at the edge of their natural ranges, but are attracted to habitat features found in the airport environment. Also, some wildlife species may occur on the airport in higher numbers than occur naturally in the region because the airport offers habitat features the species prefer. Some of these wildlife species are State-listed threatened and endangered species or have been designated by State resource agencies as species of special concern.

Many State wildlife agencies have requested that airport operators facilitate and encourage habitat on airports for state-listed threatened and endangered species or species of special concern. State-Listed threatened and endangered species and species of special interest are not afforded the level of protection of federally-listed species. These species, or the habitat needed to support them should not be allowed on airport property if direct or associated hazards are caused by their promotion in the airfield environment. Managing the on-airport environment to facilitate or encourage the presence of hazardous wildlife species can create conditions that are incompatible with, or pose a threat to, aviation safety.

3.4. NATIONAL ENVIRONMENTAL POLICY ACT REVIEW. The FAA's approval of a draft Plan is covered by the categorical exclusion in FAA Order 1050.1E, paragraph 308e. Before the FAA approves a draft Plan, the FAA must determine whether or not the draft involves extraordinary circumstances (see FAA Order 1050.1E, paragraphs 303c and 304).

- a. If a draft does not involve extraordinary circumstances, the FAA may categorically exclude the Plan under FAA Order 1050.1E, paragraph 308e.
- b. If a draft involves extraordinary circumstances, the FAA may require the airport sponsor to prepare an Environmental Assessment, or the FAA may prepare an Environmental Impact Statement.

Once a draft Plan is approved, the plan is returned to the airport sponsor for inclusion in the airport's Airport Certification Manual and is enforceable.

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SECTION 4.

PROTOCOL FOR CONTINUAL MONITORING

4.1. INTRODUCTION. Upon completion and approval of an Assessment and Plan, certificate holders should consider implementing a continual monitoring program for wildlife hazards. Recurrent wildlife monitoring would be outlined in the certificate holder's Plan and ACM. The goal of systematic, long-term wildlife hazard monitoring in an airport environment is to identify changes to wildlife composition, numbers, attractants, travel corridors and the general airport environment in a timely manner that can affect the presence or behavior of wildlife. Continual monitoring would enhance safety because it allows the airport operator to regularly determine trends in wildlife fluctuations and target mitigation practices to reduce the possibility of strikes. The certificate holder can use this information to quickly and efficiently implement mitigation techniques and evaluate the efficacy of its mitigation program. Ultimately, the frequent hazard identification and adaptable mitigation would reduce the likelihood of wildlife strikes. Additionally, continual monitoring should decrease the time, effort, personnel hours, and money spent on mitigation because hazards would be identified before they pose a high risk.

In contrast to an assessment or inventory of wildlife hazards in an airport environment, a monitoring program over time assesses changes and trends of the resources. Consideration should be given to data points and techniques tested and incorporated into an airport's Assessment for use in its long term monitoring protocol. Ultimately, the techniques used for long term monitoring may change over time dependent on the airports goals/ management objectives, personnel changes, availability of improved methodologies/ equipment or recommendations based on systematic evaluation of the monitoring program.

4.2 CONTINUAL MONITORING PROTOCOL. The monitoring should consist of monthly wildlife surveys and identification of significant changes to natural/ artificial habitats and other attractants. This monitoring would best be conducted by a Qualified Airport Wildlife Biologist.

a. Avian Surveys.

- (1) Twelve months data collection
- (2) Minimum one survey/ month for each of the survey points during the diurnal periods of morning, midday and evening; unless the Assessment, strike records or monitoring data justifies the elimination of a survey time period (i.e., elimination of midday surveys for example)⁷.

b. Mammalian Surveys.

⁷ It may be beneficial to increase avian surveys during spring and fall migrations.

- (1) Twelve months data collection.
- (2) Airports that have documented hazardous terrestrial mammals (i.e., deer, canids) should conduct a minimum of one survey/ month. Airports without recognized terrestrial mammal hazards should conduct a minimum of quarterly surveys throughout the year.

c. Monitoring of Airport Procedures. Monitoring of airport procedures should include:

- (1) ATC and airport “event logs” or wildlife management, patrol, monitoring logs
- (2) Wildlife/aircraft strike reports
- (3) Federal/State Depredation Permit use; Special Permit use (e.g., Eagle Disturbance or Nest Removal Permits)

4.3 CONTINUAL MONITORING ANNUAL REPORT. As part of a continual monitoring program, a certificate holder may choose to prepare an annual report to best evaluate the efficacy of its wildlife mitigation program summarizing:

- (1) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences
- (2) Identification and location of features on and near the airport that attract wildlife
- (3) Description of wildlife hazards to air carrier operations
- (4) Description of wildlife strikes during the year
- (5) Discussion of any significant modifications on or near the airport property
- (6) Summary of ATC and airport “event logs” or wildlife management, patrol, monitoring logs
- (7) Summary of Federal/State Depredation Permit use; Special Permit use (e.g., Eagle Disturbance or Nest Removal Permits)

APPENDIX A: Airport Wildlife Hazard Site Visit Checklist

Wildlife Hazard Site Visits must be conducted by a Qualified Airport Wildlife Biologist to provide an airport a quick analysis and actionable information concerning wildlife hazards that allows the airport to expedite the mitigation of these hazards. A Site visit can be used to investigate a triggering event or other significant event and determine whether an existing Plan adequately addresses the incident and if applicable, the necessity of an Assessment.

During the Site visit, the Qualified Airport Wildlife Biologist collects and compiles information on the airport's wildlife hazard history, documented and suspected wildlife hazards, habitat attractants, control activities, airport operations procedures, communications of hazards through ATC and pilots, aircraft operations and scheduling. A Site visit is typically conducted over a period of one to three days during which a Qualified Airport Wildlife Biologist evaluates the habitat on and surrounding the airport and records direct or indirect wildlife observations; and reviews the current Plan, current wildlife management activities and airport wildlife strike data.

The following is a Checklist that can be utilized to insure a complete and detailed site visit. The checklist can also be used to review the site visit protocol and report.

The following is a Checklist that can be utilized to insure a complete and detailed Site visit. The checklist can also be used to review the Site visit protocol and report.

Airport Wildlife Hazard Site Visit Checklist

Airport Name:		
Date of Site Visit:		Time:
Airport Representative:		
Qualified Airport Wildlife Biologist:		
	Yes/No	Comments/Observations
Information review		
Personnel and departments responsible for airport ops		
Type of airport/annual movements		
Recent improvements		
Strike records (in database or airport records)		
Depredation permits		
Review of habitat management activities		
Mowing		
Clearing ditches of vegetation		
Tree removal		
Other		
Review wildlife management activities		
Pyrotechnics		
Fencing		
Wildlife removal (lethal, trapping, etc.)		
Nest removal		
Other		
Review Plan (if applicable)		
Observe features on airport property that may attract wildlife		
Wetlands		
Ditches		
Stormwater Treatment Areas		
Forested/Shrub Areas		
Abandoned Structures		
Construction Sites/Debris		

Airport Wildlife Hazard Site Visit Checklist (page 2)

Observe features adjacent to airport property that may attract wildlife (5,000 ft 10,000 ft 5 miles)		
Wetlands		
Agriculture		
Forested/Shrub Areas		
Golf Courses		
Other		
Observe and identify wildlife species and/or sign		
List all wildlife observed		Please list on separate data sheet
List all wildlife sign observed		Please list on separate data sheet
State and/or Federally Listed Species		
Site Visit Report		
General airport information		
Strike data analysis		
List of bird/mammal species observed and times of observations		
State and federal status of species		
Description of habitat features (natural and man-made) that may attract wildlife on and near the airport		
Map of airport with location of wildlife attractants on or near airport and observations		
Recommended actions* for reducing identified wildlife hazards to air carrier operations		
Recommendation regarding whether a 12-month wildlife hazards assessment is necessary		

*Recommendations can include (but are not limited to) the following:

- Clearing vegetation in ditches to improve drainage and reduce nesting habitat
- Mowing grass to recommended heights
- Tree removal inside the perimeter fence
- Repair breaches in perimeter fence when observed
- Keep vegetation maintained along fencing
- Install perching deterrents on signs and lights
- Use pyrotechnics to disperse hazardous wildlife
- Trap and remove hazardous mammal species (beavers, feral hogs, etc.)

APPENDIX B: Airport Wildlife Hazard Assessment and Report Checklist

A Wildlife Hazard Assessment (Assessment) is a 12-month assessment of wildlife and wildlife attractants on or near an airport. An Assessment provides the baseline data and understanding of wildlife hazards and trends for preparing a Wildlife Hazard Management Plan (Plan).

The following is a Checklist that can be utilized to insure a complete and detailed Assessment. The checklist can also be used to review the Assessment protocol and report.

DRAFT

Airport Wildlife Hazard Assessment and Report Checklist

Airport Name:
Airport Representative:
Qualified Airport Wildlife Biologist:
Assessment Dates (Initiation/Completion):
Assessment Report – Date Completed:
Assessment Report – Date Approved by FAA:

	Yes/No	Comments/Observations
ASSESSMENT CHECKLIST		
Analysis of the event or circumstances that prompted the assessment (14 CFR 139.337 (c)(1))		
General Airport Information Review		
Personnel and departments responsible for airport ops		
Type of airport/annual movements		
Recent improvements		
Strike records (in database or airport records)		
Depredation permits		
Wildlife hazard management plan (if applicable)		

Airport Wildlife Hazard Assessment and Report Checklist (page 2)

Review of Habitat Management Activities	Yes/No	Comments/Observations
Mowing		
Drainage maintenance/clearing		
Tree removal		
Other		
Review of Wildlife Management Activities		
Harassment		
Exclusion		
Wildlife removal (lethal, trapping, etc.)		
Nest removal		
Other		
Identification and location of features on airport that attract wildlife (14 CFR 139.337 (c)(3))		
Wetlands		
Drainages		
Agriculture		
Water impoundments/ponds/streams/marine		
Forested/Shrub Areas		
Structures/towers/antennas		
Construction Sites/Debris		

Airport Wildlife Hazard Assessment and Report Checklist (page 3)

Identification and location of features near airport (within 5 miles) that attract wildlife (14 CFR 139.337 (c)(3))	Yes/No	Comments/Observations
Wetlands		
Ditches		
Agriculture		
Water impoundments/ponds/streams/marine		
Landfill		
Forested/Shrub Areas		
Golf Courses		
Other		
Identification of wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences (14 CFR 139.337 (c)(2))		
Assessment = Minimum of 12 consecutive months		
Locate standardized observation points on airport (observation points off airport are optional) to adequately observe wildlife and their movements on all parts of AOA.		
Point count surveys conducted morning, midday and evening		
Avian surveys conducted a minimum of twice monthly		
Mammal surveys conducted a minimum of once monthly		

Airport Wildlife Hazard Assessment and Report Checklist (page 4)

	Yes/No	Comments/Observations
Record results of point count surveys and all general wildlife observations (including wildlife sign)		
Small mammal trapping (optional)		
Record presence of state and/or federally listed species		
REPORT SECTION-(Assessment Report <u>must</u> have a Methods, Results and Recommendations section to provide required information)		
Executive summary and qualified airport wildlife biologist qualifications (recommended)		
Analysis of the event or circumstances that prompted the study (14 CFR 139.337 (c)(1))		
General airport information (refer to General Airport Information Review section at beginning of appendix)		
Strike data spreadsheet		
Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences (14 CFR 139.337 (c)(2))		
Description of avian and mammal survey methodologies (minimum survey methodologies described above)		
List and description of bird/mammal species observed		
State and federal status of species		

Airport Wildlife Hazard Assessment and Report Checklist (page 5)

Map of airport with location of observation points		
Identification and location of features on and near the airport that attract wildlife (14 CFR 139.337 (c)(3))		
Description of habitat features (natural and man-made) that may attract wildlife on and near the airport		
Map of airport with location of wildlife attractants on airport property		
Map of airport with location of wildlife attractants near airport (within 5,000 ft, 10,000 ft, and 5 miles).		
Description of the wildlife hazards to air carrier operations (14 CFR 139.337 (c)(4))		
List the wildlife hazards that have been observed that are unique to this airport		
Recommended actions for reducing identified wildlife hazards to air carrier operations (14 CFR 139.337 (c)(5))		
List of prioritized recommendations* that are unique to this airport (is a Section 7 Consultation required based on these recommendations?)		

*Recommendations can include (but are not limited to) the following:

- Clearing vegetation in ditches to improve drainage and reduce nesting habitat
- Mowing grass to recommended heights
- Tree removal inside the perimeter fence
- Repair breaches in perimeter fence when observed
- Keep vegetation maintained along fencing
- Install perching deterrents on signs and lights
- Use pyrotechnics to disperse hazardous wildlife
- Trap and remove hazardous mammal species (beavers, feral hogs, etc.)

APPENDIX C: Airport Wildlife Hazard Management Plan Checklist

A Wildlife Hazard Management Plan (Plan) is a document that is prepared by the airport if the FAA determines a Plan is necessary based on the results of an Assessment. The goal of the Plan is to minimize risk to aviation safety, airport structures, or equipment, or human health posed by populations of hazardous wildlife on and around the airport. The items that must be included in the plan are listed in 14 CFR 139.337(f). These items are listed and further described in the list below.

The following is a Checklist that can be utilized to insure a complete and detailed Plan. The checklist can also be used to review the Plan contents.

DRAFT

Airport Wildlife Hazard Management Plan Checklist

Airport Name:
Airport Representative:
Plan Preparation Date:
Plan FAA Review Date:
FAA Reviewer:

	Yes/No	Comments/Observations
Brief introduction describing hazards identified in the Assessment and the wildlife attractants on and near the airport		
A list of individuals having authority and responsibility for implementing each aspect of the plan (14 CFR 139.337 (f)(1))		
Decision making roles and responsibilities including: Airport Director, Wildlife Coordinator, Operations Supervisor, Maintenance Supervisor, Security Dept., Planning Dept., Finance Dept., Wildlife Hazard Working Group		
Other		
A list prioritizing the following actions identified in the Assessment and target dates for their initiation and completion (14 CFR 139.337 (f)(2)):		
(i) Wildlife population management (list of problem wildlife populations and mitigation actions/target dates)		
(ii) Habitat modification (list of wildlife attractants and mitigation actions/target dates)		
(iii) Land use changes (list of land use on and near airport that attract wildlife and mitigation actions/target dates)		
Ongoing data collection and analysis		
Recordkeeping		
Other		
Do any proposed activities require NEPA review or Section 7 Consultation with USFWS?		

Airport Wildlife Hazard Management Plan Checklist (page 2)

	Yes/No	Comments/Observations
Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits (14 CFR 139.337 (f)(3)) (Copies of all valid permits must be included in Plan)		
Federal depredation permit		
State game hunting permit		
Incidental take permits		
Pesticide-use license/permits		
Other		
Identification of resources that the certificate holder will provide to implement the plan (14 CFR 139.337 (f)(4))		
Personnel		
Field identification guides		
Pyrotechnics		
Vehicles		
Pesticides and application equipment		
Other (binoculars, traps, guns, radios, etc.)		
Sources of supplies		
Procedures to be followed during air carrier operations that at a minimum includes (14 CFR 139.337 (f)(5)):		
(i) Designation of personnel responsible for implementing the procedures (Wildlife patrol staffing and primary responsibilities, hours of availability, etc.)		
(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 <ul style="list-style-type: none"> • Routine inspection procedures, • Documentation of inspections and observations • Runway/taxiway sweeps, perimeter fence inspections 		

Airport Wildlife Hazard Management Plan Checklist (page 3)

	Yes/No	Comments/Observations
(iii) Wildlife hazard control measures <ul style="list-style-type: none"> • Monitoring • Recordkeeping, • Dispersal/harassment procedures • Procedures for wildlife control during different seasons and heavy air traffic times) 		
(iv) Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower <ul style="list-style-type: none"> • Training in communication procedures • Procedures for immediate coordination and response to pilot-reported wildlife strikes or observations 		
Other		
Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following a triggering event, including 14 CFR 139.337 (f)(6)):		
(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 <ul style="list-style-type: none"> • One or more meetings with Wildlife Hazard Working Group to review Plan • Procedures for documentation of wildlife observations and wildlife control activities • Protocol to meet training requirements 		
A training program conducted by a qualified airport wildlife biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the wildlife hazard management plan (14 CFR 139.337 (f)(7))		
Certification that training meets requirements in AC 150/5200-36A		
Training participation documentation		

APPENDIX D: Airport Wildlife Hazard Continual Monitoring and Report Checklist

Upon completion and approval of an Assessment and Plan, airports can implement a continual monitoring program that will be outlined in their Plan and ACM. Continual monitoring is an ongoing assessment of wildlife hazards at an airport that results in an annual report. The annual report will include recommendations for wildlife hazard mitigation and data on the effectiveness of mitigation programs at the airport and seasonal trends of species behavior and utilization of the airport.

The following is a Checklist that can be utilized to insure a complete and detailed Continual Monitoring program. The checklist can also be used to review the monitoring protocol and report.

DRAFT

Airport Wildlife Hazard Continual Monitoring and Report Checklist

Airport Name:
Airport Representative:
Qualified Airport Wildlife Biologist:
Initial Assessment Dates (Initiation/Completion):
Continual Monitoring Dates (Initiation/Completion):

	Yes/No	Comments/Observations
Assessment Checklist		
General Airport Information Review		
Recent improvements, ALP or MP changes		
Strike records (database/airport records)		
Depredation permits (current?)		
Review of Plan		
Review of Habitat Management Activities		
Mowing		
Clearing ditches of vegetation		
Tree removal		
Other		
Review of Wildlife Management Activities		
Pyrotechnics		
Fencing		
Wildlife removal (lethal, trapping, etc.)		
Nest removal		
Other		
Identification and location of features on airport that attract wildlife		
Wetlands		
Ditches		
Agriculture		
Stormwater Treatment Areas		
Forested/Shrub Areas		
Abandoned Structures		
Construction Sites/Debris		

Airport Wildlife Hazard Continual Monitoring and Report Checklist (page 2)

	Yes/No	Comments/Observations
Identification and location of features near airport (within 5 miles) that attract wildlife		
Wetlands		
Ditches		
Agriculture		
Stormwater Treatment Areas		
Landfill		
Forested/Shrub Areas		
Golf Courses		
Other		
Identification of wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences		
Minimum of 12 months data collection		
Locate standardized observation points on airport (observation points off airport are optional) to adequately observe wildlife and their movements on all parts of AOA. Use points established during initial Assessment is recommended		
Point count surveys conducted morning, midday and evening (unless Assessment, strike data, or monitoring data justifies the elimination of a survey time period)		
Avian surveys conducted a minimum of once monthly		
Mammal surveys conducted once a month for airports with documented hazardous terrestrial mammals OR....		
Mammal surveys conducted quarterly for airports without recognized terrestrial mammal hazards		
Record results of point count surveys and all general wildlife observations (including wildlife sign)		
Small mammal trapping (optional)		
Record presence of state and/or federally listed species		

Airport Wildlife Hazard Continual Monitoring and Report Checklist (page 3)

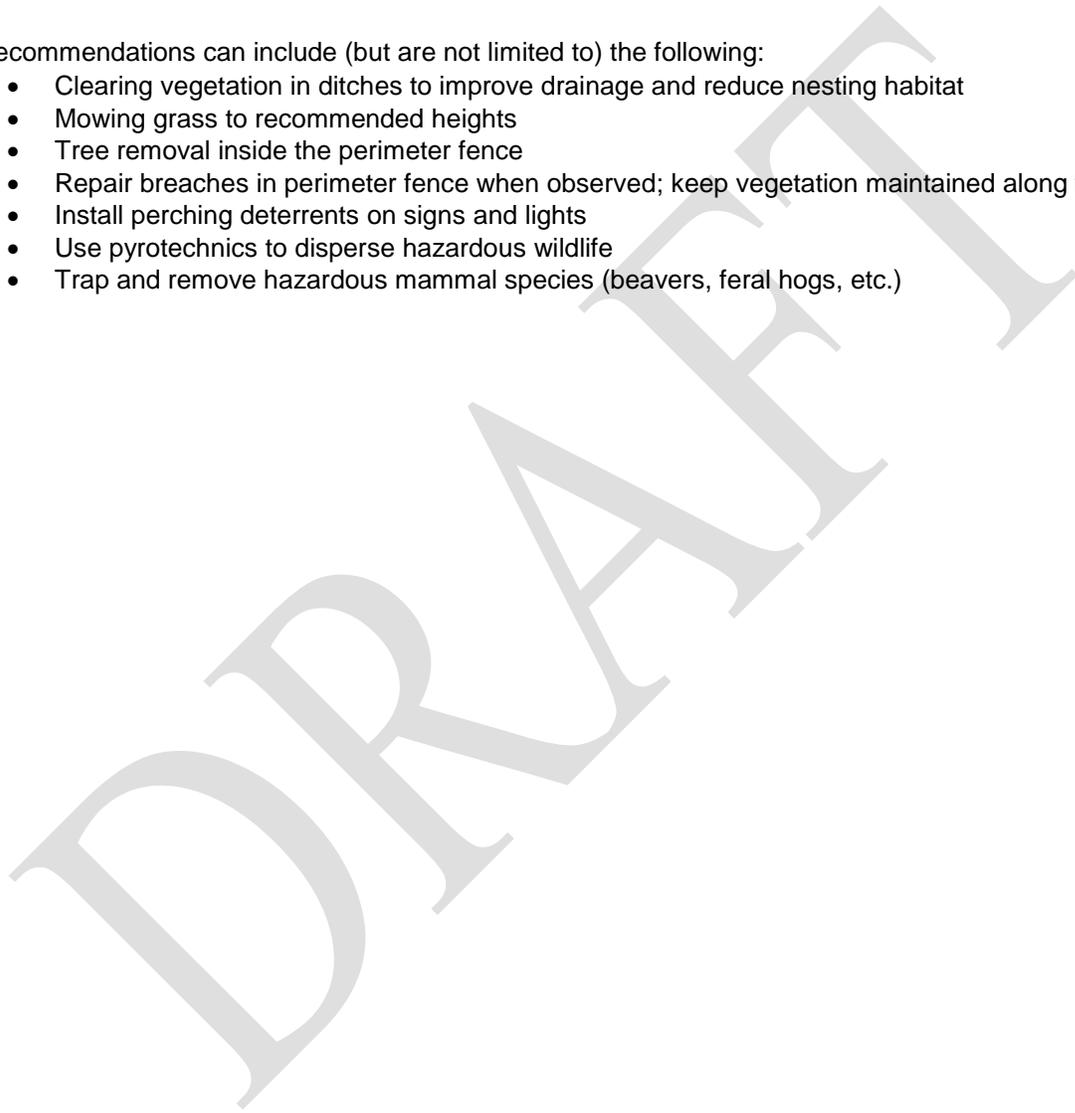
	Yes/No	Comments/Observations
Report Checklist		
General airport information (refer to General Airport Information Review section at beginning of appendix)		
Identification and location of features on and near the airport that attract wildlife		
Description of habitat features (natural and man-made) that may attract wildlife on and near the airport		
Map of airport with location of wildlife attractants on airport property		
Map of airport with location of wildlife attractants near airport (within 5,000 ft, 10,000 ft, and 5 miles).		
Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences		
Description of avian and mammal survey methodologies (minimum survey methodologies described above)		
List and description of bird/mammal species observed		
State and federal status of species		
Map of airport with location of observation points		
Description of the wildlife hazards to air carrier operations		
List the wildlife hazards that have been observed that are unique to this airport		
Description of wildlife strikes during the year and table depicting strike data		
Summary of ATC and airport records including wildlife observations, patrol, control, and monitoring		
Summary of Federal/State depredation permit use; special permit use (Eagle Disturbance or Nest Removal permits		

Airport Wildlife Hazard Continual Monitoring and Report Checklist (page 4)

Recommended actions for reducing identified wildlife hazards to air carrier operations		
Recommendation regarding whether or not modifications should be made to existing Plan		

*Recommendations can include (but are not limited to) the following:

- Clearing vegetation in ditches to improve drainage and reduce nesting habitat
- Mowing grass to recommended heights
- Tree removal inside the perimeter fence
- Repair breaches in perimeter fence when observed; keep vegetation maintained along fencing
- Install perching deterrents on signs and lights
- Use pyrotechnics to disperse hazardous wildlife
- Trap and remove hazardous mammal species (beavers, feral hogs, etc.)



APPENDIX E: PROCUREMENT OF AIRPORT WILDLIFE BIOLOGISTS

This Appendix contains information about qualified airport wildlife biologists for the conduct of Wildlife Hazard Assessment (and Related Services) procurement.

1. Procurement Method: Airports must use the competitive proposal method as defined in 49 CFR §18.36 (d)(3) when procuring airport wildlife biologists for AIP-funded procurements.
2. Required Federal Contract Provisions. The procurements must follow all other procurement and contracting requirements for AIP projects, including all required federal contract provisions.
3. Proposal Contents. The proposals from the vendors must contain the following information:
 - a. Relevant references and evidence of experience in assessing and managing wildlife hazards.
 - b. A Statement of Qualifications (SOQ) that includes the documentation verifying the Qualified Airport Wildlife Biologist conducting the WHA meets the requirements of AC 150/5200-36A as described in Section B (above). Sponsors MAY require:
 1. Copies of college transcripts,
 2. Copies of certificates of training/attendance at approved courses and/or Bird Strike Committee meetings,
 3. Letter from FAA approving initial WHA
 4. Letter from qualified mentor
 - c. Project Experience, including descriptions of previous airport projects and references.
 - d. Firm's Organizational Chart. The organizational chart with the key personnel who will be working on the project along with their resumes and estimated percentage of time each person will have available to spend on the project should be submitted.
 - e. Vendors must submit a detailed Statement of Project Approach describing the work to be conducted to the sponsor for review prior to beginning the WHA. The project approach should demonstrate an understanding of the project and should include, in detail, how the Qualified Airport Wildlife Biologist intends to meet the minimum requirements detailed in Section 2.5 of this AC.

